

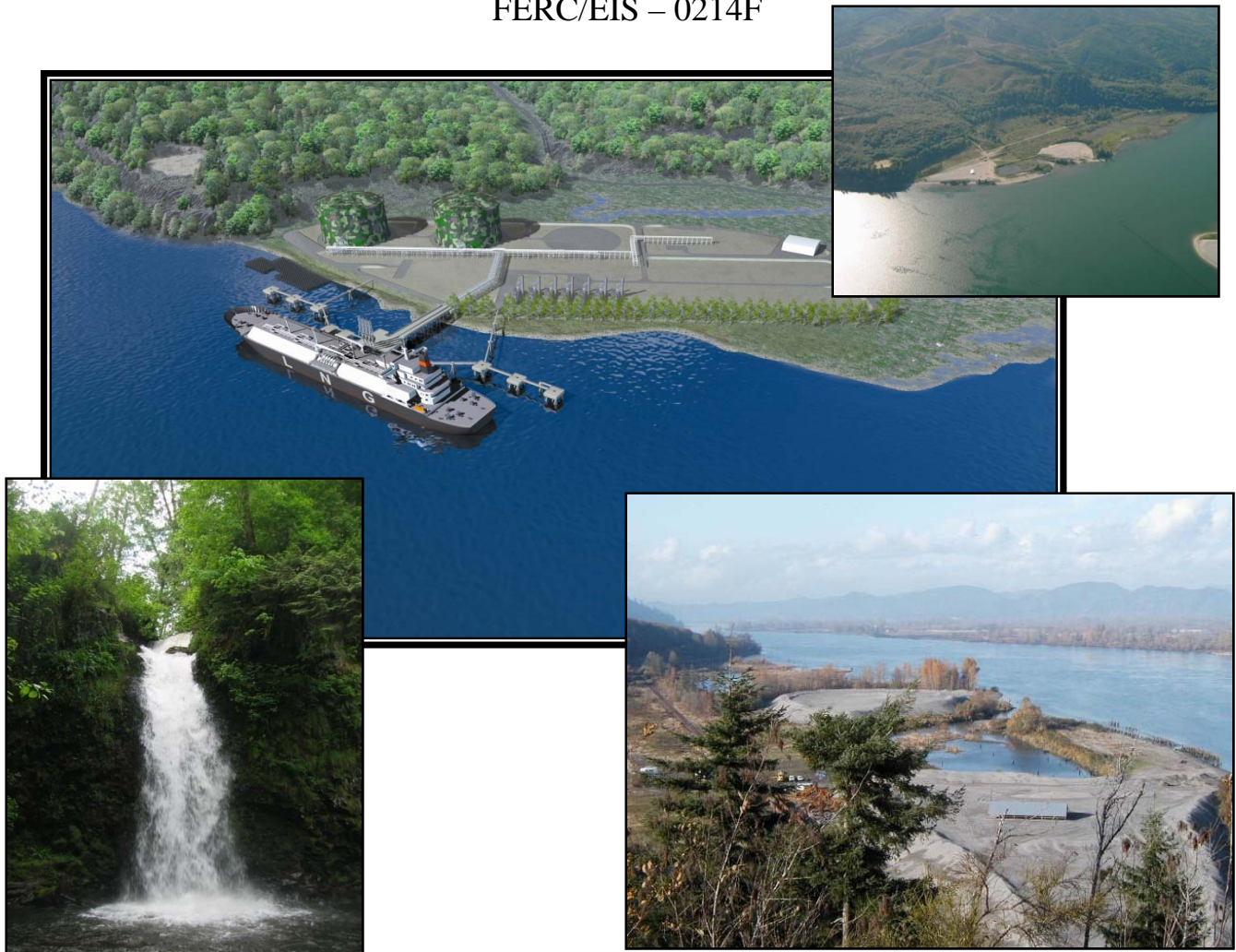
Final Environmental Impact Statement

Bradwood Landing Project

Bradwood Landing, LLC
NorthernStar Energy, LLC

Docket No. CP06-365-000
Docket No. CP06-366-000

FERC/EIS – 0214F



Federal Energy Regulatory Commission
Office of Energy Projects
Washington, DC 20426



Cooperating Agencies:



**US Army Corps
of Engineers**



June 2008

FEDERAL ENERGY REGULATORY COMMISSION

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FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

OFFICE OF ENERGY PROJECTS

In Reply Refer To:
OEP/DG2E/Gas 3
Bradwood Landing LLC
NorthernStar Energy LLC
Docket Nos. CP06-365-000 and
CP06-366-000

FERC/EIS-0214F

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has prepared this final Environmental Impact Statement (EIS) for the construction and operation of the liquefied natural gas (LNG) import terminal and natural gas pipeline facilities, referred to as the Bradwood Landing Project, proposed by Bradwood Landing LLC and NorthernStar Energy LLC (collectively referred to as NorthernStar) in the above-referenced dockets. The Bradwood Landing Project facilities would be located in Clatsop and Columbia Counties, Oregon, and Cowlitz County, Washington.

This final EIS was prepared to satisfy the requirements of the National Environmental Policy Act (NEPA). The U.S. Department of the Army Corps of Engineers (COE), U.S. Department of Homeland Security Coast Guard (Coast Guard), and the Pipeline and Hazardous Materials Safety Administration of the U.S. Department of Transportation (DOT) are cooperating agencies for the development of the EIS. A cooperating agency has jurisdiction by law or special expertise with respect to potential environmental impacts associated with the proposal and is involved in the NEPA analysis.

Based on the analysis included in the EIS, the FERC staff concludes that the proposed action would have limited adverse environmental impacts. However, if the Bradwood Landing Project is constructed and operated in accordance with applicable laws and regulations, and with implementation of NorthernStar's proposed mitigation measures, and the additional mitigation measures recommended by staff, environmental impacts would be substantially reduced.

The purpose of the Bradwood Landing Project is to provide a new source of natural gas to the Pacific Northwest through importing LNG. LNG is natural gas that has been turned into a liquid state by cooling it to about -260 degrees Fahrenheit to reduce its volume for transport in specially designed carriers some distance across oceans from its point of origin to the proposed LNG import terminal. NorthernStar would store the LNG at its terminal, vaporize the LNG back into natural gas, and provide up to 1.3 billion cubic feet per day of natural gas to the region through its sendout pipeline and interconnects at two industrial facilities, an intrastate pipeline, and an interstate pipeline system.

The EIS addresses the potential environmental effects associated with the construction and operation of the following facilities located at the proposed Bradwood Landing LNG terminal, at Columbia River Mile 38, in Clatsop County, Oregon:

- a 58-acre maneuvering area off the federally-maintained Columbia River navigation channel, and a single berth capable of receiving and unloading LNG carriers with cargo capacities ranging from 100,000 to 200,000 cubic meters (m³);
- a set of four 16-inch-diameter LNG unloading arms at the berth, and a 1,240-foot-long 32-inch-diameter cryogenic LNG transfer pipeline and 6-inch-diameter LNG recirculation cooldown pipeline from the berth to the storage tanks;
- two 160,000 m³ insulated LNG storage tanks;
- a vapor handling system and vaporization equipment, including seven submerged combustion vaporizers capable of regasifying the LNG for sendout through a transfer meter station; and
- ancillary utilities, service buildings, and associated safety and security systems.

The EIS also addresses the potential environmental effects associated with the construction and operation of NorthernStar's proposed sendout pipeline and associated facilities, including:

- a 36.3-mile-long underground, high-pressure steel sendout pipeline consisting of approximately 18.9 miles of 36-inch-diameter pipeline in Clatsop and Columbia Counties, Oregon and 17.4 miles of 30-inch-diameter pipeline in Columbia County, Oregon and Cowlitz County, Washington; and
- associated facilities, including five meter and regulation stations, four interconnects, two pig¹ launchers, and two pig receivers.

The final EIS has been placed in the public files of the FERC and is available for distribution and public inspection at:

Federal Energy Regulatory Commission
Public Reference Room
888 First Street N.E., Room 2A
Washington, DC 20426
(202) 502-8371

Only volume 1 of the final EIS, containing text of the analysis, was printed in hard copy. Volume 2, containing the appendices, was produced as .pdf files on a compact disk (CD) that can be read by a computer with a CD-ROM drive. A limited number of hard copies and CDs of the final EIS are available from the FERC's Public Reference Room, identified above. This final

¹ A pig is an internal tool used to clean and dry a pipeline and/or to inspect it for damage or corrosion.

EIS is also available for public viewing on the FERC's Internet website at www.ferc.gov, via the eLibrary link.

Copies of the final EIS have been mailed to federal, state, and local agencies; elected officials; Indian tribes and Native American organizations with an interest in the project area; interveners; regional environmental organizations and public interest groups; affected landowners; local libraries and newspapers; and other interested parties. Hard copies of volume 1 were mailed to those who specifically requested them, while all others on the mailing list were sent both volumes of the EIS on CDs.

Additional information about the project is available from the Commission's Office of External Affairs at **1-866-208-FERC** (3372). The administrative public record for this proceeding to date is on the FERC Internet website (<http://www.ferc.gov>). Go to Documents & Filings and choose the eLibrary link. Under eLibrary, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (e.g., CP06-365). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at: FERCOnlineSupport@ferc.gov or toll free at 1-866-208-3676, or for TTY call 202-502-8659. The eLibrary link on the FERC Internet website also provides access to the texts of formal documents issued by the Commission, such as orders, notices, and rulemakings.

In addition, the Commission now offers a free service called eSubscription that allows you to keep track of all formal issuances and submittals in specific dockets. This can reduce the amount of time you spend researching proceedings by automatically providing you with notification of these filings, document summaries, and direct links to the documents. To register for this service, go to the eSubscription link on the FERC Internet website (<http://www.ferc.gov/docs-filing/esubscription.asp>).

Kimberly D. Bose,
Secretary

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Final Environmental Impact Statement

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
µg/g	micrograms per gram
µg/m ³	micrograms per cubic meter
µPa	microPascal
2006 IBE	2006 International Building Code
ABSG	ABSG Consulting, Inc.
ACDP	Air Contaminant Discharge Permit
ACHP	Advisory Council on Historic Preservation
ACRR	Astoria and Columbia River Railroad, now called the Portland Western Railroad
AERMIC	American Meteorological Society / Environmental Protection Agency Regulatory Model Improvement Committee
AERMOD	American Meteorological Society / Environmental Protection Agency Regulatory Model Improvement Committee modeling program
AMEC	AMEC Earth and Environmental, Inc.
ANSI	American National Standards Institute
APE	area of potential effect
API	American Petroleum Institute
AQCR	Air Quality Control Region
AQIA	Air Quality Impact Analysis
ASTM	American Society for Testing and Materials
BA	biological assessment
BACT	Best Available Control Technology
Bcfd	billion cubic feet per day
BEA	Bureau of Economic Analysis
bgs	below the ground surface
Bhp	brake horsepower
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practice
BO	Biological Opinion
BOG	boil-off gas
BPA	Bonneville Power Administration
Btu	British thermal unit
Btu/ft ² -hr	British thermal units per square foot per hour
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
Calpine	Calpine Corporation
CCC	Cowlitz County Code
CCS	carbon capture and storage
CEC	California Energy Commission
CEII	critical energy infrastructure information
CEQ	Council on Environmental Quality
Certificate	Certificate of Public Convenience and Necessity
CFR	Code of Federal Regulations
cfs	cubic feet per second
Chevron	Chevron Corporation
CLC	California State Lands Commission
CMMP	<i>Contaminated Materials Management Plan</i>
CMMS	computerized maintenance management system

ACRONYMS AND ABBREVIATIONS (cont'd)

CO	carbon monoxide
CO ₂	carbon dioxide
Coast Guard	U.S. Department of Homeland Security, Coast Guard
COC	Certificate of Compliance
COE	U.S. Army Corps of Engineers
COI	Certificate of Inspection
Commission	Federal Energy Regulatory Commission
Compensatory Mitigation Plan	Preliminary Engineering Design Draft Mitigation Plan
COTP	Captain of the Port
Council	Oregon Energy Facility Siting Council
CPSAR	Cherry Point State Aquatic Reserve
CRBG	Columbia River Basalt Group
CRD	Columbia River Datum
CREST	Columbia River Estuary Study Taskforce
CRITFC	Columbia River Intertribal Fisheries Commission
CRM	Columbia River Mile
CSCSL	Confirmed and Suspected Contaminated Sites List
CSZ	Cascadian Subduction Zone
CWA	Clean Water Act
CZMA	Coastal Zone Management Act of 1972
dB	decibels
dBA	A-weighted scale
DDT	dichloro-diphenyl-trichloroethane
DE	Design Earthquake
DEGADIS	Dense Gas Dispersion Model
Discovery Plan	Plan and Procedures for the Unanticipated Discovery of Cultural Resources and Human Remains
DMD	Dredged Material Disposal
DMEF	Dredged Material Evaluation Framework
DMMU	Dredge Material Management Units
DPS	distinct population segment
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOGAMI	Oregon Department of Geology and Mineral Industries
DOT	U.S. Department of Transportation
Dthd	decatherms per day
DWPA	Drinking Water Protection Area
ECSI	Environmental Cleanup Site Information System
EDNA	environmental designations for noise abatement
EFH	essential fish habitat
EIA	Energy Information Administration
EIS	Environmental Impact Statement
El Paso	El Paso Corporation
EPA	Environmental Protection Agency
EPAct	Energy Policy Act of 2005
ERP	Emergency Response Plan
ESA	Endangered Species Act of 1973
ESD	emergency shutdown

ACRONYMS AND ABBREVIATIONS (cont'd)

ESEE	Energy, social, economic, and environmental
Esperanza	Esperanza Energy LLC
ESUs	evolutionarily significant units
Excelerate	Excelerate Energy
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHO	Flood Hazard Overlay District
FMSC	Federal Maritime Security Coordinator
FS	U.S. Department of Agriculture, Forest Service
FSO	Facility Security Officer
FSRU	floating, storage, and regasification unit
ft/s	feet per second
FWS	U.S. Fish and Wildlife Service
g	gravity
GAO	U.S. General Accounting Office
GBS	gravity-based structure
GHG	greenhouse gas
GHO	Geologic Hazards Overlay District
gpm	gallons per minute
GSI	Groundwater Solutions, Inc.
GSX	Georgia Strait Crossing
GTN	Gas Transmission Northwest Corporation
GW	gigawatt
GWMA	Groundwater Management Area
GWP	global warming potential
HAP	hazardous air pollutant
HCA	high consequence area
HDD	horizontal directional drill
HEL	highly erodible land
HMP	Habitat Mitigation Policy
HRA	Historical Research Associates, Inc.
HUD	U.S. Department of Housing and Urban Development
Hz	hertz
I	Importance Factor
I _p	Importance Factor
ICF	ICF International
IMO	International Maritime Organization
IMPLAN	Impact Analysis for Planning
INGAA	Interstate Natural Gas Association of America
JBHNR	Julia Butler Hansen National Wildlife Refuge
Jordan Cove	Jordan Cove Energy Project, L.P.
KB pipeline	Kelso Beaver Pipeline
Kitimat LNG	Kitimat LNG Inc.
KO	knockout
kPa	kilopascal
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
L _{eq}	daytime and nighttime equivalent sound level

ACRONYMS AND ABBREVIATIONS (cont'd)

$L_{eq(24)}$	the level of steady sound with the same total (equivalent) energy as the time-varying sound of interest, averaged over a 24-hour period
L_{dn}	day-night noise level
LCFRB	Lower Columbia Fish Recovery Board
LCNHT	Lewis and Clark National Historic Trail
LDC	local distribution company
LFL	lower flammability limit
LiDAR	Light Detection and Ranging
Lighting Plan	Lighting Plan for the Bradwood Landing LNG Terminal
LNG	liquefied natural gas
LOI	Letter of Intent
LOR	Letter of Recommendation
LPG	liquid petroleum gas
LWD	Large woody debris
LWDUO	Land and Water Development and Use Ordinance
M	maximum moment magnitudes
m^2	square meter
m^3	cubic meter
m^3/hr	cubic meters per hour
MACT	Maximum Achievable Control Technology
MARAD	U.S. Department of Transportation, Maritime Administration
MARSEC	Maritime Security
MCE	Maximum Considered Earthquake
Mcf	thousand cubic feet
MDth	thousand dekatherms
mgd	million gallons per day
mg/g	milligrams per gram
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
Memorandum	Memorandum of Understanding on Natural Gas Transportation Facilities
MHW	mean high water
MHHW	mean higher high water
Mitigation Plan	Mitigation Plan for the Bradwood Landing Project
MLLW	mean lower low water
MLRA	Major Land Resource Area
MLV	mainline block valve
MMBtu	million British thermal units
MMBtu/hr	million British thermal units per hour
MMcfd	million cubic feet per day
MMPA	Marine Mammal Protection Act
MMscf	million standard cubic feet
MP	milepost
MPRSA	Marine Protection, Research, and Sanctuaries Act
MRL	Method Reporting Limit
MSA	Magnuson-Stevens Fishery Conservation and Management Act
msl	mean sea level
MW	megawatt
mya	million years ago
NAAQS	National Ambient Air Quality Standards

ACRONYMS AND ABBREVIATIONS (cont'd)

NAICS	North American Industry Classification System
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NFPA 59A	National Fire Protection Association, <i>Standards for the Production, Storage, and Handling of LNG</i>
NFWF	National Fish and Wildlife Foundation
NGA	Natural Gas Act
NHPA	National Historic Preservation Act
NMFS	U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
N ₂ O	nitrous oxide
NOA	Notice of Availability
NOI	<i>Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Bradwood Landing LNG Project, Request for Comments on Environmental Issues, and Notice of Joint Public Meeting, and Site Visit</i>
NorthernStar	Bradwood Landing LLC and NorthernStar Energy LLC
Northwest Natural	Northwest Natural Gas Company
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRCS	USDA Natural Resources Conservation Services
NRHP	National Register of Historic Places
NSA	noise-sensitive area
NSPS	New Source Performance Standards
NTU	Nephelometric Turbidity Units
NVIC 05-05	Navigation and Vessel Inspection Circular – Guidance on Assessing the Suitability of a Waterway for Liquefied Natural Gas (LNG) Marine Traffic
NWGA	Northwest Gas Association
NWI	National Wetlands Inventory
NWS	National Weather Service
OAAQS	Oregon Ambient Air Quality Standards
OAR	Oregon Administrative Rule
OBE	Operating Basis Earthquake
OCMP	Oregon Coastal Management Program
OCRM	Office of Coast and Resource Management
ODA	Oregon Department of Agriculture
ODE	Oregon Department of Energy
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODHS	Oregon Department of Human Services
ODLCD	Oregon Department of Land Conservation and Development
ODSL	Oregon Department of State Lands
ODOT	Oregon Department of Transportation
ODWR	Oregon Department of Water Resources
OEP	Office of Energy Projects
OHWM	ordinary high water mark

ACRONYMS AND ABBREVIATIONS (cont'd)

OPS	Office of Pipeline Safety
ORNHIC	Oregon Natural Heritage Information Center
ORS	Oregon Revised Statute
ORV	open rack vaporizer
ORW	Outstanding Resource Water
OSHA	Occupational Safety & Health Administration
OTLC	Oregon Timber and Lumber Company
P&ID	Piping & Instrument Diagrams
PA	Primary Agriculture
PAH	polycyclic aromatic hydrocarbon
Palomar	Palomar Gas Transmission pipeline project
PCB	polychlorinated biphenyls
PCE	Primary Constituent Elements
PCGP	Pacific Connector Gas Pipeline, L.P.
PFMC	Pacific Fishery Management Council
PGA	peak ground acceleration
PG&E	Pacific Gas and Electric
PGE	Portland General Electric Company
pH	hydrogen ion concentration
PHEL	potentially highly erodible land
PHMSA	Pipeline and Hazardous Material Safety Administration
PHS	Priority Habitats and Species
pipeline ESC Plan	Erosion and Sediment Control Plan for Oregon – Bradwood Landing Pipeline
Plan	<i>Upland Erosion Control, Revegetation, and Maintenance Plan</i>
PM _{2.5}	particle matter less than 2.5 microns in diameter
PM ₁₀	particle matter less than 10 microns in diameter
POP	NMFS National Marine Mammal Laboratory's Platform of Opportunity Program
PWRR	Portland & Western Railroad, Inc.
Portland MSA	Portland-Vancouver-Beaverton, Oregon-Washington, Metropolitan Statistical Area
ppb	parts per billion
ppm	parts per million
ppmw	parts per million by weight
PRM Plan	Paleontological Resources Mitigation Plan
Procedures	<i>Wetland and Waterbody Construction and Mitigation Procedures</i>
PSD	Prevention of Significant Deterioration
PSE	Puget Sound Energy, Inc.
PSEL	plant site emission limit
PHSA	Probabilistic Seismic Hazard Analysis
psi	pounds per square inch
psig	pounds per square inch gauge
Quest	Quest Consultants, Inc.
RCRIS	Resource Conservation and Recovery Information System
RCW	Revised Code of Washington
REC	Recognized Environmental Concerns
REX	Rockies Express Pipeline, LLC
RFPD	Rural Fire Protection District
RHA	Rivers and Harbors Act
Rhea	Rhea Environmental Consulting, LLC

ACRONYMS AND ABBREVIATIONS (cont'd)

RIPD	Resource - Industrial-Planned Development
RMP	Risk Management Plan
RMS	root mean square
RMT	Regional Management Team
RPT	rapid phase transition
RR	Rural Residential
RV	recreational vehicle
SAP	<i>Sampling and Analysis Plan</i>
SCV	submerged combustion vaporizer
Secretary	Secretary of the Commission
SEI	Salmon Enhancement Initiative
SEF	Sediment Evaluation Framework
SEPA	State Environmental Policy Act
SER	significant emission rate
SES	Sound Energy Solutions
SHPO	State Historic Preservation Office
SIL	Significant Impact Levels
SMP	Shoreline Master Program
SO	Shoreland Overlay District
SO ₂	sulfur dioxide
SO _x	sulfur oxides
SoCal	Southern California Gas Company
SOLAS	<i>International Convention for the Safety of Life at Sea</i>
SOPEP	<i>Shipboard Oil Pollution Emergency Plan</i>
Spectra	Spectra Energy Transmission Pipeline System
Squirt	Screening Quick Reference Tables
SSE	Safe Shutdown Earthquake
SSURGO	Soil Survey Geographic Database
STV	shell and tube vaporizer
SWCA	SWCA Environmental Consultants
SWCAA	Southwest Clean Air Agency
SWPPP	Construction Stormwater Pollution Prevention Plan for Washington – Bradwood Landing Pipeline
TACT	Typically Achievable Control Technology
Tcf	trillion cubic feet
TEL	Threshold Effects Level
terminal ESC Plan	Erosion and Sediment Control Plan – Bradwood Landing Terminal
TMDL	Total Maximum Daily Load
TNT	trinitrotoluene
TOC	total organic carbon
tpy	tons per year
TransCanada	TransCanada Corporation
TSP	total suspended particulates
TSS	total suspended solids
UET	Upper Effects Threshold
UGA	Urban Growth Area
UIC	Underground Injection Control
UPS	uninterruptible power supply
URS	URS Corporation

ACRONYMS AND ABBREVIATIONS (cont'd)

USC	United States Code
USDA-SCS	U.S. Department of Agriculture - Soil Conservation Survey
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VOC	volatile organic compound
V _s	shear velocity
VSO	Vessel Security Officer
W	watt
WAAQS	Washington Ambient Air Quality Standards
WAC	Washington Administrative Code
Wauna Mill	Georgia-Pacific's Wauna paper mill
WCSB	Western Canada Sedimentary Basin
WDE	Washington State Department of Ecology
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WDOH	Washington State Department of Health
WDOT	Washington State Department of Transportation
WEG	wind erodibility group
WEST	West Consultants
WestPac	WestPac Terminals, Inc.
Williams	Williams Companies, Inc.
Williams Northwest	Williams Northwest Pipeline
WNHP	Washington DNR Natural Heritage Program
Woodside	Woodside Energy, Inc
WSA	Waterway Suitability Assessment
WSR	Waterway Suitability Report
WST	Waterway Simulation Technology Inc.
WUTC	Washington Utilities and Transportation Commission

EXECUTIVE SUMMARY

This final environmental impact statement (EIS) for the Bradwood Landing Project, proposed by Bradwood Landing LLC and NorthernStar Energy LLC (collectively referred to as NorthernStar), has been prepared by the staff of the Federal Energy Regulatory Commission (FERC or Commission) to fulfill the requirements of the National Environmental Policy Act of 1969 (NEPA) and the Commission's implementing regulations under Title 18 Code of Federal Regulations Part 380. The purpose of this document is to inform the public and the permitting agencies about the potential adverse and beneficial environmental impacts of the proposed project and its alternatives, and to recommend mitigation measures that would avoid or reduce any significant adverse impacts.

The FERC is the federal agency responsible for authorizing onshore liquefied natural gas (LNG) import and interstate natural gas transmission facilities under the Natural Gas Act, and is the lead federal agency for the preparation of this EIS in compliance with the requirements of the NEPA. The U.S. Department of Homeland Security, Coast Guard (Coast Guard) and the U.S. Army Corps of Engineers (COE) are cooperating agencies for the development of this EIS. The Coast Guard has authority over the safety and security of LNG carriers, and the waterway for LNG marine traffic. The Coast Guard determines the suitability of the waterway for LNG marine traffic by issuing a Letter of Recommendation (LOR). The COE has authority to issue dredging and wetland permits for the project under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act (CWA).

The Pipeline and Hazardous Materials Safety Administration of the U.S. Department of Transportation (DOT), is participating as a cooperating agency in accordance with an interagency agreement between the DOT, the FERC, and the Coast Guard. The DOT has authority to enforce safety regulations and standards for the LNG terminal beginning at the last valve before the storage tanks and the design and operation of the natural gas sendout pipeline.

PROPOSED ACTION

The purpose of the Bradwood Landing Project is to import and store LNG to provide a new source of natural gas to the Pacific Northwest. LNG is natural gas cooled to about -260 degrees Fahrenheit (F) to reduce its volume so that it can be transported long distances across oceans in specially designed ships from its point of origin to foreign markets. NorthernStar proposes to provide up to 1.3 billion cubic feet per day of natural gas to the region through interconnects at two industrial facilities, an intrastate pipeline, and an interstate pipeline system.

The waterway for LNG marine traffic would extend from the boundary of the U.S. territorial sea, located 12 nautical miles off the Pacific Coast, up the Columbia River approximately 38 miles to the LNG terminal. The proposed LNG terminal is located at the former townsite of Bradwood, in Clatsop County, Oregon, and would occupy about 40 acres of land within a 411-acre site controlled by NorthernStar. About 46 acres within a 58-acre area in the Columbia River would be dredged to create a ship maneuvering area for the terminal berth. The LNG terminal facilities would include:

- a single ship berth capable of receiving and unloading LNG carriers with cargo capacities ranging from 100,000 to 200,000 cubic meters (m³);
- two 160,000 m³ insulated LNG storage tanks;
- vapor handling system, and vaporization equipment capable of regasifying the LNG for delivery into the natural gas sendout pipeline; and
- piping, ancillary buildings, safety systems, and other support facilities.

The natural gas pipeline facilities would include:

- a 36.3-mile-long, underground, high-pressure steel sendout pipeline consisting of approximately 18.9 miles of 36-inch-diameter pipeline in Clatsop and Columbia Counties, Oregon and 17.4 miles of 30-inch-diameter pipeline in Columbia County, Oregon and Cowlitz County, Washington; and
- associated pipeline support facilities, including five meter and regulation stations, four interconnects, two pig¹ launchers, and two pig receivers.

The sendout pipeline would extend from the LNG terminal to an interconnect with the existing Williams Northwest Pipeline Corporation (Williams Northwest) interstate pipeline system north of Kelso, Washington. Between the LNG terminal and the terminus at the Williams Northwest system, the sendout pipeline would interconnect with Northwest Natural Gas Company's intrastate pipeline system, Georgia Pacific's Wauna paper mill, and Portland General Electric Company's Beaver Power Plant.

In addition to the LNG terminal and natural gas pipeline facilities, the Bradwood Landing Project would require construction of facilities that do not fall under the Commission's jurisdiction. These include electric transmission facilities, three natural gas pipeline laterals, and NorthernStar's Salmon Enhancement Initiative.

PROJECT IMPACTS AND MITIGATION

The major issues identified in our² analysis are geologic hazards, dredging-related impacts, fish entrainment, forest clearing, impacts on residents and river users, and safety. These are discussed below. The final EIS includes 110 recommended measures to mitigate or avoid environmental impacts.

Geology and Soils

The proposed Bradwood Landing LNG terminal is located in an area of a high seismic risk and is susceptible to soil liquefaction during a major earthquake. The critical safety-related components of the facility would be designed to withstand an earthquake of approximately magnitude 9 originating beneath the site on the Cascadian Subduction Zone mega-thrust fault. Measures currently proposed to mitigate soil liquefaction impacts include supporting the LNG tanks and other integral structures on deep foundations and vibroflotation to compact existing soils and new fill. The final engineering design for the LNG terminal would incorporate detailed seismic specifications and other measures to mitigate the impacts of seismic hazards and would be subject to final review and approval by the FERC's Director of the Office of Energy Projects prior to construction. We are also recommending that prior to construction NorthernStar retain the services of an independent Board of Consultants to provide oversight of the design and construction of all civil and structural components of the project with particular emphasis on the seismic design requirements and geological hazard mitigation measures for both the LNG terminal and sendout pipeline.

Landslide areas along the pipeline route would be mitigated by one or more of the following: relocation of the pipeline route; horizontal directional drill crossing of the feature to place the pipeline below potential failure surfaces; and instrumentation of the pipe and/or the surrounding rock or soil to monitor strain in the pipe and movement of the surrounding ground. NorthernStar would conduct additional studies and produce a Final Pipeline Design Geotechnical Report with site-specific mitigation

¹ A pig is an internal tool used to clean and dry a pipeline and/or to inspect it for damage or corrosion.

² The pronouns "our," "we," and "us" refer to the environmental staff of the FERC's Office of Energy Projects.

measures prior to construction which would be subject to review by the Board of Consultants and approval by the Director of OEP.

About 700,000 cubic yards of sediment would be dredged from the Columbia River bottom to create the proposed ship maneuvering area adjacent to the navigation channel. NorthernStar tested samples of sediments from the dredge area. Although some contaminants were detected in the samples, the concentrations were relatively low, and none exceeded screening levels or threshold effects levels used to identify concentrations of concern. The sediments are primarily sand and would settle quickly. As a result, the size of the sediment plume would be small and confined to an area immediately surrounding the dredging site. Modeling conducted by NorthernStar indicates that dredging for the maneuvering area would cause a reduction in stream flow through Clifton Channel and minor changes to the main navigation channel of the Columbia River. NorthernStar prepared a *Shoreline Monitoring Plan* for the LNG terminal to address shoreline erosion that may occur as a result of dredging for the maneuvering basin. NorthernStar proposes to place up to the entire 700,000 cubic yards of dredged material at the terminal site. Any sediments not placed at the terminal site would be deposited at the existing Wahkiakum County Sand Pit site on the northwestern end of Puget Island via a temporary pipeline.

Water and Wetlands

Water would be appropriated from the Columbia River during construction for ground improvement, hydrostatic testing, and general purposes. During operation, river water would be withdrawn for weekly testing of the fire suppression system. Permanent and temporary surface water intakes that withdraw water from the Columbia River would be screened in accordance with the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) and Oregon Department of Fish and Wildlife (ODFW) requirements to minimize impacts on aquatic resources. In addition, ballast and engine cooling water would be taken on during LNG carrier offloading operations. NorthernStar would construct and install a system capable of delivering filtered river water to the LNG carriers. This system would use a screened water intake located at the ship berth that would minimize the entrainment and impingement of juvenile fish. Since the issuance of the draft EIS, NorthernStar has stated that some LNG carriers may arrive at the terminal without the necessary retrofitting in place to allow the use of the screened water supply system. NorthernStar would continue to offer incentive-based contractual agreements for vessels to accommodate the screened water supply system. We are recommending that NorthernStar require that LNG carriers are retrofitted or develop an alternative system for non-retrofitted carriers that would offer similar protection.

LNG carriers that have not been retrofitted to use the proposed screened water supply system could routinely discharge cooling water at the wharf. We are recommending that NorthernStar develop performance standards that address water quality impacts from cooling water discharges at the LNG terminal. Operation of the submerged combustion vaporizers (SCV) at the LNG terminal would generate up to 160 gallons per minute of condensate water. The condensate water would be neutralized and discharged to the Columbia River using an outfall/diffuser system designed to rapidly mix the 68 °F condensate with the river water.

Ninety-four waterbodies would be crossed by the pipeline. The HDD or conventional bore method would be used at up to 23 of the waterbody crossings to avoid or minimize impacts on aquatic resources. Construction of the LNG terminal facilities would result in impacts on about 15 acres of wetlands and, of these, about 13 acres would be permanently lost. Construction of the pipeline facilities would affect about 98 acres of wetlands, while operation of the pipeline would result in the permanent conversion of approximately 15 acres of forested wetlands to other wetland types within the permanent right-of-way. Impacts on wetlands and water resources would be minimized through measures specified

in *Erosion and Sediment Control Plan for Oregon – Bradwood Landing Pipeline* (ESC), *Construction Stormwater Pollution Prevention Plan for Washington – Bradwood Landing Pipeline* (SWPPP), and *Wetland and Waterbody Construction and Mitigation Procedures Plan*; and the FERC’s *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures). NorthernStar would also mitigate construction-related impacts by complying with CWA section 404 and section 401 permit conditions. In addition, NorthernStar has proposed a *Preliminary Engineering Design Draft Mitigation Plan* (Compensatory Mitigation Plan), including restoration and/or preservation programs at Hunt Creek, Svensen Island, and Delameter Creek, to create or enhance wetland habitats as compensation for wetlands and habitats impacted by its project.

Vegetation and Wildlife

Construction of the LNG terminal, and its associated power line, would affect about 31 acres of forest and 13 acres of shrub-scrub vegetation in upland areas. The 37 acres of the terminal site affected by construction that are not permanently converted to industrial use would be replanted with native species. About 180 acres of forest and 7 acres of shrub-scrub vegetation would be affected by construction of the pipeline. Non-forested portions of the pipeline right-of-way would be restored and seeded after construction. Upland forest would be replanted with in-kind trees, except for a 30-foot-wide strip over the pipeline centerline. Routine maintenance of a 10-foot-wide corridor centered on the pipeline would keep that area in an herbaceous state. To minimize impacts from the potential spread of noxious weeds from the disturbed right-of-way, NorthernStar developed a *Noxious Weed and Soil-borne Plant Disease Control Plan*.

We have identified Essential Fish Habitat (EFH) that may be affected by the project for more than 90 species of groundfish, 5 coastal pelagic species, 2 species of salmon, and 13 highly migratory aquatic species. Our EFH assessment was combined with our Biological Assessment (BA) and submitted to the NMFS and U.S. Department of the Interior, Fish and Wildlife Service (FWS). We identified federally listed endangered or threatened species that potentially occur in the vicinity of the Bradwood Landing Project, including: 13 anadromous salmonids and the North American green sturgeon; four reptiles (sea turtles); nine mammals (including seven whales, Steller sea lion, and Columbian white-tailed deer); six birds; one invertebrate; and three plants. In response to our BA and EFH Assessment, the NMFS and FWS requested additional information; therefore, the FERC staff is currently revising that document. The revised analysis will be provided to the NMFS and FWS, and consultation under the Magnuson-Stevenson Act and Endangered Species Act will be concluded before any construction of facilities is allowed to proceed.

Land Use, Residences, and Recreation

Communities overlapped by the Zones of Concern along the waterway for LNG marine traffic include Warrenton and Astoria in Oregon, and Skamokawa and Cathlamet in Washington. The Zones of Concern along the waterway would also overlap state and local parks and public recreation or special use areas such as marinas. In addition, the Lewis and Clark National Wildlife Refuge and the Julia Butler Hansen National Wildlife Refuge are located along the waterway. LNG marine traffic may have visual impacts for people residing in the shoreline communities, traveling along highways adjacent to the waterway, using the parks and public interest areas, or using the river. Visual impacts would be short term, as it would typically take an LNG carrier only a few minutes to pass through a viewshed while traveling at average speeds between 8 and 12 knots.

The closest residences to the LNG terminal are about 0.5 mile away on Puget Island in Wahkiakum County, Washington. Construction impacts on these residences could include inconvenience caused by terminal lighting. We are recommending that NorthernStar submit a final lighting plan to

mitigate those operational impacts. The LNG storage tanks at the terminal may have minor visual impacts for river users and residents of Puget Island, Cathlamet, and Skamokawa, Washington. Visual impacts from the LNG terminal would generally be minor, because views are modified by topography, vegetation, and distance. Three homes have been identified within 50 feet of the construction right-of-way for the pipeline. We are recommending that NorthernStar file site-specific residential mitigation plans prior to construction. The project would not be located in areas that have a disproportionately high percentage of minorities, Native Americans, or low income populations.

The Bradwood Landing Project is subject to a federal Coastal Zone Consistency Review because it would involve activities within the coastal zone of Oregon and require several federal permits and approvals. We are recommending that prior to construction, NorthernStar should be required to demonstrate that its project is consistent with Oregon's Coastal Management Program.

Socioeconomics

The project would have a beneficial impact on the local economy. Total construction costs are estimated to be over \$700 million, with a total outlay for wages and benefits of about \$110 million. Operation of the LNG terminal would generate 65 jobs, with a total annual payroll of about \$3.9 million. In addition, NorthernStar would spend about \$1.4 million per year for tug boat rentals, and the tug boats would employ about 40 people. During operation of the LNG terminal, NorthernStar would pay about \$7.8 million per year in property taxes to Clatsop County, Oregon. Taxes would also be paid to Columbia County, Oregon, and Cowlitz County, Washington during operation of the pipeline.

There may be impacts on public services in the unlikely situation of an accident involving an LNG carrier or at the terminal. In addition to NorthernStar's proposed safety and security measures, the Coast Guard would enforce additional measures to ensure the safety of the waterway and LNG terminal. However, some local communities have expressed concerns that their current staffing and equipment for law enforcement, fire fighting, and rescue are not adequate to respond to a project-related accident. NorthernStar has developed a draft Emergency Response Plan (ERP), which includes a Cost-Sharing Plan to assist local first responders to acquire necessary resources. We will review the draft ERP in consultation with the appropriate agencies and NorthernStar would file a revised ERP before construction could begin.

Cultural Resources

NorthernStar provided cultural resources survey reports to the Oregon and Washington State Historic Preservation Offices (SHPO). Those reports identified the Lewis and Clark National Historic Trail and the Astoria and Columbia River Railroad as properties within the area of potential effect that may be eligible for the National Register of Historic Places (NRHP). However, we and the SHPOs agree that the project would have no adverse effect on those properties.

We contacted Native American tribes that may have historically occupied or used the project area and might attach religious or cultural significance to historic properties in the area of potential effect. No traditional cultural properties, religious, cultural, or sacred sites that may be affected by the project were identified by any tribe, NorthernStar's cultural resources consultant, or by the SHPOs.

We have not yet completed the process of complying with section 106 of the National Historic Preservation Act for this project. Cultural resources surveys are still needed for about 11 miles of the proposed pipeline route and associated ancillary facilities where access has not yet been obtained. Furthermore, both SHPOs have requested additional data. Once survey data are complete, the FERC, in consultation with the cooperating agencies and the SHPOs, would make determinations of NRHP

eligibility and project effects. If any historic properties would be affected by the proposed project, we would seek ways to resolve adverse effects. We are recommending that NorthernStar defer construction until: 1) cultural resource surveys are completed and evaluation reports, any required treatment or avoidance plans, and a cultural resources management plan are filed with the Secretary; 2) the SHPOs' comments on reports and plans are filed with the Commission; and 3) the Advisory Council on Historic Preservation has been given an opportunity to comment if any historic properties would be adversely affected.

Air Quality and Noise

Operation of the proposed LNG terminal would result in air emissions from stationary equipment (SCVs and emergency engines), LNG carriers, and tugs. NorthernStar would minimize air emissions from the LNG terminal through the use of clean fuel, best management practices for operation and maintenance procedures, and limiting annual hours of operation from the diesel-fired units. Based upon the air quality modeling, operational emissions from the LNG terminal would not have a significant effect on regional air quality. In addition, the emissions from construction of the LNG terminal and associated pipeline would not be regionally significant. Operation of the pipeline would result in little emissions and would not be significant.

Noise would be generated during construction of the pipeline and during construction and operation of the LNG terminal. In most areas, the increase in noise during construction would be localized, temporary, and limited primarily to daylight hours. However, noise associated with dredging operations could occur up to 24 hours per day, 7 days per week for a period of approximately 2 months. NorthernStar would incorporate noise attenuation measures during construction and operation to minimize impacts on nearby noise-sensitive areas and meet the FERC and local requirements. We are recommending that NorthernStar provide plans to mitigate noise from construction and operation of the facilities.

Safety and Reliability

We evaluated the safety of both the proposed facilities and the related LNG carrier transit through the Columbia River navigation channel. As part of our evaluation, we performed a cryogenic design and technical review of the proposed terminal design and safety systems. Several areas of concern were noted with respect to the proposed facility, and we identified specific recommendations to be addressed by NorthernStar prior to initial site preparation, prior to construction after final design, prior to commissioning, or prior to commencement of service.

Thermal radiation distances were calculated for 1,600 to 10,000 British thermal units per square foot per hour (Btu/ft²-hr) incident flux levels for an LNG storage tank impoundment fire. The resulting distances would be 377 feet for the 10,000 Btu/ft²-hr zone; 714 feet for the 3,000 Btu/ft²-hr zone; and 912 feet for the 1,600 Btu/ft²-hr zone. Although the flammable vapor dispersion exclusion zones would extend off-site into the navigation channel, there are no prohibited land uses within the channel. Therefore, the vapor exclusion zone requirements of 49 CFR 193.2059 would be met. Flammable vapor hazard distances were calculated for accident scenarios in the process area which resulted in a distance of 243 feet to the 2.5 percent average gas concentration.

Thermal radiation and flammable vapor hazard distances were calculated for an accident or an attack on a 140,000-m³ LNG carrier. For 1.0-, 1.4-, 2.5-, 3.0-, and 3.9-meter-diameter holes in an LNG cargo tank, we estimated distances to range from 2,154 to 5,225 feet for a thermal radiation level of 1,600 Btu/ft²-hr, the level, which is hazardous to unprotected persons located outdoors. Based on a 1.0-meter-diameter hole, an unignited release would result in an estimated pool radius of 421 feet. The unignited

vapor cloud would extend to 10,237 feet to the lower flammable limit (LFL) and 13,618 feet to one-half the LFL. The results of these calculations are in agreement with the Zones of Concern used by the Coast Guard in assessing the waterway suitability. However, the evaluation of safety is more than an exercise in calculating the consequences of worst case scenarios. Rather, it is a determination of the acceptability of risk which considers: the probability of events, the effect of mitigation, and the consequences of events. Based on the extensive operational experience of LNG shipping, the structural design of an LNG carrier, and the operational controls imposed by the Coast Guard and the local pilots, the likelihood of a cargo containment failure and subsequent LNG spill from a vessel casualty – collision, grounding, or allision – is highly unlikely. As a result, the risk to the public from accidental spills from LNG carriers should be considered negligible.

Unlike accidental causes, historical experience provides little guidance in estimating the probability of a terrorist attack on an LNG carrier. For an LNG import terminal proposal that would involve having a large volume of energy transported and stored, the perceived threat of a terrorist attack is a primary concern of the local population and requires that resources be directed to mitigate possible attack paths. While the risks associated with the transportation of any hazardous cargo can never be entirely eliminated, they can be managed.

If an accidental or intentional breach of an LNG carrier resulting in a release of LNG were to occur during transit along the waterway, impacts on the various environmental resources within the Zones of Concern could result. LNG would not contaminate water, because it is not soluble, it floats, and the LNG would vaporize shortly after being spilled. The primary hazard from an LNG spill would be a pool fire if the vapors are ignited. A pool fire could have adverse affects on vegetation, wildlife, structures, and people. In general, the area of effect of an LNG release and any resulting fire would be fairly limited in area and short-lived. The severity and duration of the impacts would vary depending on the resource and its distance from the source, as resources in Zone 1 would be more severely impacted than resources in Zone 3. However, with implementation of the mitigation measures described in the Coast Guard's Waterway Suitability Report (WSR), a release would be highly unlikely and the potential impact on resources would be less than significant.

Based on its review of NorthernStar's Waterway Suitability Assessment (WSA), the Coast Guard advised the FERC in its WSR dated February 28, 2007 that to make the Columbia River suitable for the LNG marine traffic associated with the Bradwood Landing Project, specific risk mitigation measures would be necessary. These measures would include a 500-yard moving safety and security zone around LNG carriers in transit, a 200-yard fixed security zone around the LNG carriers moored at the proposed LNG terminal, and one-way traffic in designated portions of the waterway.

ALTERNATIVES CONSIDERED

Alternatives considered by the FERC include no action or postponed action, system alternatives, LNG terminal site alternatives, LNG terminal layout alternatives, and pipeline route alternatives. While denying project approval or taking no action (or postponing action) would eliminate the environmental impacts identified in this EIS, the project objective would not be met of providing a new source of natural gas for the Pacific Northwest.

We did not identify any existing interstate pipeline systems that could provide additional supplies of natural gas to the Pacific Northwest equivalent to the volumes proposed for the Bradwood Landing Project without major expansions. Converting one of the five Pacific Northwest LNG "peak shaving" storage facilities into an import terminal would not be feasible. An offshore LNG terminal near the mouth of the Columbia River would not be a viable alternative to the Bradwood Landing Project. This is due to rough sea conditions off the Oregon Coast, technological limitations related to offshore LNG

import terminal designs; and the additional environmental impacts associated with a longer sendout pipeline. We considered five newly proposed jurisdictional interstate pipelines as system alternatives to the Bradwood Landing Project but did not find any of them to be environmentally preferable. A number of proposed onshore LNG import terminals along the West Coast in North America were examined as potential alternatives. However, we concluded that none of these facilities would meet all the objectives of the Bradwood Landing Project. We considered alternative LNG terminal locations along the coast of Washington and Oregon and along the Columbia River, but that none appear to have clear environmental advantages over the Bradwood Landing location. The FERC would review individual projects based on their own merits and allow the market to decide which projects ultimately are built.

We have reviewed the various alternatives related to LNG terminal facility design and power line route designs, and found that NorthernStar's current proposal is reasonable given technical, engineering, economic, and environmental considerations. Furthermore, we did not identify dredge material placement alternatives that were preferable to the proposed action

We evaluated four major sendout pipeline routes as alternatives to the route proposed by NorthernStar, but none would provide significant environmental advantages over the proposed pipeline route. NorthernStar adopted some minor route variations that we found environmentally preferable to its original route, but other route variations did not need to be adopted because they had no clear environmental advantages. However, additional route modifications would likely be necessary following completion of the Final Pipeline Design Geotechnical Report to minimize slope stability problems along the pipeline.

The proposed action for the Coast Guard is to issue an LOR finding the waterway suitable for LNG marine traffic with conditions. Among the conditions that may be included are: 1) establishment of a 500-yard moving safety/security zone during LNG vessels' transit of the waterway, including the requirements for one-way LNG marine traffic along certain portions of the waterway such as at turns and for a 200-yard security zone around the LNG vessel when it is moored at the LNG terminal; 2) a 50-yard security zone around the LNG terminal when there is not a vessel at the dock; 3) the submission by the applicant of an annual review of its WSA to evaluate if any conditions in the waterway have changed that would require issuance of a new LOR and submit the annual review to the Captain of the Port (COTP) for his/her review and issuance of a new LOR if necessary; 4) the requirement that LNG vessels must board a pilot(s) at least 5 miles before the Columbia River Buoy and for at least the first 6 months, at least two pilots must be on board throughout the transit and that at least two tugs escort the vessel along the waterway with a third to assist with turning and mooring; 5) implementation of a Coast Guard-approved *LNG Vessel Transit Management Plan*; 6) improvements to the Columbia River's Vessel Traffic Information System; and 7) availability of Coast Guard as well as other safety and security resources to implement the above security measures. If these and other conditions to the LOR are imposed, the potential for accidental releases or releases from terrorist attacks would be minimized.

Reasonable alternatives to the Coast Guard's proposed action with conditions include: 1) issuance of a Coast Guard LOR finding the waterways suitable for LNG marine traffic without conditions; and 2) issuance of a Coast Guard LOR finding the waterways not suitable for LNG marine traffic (no action alternative). The Coast Guard's preferred alternative is to issue an LOR finding the waterway suitable for LNG traffic with certain conditions.

The no action alternative for the Coast Guard would avoid any project-related environmental effects in the waterway; however, it would also prevent LNG carriers from delivering LNG to the proposed import terminal and the project objectives would not be met. A reasonable alternative to the Coast Guard action of issuing an LOR, which finds the waterway suitable for LNG marine traffic with certain conditions, is to issue an LOR without any conditions. With this alternative, some of the adverse

economic effects of the conditions would be lessened. However, the potential for adverse environmental effects would be greater if conditions were not imposed.

In summary, we have determined that NorthernStar's proposed project, as modified by our recommended mitigation measures, is the preferred alternative that can meet the project objectives.

PUBLIC INVOLVEMENT AND AREAS OF CONCERN

As part of the Commission's Pre-filing Process, on September 23, 2005, the FERC issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Bradwood Landing LNG Project, Request for Comments on Environmental Issues, and Notice of Joint Public Meeting, and Site Visit*. This notice was sent to elected federal, state, and local government officials; agency representatives; environmental and public interest organizations; Native American tribes; and local libraries and newspapers. The notice encouraged project stakeholders or interested parties to provide input on environmental issues that should be addressed during the environmental review process. The Coast Guard published a notice in the Federal Register on September 9, 2005 for preparing an LOR as to the suitability of the Columbia River navigation channel for LNG marine traffic.

On September 29, 2005, the Coast Guard and FERC staff conducted a joint public scoping meeting in Knappa, Oregon, to provide an opportunity for the general public to learn more about the proposed project. The FERC held a second public meeting in Cathlamet, Washington on October 26, 2005 to answer questions regarding the Commission's Pre-filing and the NEPA review processes. Through the scoping process, we received comments on a variety of environmental issues. Those issues are addressed in this EIS.

The FERC issued a Notice of Availability (NOA) of the draft EIS on August 17, 2007. The NOA established a 120-day period for comments on the draft EIS, ending on December 24, 2007 (later extended to December 26, 2007). In addition, a total of six public comment meetings were held November 5 through November 8 in Clatskanie and Knappa, Oregon and in Longview and Cathlamet, Washington. Comments from the public meetings, as well as written comments on the draft EIS, are provided along with our responses in Appendix K.

MAJOR CONCLUSIONS

We conclude that construction and operation of the Bradwood Landing Project would have limited adverse environmental impacts. However, that implementation of NorthernStar's proposed mitigation measures, and additional measures we recommend, would substantially reduce the environmental impact of the project. The primary reasons for our decision are:

- the final engineering design for the LNG terminal would incorporate detailed seismic specifications and other measures to mitigate the impacts of seismic hazards, and mitigation measures would be implemented along the pipeline route to address landslides and other geological hazards;
- NorthernStar would implement its project-specific ESC Plans, a SWPPP, and *Wetland and Waterbody Construction and Mitigation Procedures Plan*, and follow the FERC staff's Plan and Procedures to mitigate impacts on soils, wetlands, and water resources;
- NorthernStar would implement various mitigation plans to compensate for impacts on waterbodies, wetlands, vegetation, and habitats;

- consultations with the COE, Coast Guard, NMFS, FWS, Oregon Department of Land Conservation and Development, Oregon Department of Environmental Quality, Oregon Department of State Lands, ODFW, Washington Department of Ecology, Washington Department of Fish and Wildlife, Oregon and Washington SHPOs, and other appropriate agencies would be completed before NorthernStar would be allowed to begin construction;
- the proposed LNG terminal would meet the federal safety regulations regarding the thermal radiation and flammable vapor dispersion exclusion zones, and appropriate safety features would be incorporated into the design and operation of the LNG import terminal and LNG carriers; and
- an environmental inspection and mitigation monitoring program would be implemented to ensure compliance with all mitigation measures that become conditions of any FERC authorization.

In addition, our decision is based on the Coast Guard's preliminary determination in the WSR that the waterway may be suitable for LNG marine traffic if additional measures and operational controls are implemented, including:

- availability of Coast Guard as well as other safety and security resources, including additional safety measures when a cruise ship is in port, security boardings, waterway monitoring, shoreline patrols, and vessel escorts to implement the additional security measures;
- establishment of a safety/security zone around the LNG vessel and the dock;
- a restriction on the size of LNG carriers to a capacity of 148,000 m³ until a completed site-specific risk analysis for larger ships is approved by the COTP;
- operational and pilotage requirements, including tug escorts and multiple pilots;
- upgrades to navigational aids including installation of three aids at Bradwood, a Physical Oceanographic Real-Time System station at Bradwood contracted with the National Oceanographic and Atmospheric Administration to provide real-time river level, current, and weather data, and a Doppler docking station;
- augmentation of shoreside firefighting capabilities to provide protection services to the facility as well as communities along the transit route;
- implementation of a public notification system to notify the public along the transit route;
- implementation of a Regional Communication Plan and associated equipment to ensure that the facility, associated command centers, emergency responders, Coast Guard, tug operators, escort vessels, and pilots are able to communicate effectively; and
- improvements to the Columbia River's Vessel Traffic Information System, including: augmentation of a camera monitoring system capable of monitoring the entire route and detecting vessel traffic in wind, rain, fog, and dark conditions; and installation of an Automatic Identification System repeater located in Astoria.

1.0 INTRODUCTION

On June 5, 2006, Bradwood Landing LLC and NorthernStar Energy LLC (affiliates of NorthernStar Natural Gas, Inc.) filed applications with the Federal Energy Regulatory Commission (FERC or Commission) under sections 3(a) and 7(c) of the Natural Gas Act (NGA). The applications were noticed in the Federal Register on June 15, 2006. In Docket No. CP06-365-000, Bradwood Landing LLC seeks authorization to site, construct, and operate a liquefied natural gas (LNG) import terminal at Bradwood, about 38 miles up the Columbia River from its mouth, in Clatsop County, Oregon. In Docket No. CP06-366-000, NorthernStar Energy LLC seeks a Certificate of Public Convenience and Necessity (Certificate) to construct and operate a new natural gas pipeline and ancillary facilities to connect the proposed LNG terminal to the existing Williams Northwest Pipeline Corporation (Williams Northwest) interstate natural gas pipeline system in Cowlitz County, Washington. In Docket Nos. CP06-376-000 and CP06-377-000, NorthernStar Energy LLC also applied for a blanket certificate under Part 157, Subpart F of the Commission's regulations and requested issuance of a blanket certificate under Subpart G of Part 284, respectively. Hereafter, Bradwood Landing LLC and NorthernStar Energy LLC are referred to collectively as NorthernStar. The project, including the LNG terminal and pipeline components, is referred to as the Bradwood Landing Project.

The FERC is the federal agency responsible for authorizing applications to construct and operate onshore LNG import and interstate natural gas transmission facilities. For the Bradwood Landing Project, the FERC is the lead federal agency for the preparation of this environmental impact statement (EIS) in compliance with the requirements of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations for implementing the NEPA (Title 40, Code of Federal Regulations (CFR) 1500-1508), and the FERC's regulations implementing the NEPA (18 CFR Part 380).

The U.S. Army Corps of Engineers (COE) and the U.S. Department of Homeland Security, Coast Guard (Coast Guard) are cooperating agencies for the development of this EIS. A cooperating agency has jurisdiction by law or special expertise with respect to environmental impacts involved with the proposal, and is involved in the NEPA analysis. The Pipeline and Hazardous Materials Safety Administration (PHMSA) within the U.S. Department of Transportation (DOT) is participating in the NEPA analysis under the terms of an interagency agreement between the PHMSA, the FERC, and the Coast Guard, issued February 11, 2004.¹

The Coast Guard has authority over the safety and security of LNG carriers, the marine traffic route, and the LNG terminal. The Coast Guard determines the suitability of the waterway for LNG marine traffic by issuing a Letter of Recommendation (LOR) (see section 1.3.1). The COE has authority to issue dredging and wetland permits for the project (see section 1.3.2). The DOT has authority to enforce safety regulations and standards for the LNG terminal beginning at the last valve immediately before the storage tanks and the design and operation of the sendout pipeline.

<p>The vertical line in the margin identifies text that has been modified in the final EIS and differs from the corresponding text in the draft EIS.</p>
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This final EIS discloses and assesses the potential environment impacts that may be associated with the construction and operation of the Bradwood Landing Project in Clatsop and Columbia

¹ The *Interagency Agreement Among the Federal Energy Regulatory Commission, United States Coast Guard, and Research and Special Programs Administration for the Safety and Security Review of Waterfront Import/Export Liquefied Natural Gas Facilities* is available for viewing by the public through the FERC Internet web page at www.ferc.gov, then clicking on Industries, LNG, Safety and Inspections.

Counties, Oregon, and Cowlitz County, Washington. NorthernStar's proposed facilities would transport up to 1.3 billion cubic feet per day (Bcfd) of imported natural gas to markets in the Pacific Northwest.

The LNG import terminal proposed by Bradwood Landing LLC would include:

- a dredged maneuvering area off of the Columbia River navigation channel;
- a berth capable of receiving LNG carriers with cargo capacities ranging from 100,000 to 200,000 cubic meters (m³);
- a set of four 16-inch-diameter LNG unloading arms, including two liquid unloading arms, one hybrid arm, and a vapor return arm on the wharf, and a 1,240-foot-long, 32-inch-diameter cryogenic LNG transfer pipeline and 6-inch-diameter LNG recirculation pipeline extending from the berth to the LNG storage tanks;
- two insulated LNG storage tanks, each with a useable volume of over 1 million barrels, or 160,000 m³;
- a vapor management system to handle the boil-off gas (BOG) that occurs during the unloading process, including vapor return blowers and knockout (KO) drum on the wharf, vapor handling pipework, two BOG compressors, and a BOG condenser;
- an LNG sendout system, consisting of six submerged in-tank LNG discharge pumps (three in each storage tank) and five sendout pumps;
- seven submerged combustion vaporizers (SCV), of which six would normally operate and one would be a back-up, to re-gasify the LNG and provide natural gas through a metering station to the inlet valve of the sendout pipeline;
- support buildings, including a warehouse/administrative building, control building, switch rooms, compressor building, and gatehouse/security building;
- utilities, including a 1.5-mile-long, 115-kilovolt (kV) power line and switchyard, and an 800-kilowatt (kW) emergency diesel-fueled generator;
- screened water intakes, pumps, and piping to supply water to unloading ships for cooling and ballast, and for other site uses; and
- a fire protection and detection system, including a firewater pumphouse, and
- a security system including fencing.

The natural gas pipeline facilities proposed by NorthernStar Energy LLC would include:

- a 36.3-mile-long, underground, high-pressure welded steel sendout pipeline consisting of approximately 18.9 miles of 36-inch-diameter pipeline in Clatsop and Columbia Counties, Oregon and 17.4 miles of 30-inch-diameter pipeline in Columbia County, Oregon and Cowlitz County, Washington;
- five meter stations, including at the LNG terminal, the Georgia-Pacific Wauna paper mill (Wauna Mill) delivery point, the interconnection with the Northwest Natural Gas

Company (Northwest Natural) interstate pipeline system, the Portland General Electric Company (PGE) Beaver Power Plant delivery point, and the interconnection with Williams Northwest pipeline system; and

- at least five mainline block valves (MLV), two pig² launchers, and two pig receivers.

Some commentors on our³ draft EIS questioned whether the Williams Northwest system has the capacity to transport the additional volumes of natural gas to be provided through the importation of LNG by the Bradwood Landing Project. In a February 9, 2006 data request to NorthernStar, we asked for a description of any expansions that may be necessary on either the Northwest Natural or Williams Northwest systems in order to accommodate the new volumes of natural gas proposed to be delivered through the Bradwood Landing pipeline. In a response dated March 28, 2006, NorthernStar stated that: “No expansions of the Northwest Natural pipeline system or the Williams-Northwest Pipeline system would be necessary in order to accommodate the new volumes of natural gas to be delivered by the Bradwood Landing LNG Project.”

In its motion to intervene in this proceeding, filed July 6, 2006, Williams Northwest stated that: “Although NorthernStar currently does not have an interconnect agreement with Northwest, Northwest is willing to accommodate an interconnect with the proposed Bradwood Landing Pipeline as long as the conditions outlined in the Commission’s interconnect policy...are satisfied.” While Williams Northwest acknowledges the value of enhanced gas supply diversity in the region, it pointed out that its existing pipeline capacity (both north and south flow) from the proposed interconnect point with NorthernStar is currently fully contracted on a long-term basis for transportation services from existing primary receipt points. Without an expansion of its system, Williams Northwest believes that the proposed interconnect with NorthernStar would only serve as an alternative receipt point for Williams Northwest’s existing shippers.

However, it is our opinion that just because a pipeline is fully subscribed does not mean that pipeline capacity is never available for new entrants. The Williams Northwest system could handle the additional new volumes provided by the Bradwood Landing Project without expansion, under several different sets of circumstances. Although the Bradwood Landing Project is designed for a maximum sendout capacity of 1.3 Bcfd, it should be noted that for the last few years existing LNG import terminals along the Eastern and Gulf coasts of the United States have been operating at about 50 percent capacity. Further, a significant amount of the volumes being imported are in the summer months when spare pipeline capacity is widely available. Even in the winter months, and the shoulder seasons, capacity can be made available on fully subscribed pipelines through various Commission programs such as reverse open seasons, capacity turnbacks, capacity releases, and interruptible capacity. By encouraging the use of these programs, the Commission ensures that, to the greatest extent possible, contracted pipelines are fully utilized. In addition, the FERC has recently proposed new rules which would further aid in efficient use of available capacity by allowing asset managers to tie capacity released on a pipeline with gas supplies.

The Bradwood Landing Project would require construction of some facilities that do not fall under the Commission’s jurisdiction. These include electric transmission facilities and three natural gas pipeline laterals. The waterway to the LNG terminal for the LNG carriers is an additional component of the project for the purpose of this EIS. The Bradwood Landing Project also would include development of several mitigation sites as well as a Salmon Enhancement Initiative (SEI).

² A pig is an internal tool used to clean and dry a pipeline and/or to inspect it for damage or corrosion.

³ The pronouns “we,” “us,” and “our” refer to the environmental staff of the FERC’s Office of Energy Projects. The FERC issued the draft EIS for the Bradwood Landing Project on August 17, 2007.

1.1 PURPOSE AND NEED

The purpose of the Bradwood Landing Project is to provide a new source of natural gas to the Pacific Northwest through importation of LNG. LNG is natural gas that has been cooled to about -260 degrees Fahrenheit (°F) for shipment and storage as a liquid. As a liquid, LNG is about 600 times more compact than its equivalent amount of natural gas vapors. LNG is typically produced in foreign countries with excess supplies of natural gas, and transported long distances across oceans using specially designed ships. The 15 LNG exporting nations hold about 33 percent of the world's natural gas reserves (U.S. Department of Energy, Energy Information Administration (EIA); 2008a).

NorthernStar has not revealed its expected sources for the LNG, but most likely it would come from LNG exporting countries around the Pacific Basin, including Australia, Malaysia, Indonesia, and perhaps even the United States (Alaska has a liquefaction and LNG export facility). In 2006, Trinidad and Tobago was the largest supplier of LNG for the existing import terminals operating on the East and Gulf coasts, accounting for about 67 percent of all LNG imported into the United States (EIA, 2008a). At the Bradwood Landing import terminal, the LNG would be stored and then vaporized back into natural gas for transportation by pipeline into the existing national grid.

NorthernStar's project is specifically designed to provide up to 1.3 Bcfd of natural gas to the Pacific Northwest by:

- delivering natural gas to the Wauna Mill at Wauna, Oregon and the PGE Beaver Power Plant at Port Westward, Oregon;
- interconnecting with Northwest Natural's existing bidirectional intrastate pipeline facilities capable of transporting gas to their Mist underground storage facility; and
- interconnecting with Williams Northwest interstate pipeline system.

By creating access to new and competitively-priced LNG supplies, the proposed project would diversify available sources of energy and increase the supply of natural gas to meet estimated future demand in the region, which would contribute to natural gas price stabilization. The states of Washington and Oregon do not produce much natural gas.⁴ Natural gas is currently supplied to the region through the existing interstate pipeline systems operated by Williams Northwest and Gas Transmission Northwest Corporation (GTN). Williams Northwest is a subsidiary of the Williams Companies, Inc. (Williams), while GTN is part of the TransCanada Corporation (TransCanada). These systems bring to the Pacific Northwest natural gas produced in the provinces of British Columbia and Alberta, Canada, and the Rocky Mountain states of Wyoming, Colorado, and New Mexico. In total, these existing pipelines have a transportation capacity of 4.1 Bcfd as they enter the region (from Canada and Idaho), with 2.2 Bcfd in capacity targeted for the California market. In 2007, total natural gas consumption in Washington and Oregon was estimated to average about 1.2 Bcfd (ICF International (ICF), 2007).

In 2006, natural gas represented 22 percent of the total primary energy used in the United States. More than half of all American homes are heated with natural gas, and it is the fuel of choice for about 41 percent of the nation's industrial sector (James A. Baker III Institute for Public Policy (Baker Institute), 2008). In the Pacific Northwest, natural gas accounts for about 50 percent of the energy currently consumed. It is used for residential space and water heat, for commercial and industrial processes, and for electric generation. Industrial users account for about 28 percent of the natural gas

⁴ Oregon produced 621 MMcf of natural gas in 2006, or about 0.27 percent of its consumption (ODE, 2008b).

consumed in the region. However, industrial use of natural gas in the Pacific Northwest declined between 1995 and 2007. Residential use represents a little more than 24 percent of the natural gas market in the Pacific Northwest, but has grown about 23 percent between 1995 and 2007. The number of natural gas customers increased nearly 13 percent between 2000 and 2005, despite a regional economic slump and higher commodity prices. About 30 percent of the total gas market in the Pacific Northwest is for electric generation. This sector has shown the greatest growth since the early 1990s, as newly-built gas-fired electric generation plants increased total power outputs by 5.5 gigawatts (GW) or a factor of five (NWGA, 2007; ICF, 2007).

In the Pacific Northwest, use of natural gas should continue to grow in the future due to additional gas-fired electric generation, and population increases that will provide more residential customers. Currently, more than 20 percent of the region's electric generation is fueled by natural gas. About 60 percent of the total power generation capacity in the Pacific Northwest has been added since 2001 (NWGA, 2007). Between 2001 and 2003, about 3,350 megawatts (MW) of new power generation was added to the Northwest; most of it fueled by natural gas, including 1,675 MW in Oregon (ODE, 2005a). Over the last 3 years (2006-2008) about 1,438 MW in additional gas-fired electric generation was scheduled to come online in the Pacific Northwest (Northwest Power and Conservation Council, 2008). Nationally, about 52 percent of all new power plants built since 1995 have been gas fired, and natural gas accounts for 90 percent of all new MW of capacity installed over the last 12 years in the United States (Baker Institute, 2008). Natural gas is the cleanest burning fossil fuel, and demand from the electric generation industry should increase in the future as the government seeks to find ways to reduce air pollution and greenhouse gases, including carbon emissions, to address climate change issues.

Modeling conducted by the Baker Institute (2008) projected that natural gas demand in the United States will grow by about 1.3 percent per year for the next two decades. The NWGA (2007) estimated that natural gas consumption in the Pacific Northwest should increase at an average of 1.9 percent per year over the next 5 years, for a total rise of 7.2 percent through 2012, under normal weather conditions and expected economic and population growth. Under its base case, residential natural gas consumption is expected to increase about 9 percent in total by 2012, while natural gas use for power generation would increase about 12 percent over that period. According to a 2007 study produced by ICF for the Washington Energy Facility Siting Council, future natural gas use in the Pacific Northwest should grow at an annual rate in excess of 3 percent per year, with total consumption in Washington and Oregon combined reaching 741 Bcf per year by 2025. ICF expects residential demand for natural gas in Washington and Oregon to increase by a total of about 58 percent between 2007 and 2025, while gas used for electric generation would increase by about 180 percent in that same period.

The NWGA believes that existing natural gas interstate pipeline and local storage facilities may be adequate to meet demand in the Pacific Northwest through about 2012. However, weather dependent demand, including natural gas needed for residential heating in the winter and electric generation for air conditioning in the summer, may result in short-term spikes that cannot be met by current capacity. Weather-driven peak demand will grow faster than baseline (non-weather dependent) demand in the future. If the Bradwood Landing Project were authorized by the end of 2008, it may be ready to be placed into service by the end of 2011. Therefore, this project could help to ameliorate the predicted future gap between natural gas supply and regional demand, and assist in providing additional volumes during periods of peak demand when current interstate natural gas capacity may fall short.

Demand for natural gas in North America is expected to grow nearly 20 percent by 2030. The EIA predicts, in its 2008 Annual Energy Outlook, that natural gas use in the United States will increase from about 21.9 trillion cubic feet (Tcf) in 2006 to 24.3 Tcf by 2016 (EIA, 2007d). This is lower than previous EIA projections because of higher natural gas prices and slower growth in demand for natural

gas for electric generation. In its 2007 Outlook, the EIA predicted that natural gas consumption in the United States would reach 26.1 Tcf by 2030 (EIA, 2007a).

Since the early 1980s, natural gas production in the United States has fallen short of demand. Domestic production of natural gas in the United States has risen from about 17.5 Tcf in 1991 to about 19.3 Tcf in 2006 (EIA, 2007b). Meanwhile, natural gas consumption in the United States grew to about 21.9 Tcf by 2006. The shortfall between domestic production and consumption has been bridged by importing natural gas, mainly from Canada. In the future, the Pacific Northwest will have to increasingly compete with the rest of North America for its share of natural gas supplies from Western Canadian and Rocky Mountain producers (NWGA, 2007). Providing natural gas to meet future demands in the Pacific Northwest would be constrained by North American supplies and existing pipeline infrastructure.

The Western Canada Sedimentary Basin (WCSB), extending from British Columbia to Saskatchewan, produces nearly 98 percent of the natural gas used in Canada, and represents about 23 percent of the total production in North America. About 16 percent of all natural gas consumed in the United States is imported from foreign countries, with Canada being the source of almost 86 percent of the total amount imported in 2006 (EIA, 2008a). In 2007, about 90 percent of the natural gas imported into the Pacific Northwest came from Canada.

Since 2001, production from the WCSB has been relatively constant, at about 6 Tcf per year. While, in 2006, the Pacific Northwest received about 7 percent of the total natural gas imported into the United States from Canada (about 255 Bcf), the Midwest received about 46 percent (1,632 Bcf) and the Northeast got 28 percent (1,012 Bcf) (EIA, 2008a). However, the WCSB has been characterized as a “mature” production area, and it is forecasted to decline in the future from current production levels of about 17 Bcfd to less than 15 Bcfd by 2013 (ICF, 2007; NWGA, 2007). The EIA (2008a) believes that WCSB producers are having difficulties maintaining output because of rising production costs and declining well productivity. At the same time that WCSB production would be declining, natural gas consumption in Canada should be increasing. For example, natural gas is used for heavy oil and tar sand development in Alberta and for gas-fired power plants in Ontario. Imports of natural gas from Canada to the United States are predicted to fall from 3.6 Tcf in 2006 to 1.2 Tcf in 2030 (ODE, 2008b). Therefore, imports from the WCSB into the Pacific Northwest are expected to decrease over time, at a rate of about 50 million cubic feet per year through 2015 (ICF, 2007).

According to the EIA (2007a), most of the onshore natural gas resources in the continental United States have already been discovered. Over the last 20 years, the amount of federal lands open for new gas exploration has shrunk from 75 percent to 17 percent (Baker Institute, 2008). Production from conventional onshore sources in the lower 48 states is expected to decline from about 6.4 Tcf in 2005 to about 4.9 Tcf by 2030. Natural gas from deep water offshore wells in the Gulf of Mexico, currently accounting for about 15 percent of cumulative domestic marketed production, is predicted to peak at 3.1 Tcf by 2015 and decline to 2.1 Tcf by 2030. Increases in domestic production in the future would mainly come from Alaska and unconventional onshore resources, including coalbed methane, tight sandstones, and gas shale. However, natural gas from Alaska is currently shut in; although there are plans for a future natural gas pipeline from Alaska.⁵

Natural gas production in the Rocky Mountain states has shown steady growth, from 3.6 Bcfd in 1995 to 8.1 Bcfd in 2007. It now represents about 12 percent of U.S. production. The region is estimated to have about 142 Tcf remaining. Production in the Rockies is projected to increase to almost 10 Bcfd by 2013, and up to 12.2 Bcfd by 2025 (NWGA, 2007; ICF, 2007).

⁵ The ODE (2008a) indicated that a natural gas pipeline would not be completed from Alaska until 2018 at the earliest.

Currently, the Pacific Northwest receives about 10 percent of its natural gas from the Rockies. This gas is transported through the existing Williams Northwest system, which interconnects with TransCanada's existing GTN system at several locations in Washington and Oregon. Because of constraints in existing pipeline capacity, deliveries of Rocky Mountain natural gas into the Pacific Northwest are expected to stay at current levels, at about 300 MMcfd, for the next several years (ICF, 2007).

Most of the new production from the Rockies is currently transported to markets in the Midwest and Eastern United States. For example, the Rockies Express Pipeline LLC (REX), a joint venture between Kinder Morgan Energy Partners L.P. and Sempra Pipelines and Storage, recently installed a 718-mile-long, 42-inch-diameter pipeline capable of transporting 1.5 Bcfd from Colorado to Missouri, in Docket No. CP06-354-000. REX is proposing, in Docket No. CP07-208-000, to extend its pipeline an additional 639 miles eastward to Ohio. In addition, a partnership between Alliance Pipeline and Questar Overthrust Pipeline recently announced plans for an 800-mile-long pipeline between Wamsutter, Wyoming and Emerson, Minnesota that would transport Rocky Mountain gas to markets in the Midwest (Inside FERC, 2008b; Natural Gas Intelligence, 2008c).

However, there are also recently announced plans to bring additional volumes of Rocky Mountain gas to the West Coast in the future. Both the Bronco Project, proposed by Spectra Energy, and the Ruby Project, proposed by El Paso Corporation (El Paso) would have pipelines extending from the Opal hub in southwestern Wyoming to the California border near Malin, Oregon (Inside FERC, 2007; Natural Gas Intelligence, 2008g, 2008h; Gas Daily, 2007). The so-called Sunstone Project, proposed by Williams Northwest and TransCanada, would consist of a pipeline paralleling Williams Northwest existing mainline between Opal, Wyoming and Stanfield, Oregon. In partnership with Puget Sound Energy, Williams Northwest would then use the newly proposed Blue Bridge Project pipeline to connect to Seattle, Washington (Williams, 2008; Oregonian, 2008; Natural Gas Intelligence, 2008e, 2008i; Inside FERC, 2008b). GTN, which can receive Rocky Mountain gas from Williams Northwest for delivery to the Pacific Northwest, northern Nevada, and northern California, is planning an expansion of its system in Oregon through the newly proposed Palomar Project. All of these newly proposed pipelines, which are in different stages of development and review, are discussed further in section 3.1.2.2.

A number of commentors on our draft EIS stated that they believed the natural gas from the Bradwood Landing LNG terminal would go to markets in California rather than the Pacific Northwest. NorthernStar presented a study conducted by Wood Mackenzie Limited⁶ to support its position that the main purpose of its proposed Bradwood Landing Project is to provide a new source of natural gas to the Pacific Northwest through the importation of LNG. The Wood Mackenzie Limited study indicated that at an average sendout rate of 1 Bcfd, 50.2 percent of natural gas from the Bradwood Landing LNG terminal would go to Oregon consumers, 30.3 percent would go to Washington consumers, and less than 20 percent would go to Idaho, northern California, and Nevada combined. At an average sendout of 400 MMcfd, 73 percent of natural gas from the Bradwood Landing LNG terminal would go to end users in Oregon, 26 percent would go to Washington customers, and less than 1 percent would go to other states combined.

In its comments on our draft EIS, filed December 21, 2007, the Northwest Industrial Gas Users stated: "The uncontroverted fact is that the Pacific Northwest needs access to new gas supplies and that the LNG terminal proposed by NorthernStar would help meet those needs. What is abundantly clear is that the claims by opponents of LNG that new gas supplies are not needed in the Pacific Northwest are

⁶ The Wood Mackenzie study was filed by NorthernStar in its FERC proceeding on February 21, 2008 as part of a package of materials previously provided to Clatsop County during its land use hearings about the project. These materials (accession number 20008033-9121) are available to the public through the FERC's internet web page at www.ferc.gov using the elibrary link.

patently false. The energy supply picture in the Pacific Northwest overwhelmingly shows that our region will benefit from the siting of an LNG terminal in Oregon. To suggest, as some have, that the only beneficiaries of such a terminal would be California consumers ignores all the realities facing gas consumers in Oregon, Washington, and Idaho.”

The importation of LNG as a new supplemental source of natural gas to meet future demand in the Pacific Northwest would mitigate against the predicted decline of imports from Canada, and constraints of the current interstate pipeline system to bring in additional volumes from the Rocky Mountain region. Unlike North America, where much of the resource base has already been exploited, there is ample potential for growth in LNG supply from countries with large untapped natural gas reserves. LNG represented about 14 percent of all natural gas imported into the United States in 2006 (EIA, 2008a). The Baker Institute (2008) estimated that by 2030, the United States would rely on imported LNG to account for about 31 percent of its natural gas consumption. The EIA (2007a) projected that LNG imports into the United States will increase from about 584 Bcf in 2006 to 4.5 Tcf by 2030. Even the ODE (2008a) has conceded that the United States would have to import LNG from abroad in order to make up for declining domestic natural gas production.

The Pacific Northwest historically has enjoyed natural gas prices below the national average because of its relative proximity to the WCSB and the Rockies, and local competition from hydropower plants that provide a significant amount of energy for the region. Natural gas prices have recently increased dramatically in the Pacific Northwest, and this trend will continue unless additional new sources of natural gas can be imported into the region. Between 2002 and 2005, the wellhead price of natural gas more than doubled (NWGA, 2007). Wholesale natural gas prices in Oregon increased 168 percent between 1999 and 2004, and between 1999 and 2005 residential rates rose 84 percent (ODE, 2005a, 2008a). According to the Washington Utilities and Transportation Commission (WUTC) (2006), natural gas prices in that state have soared as much as 300 percent over the last several years. Nationally, natural gas prices increased between 73 to 128 percent from 1999 to 2006 for all end-users (EIA, 2007c).

In its 2007 Annual Energy Outlook reference case, the EIA projected that wellhead prices for natural gas in the lower 48 continental United States would rise from \$5.01 per thousand cubic feet (mcf) in 2005 to \$5.89 per mcf by 2030. The Northwest Power and Conservation Council (2007) forecasts price escalation for natural gas in the region after 2010. The EIA (2008b) estimated that the spot price of natural gas at the Henry Hub will rise from \$7.17 per mcf in 2007, to \$7.93 per mcf in 2009. The California Energy Commission (CEC) (2007a) predicted that by 2017 the price of natural gas at the Malin, Oregon Hub could exceed the price at the Henry Hub. ICF (2007) had a slightly different scenario, predicting that natural gas prices at the Henry Hub would cost \$9.83 per million British thermal unit (MMBtu) in 2021, and \$9.54 per MMBtu at Malin by the same date, assuming that a pipeline was in operation from Alaska by then.

Higher natural gas prices will have negative impacts on the regional economy. The ODE (2008a) admitted that any reduction in the sources of natural gas to Oregon would disrupt the state's economy; particularly the manufacturing segment. In 2000, 1.2 percent of total personal income in Oregon was spent on purchasing natural gas (ODE, 2005a). The EIA (2007c) indicated that higher natural gas prices up to 2006 adversely affected local distribution companies (LDC) and residential customers. The number of LDC natural gas customers in arrears and the dollar value of their overdue accounts have been rising. The U.S. Federal Reserve Bank estimated that a doubling of natural gas prices would result in a reduction of gross domestic product growth between 0.6 to 2.1 percent (Baker Institute, 2008). The U.S. Department of Commerce (2005) found that higher natural gas prices between 2000 and 2004 reduced national civilian employment by an average of almost one-half million jobs per year, with about 79,000 lost jobs in manufacturing. Higher natural gas prices push up

consumer costs, reduce real disposable income, slow industrial growth, affect the competitiveness of American manufacturing, and reduce the number of new jobs created in the national economy (U.S. Department of Commerce, 2006).

According to the NWGA (2007), an LNG import terminal located in the Pacific Northwest would promote regional natural gas supply diversity and reliability, lower shipping costs, stabilize prices, and may stimulate the economy. The CEC (2007a) believes that the insertion of LNG into the West Coast mix could produce natural gas price reductions. ICF (2007) agrees that the importation of LNG in the future would put downward pressure on Pacific Northwest natural gas prices. NorthernStar commissioned Dr. Philip Romero, of the Lunquist College of Business, University of Oregon, to perform an analysis of the impact of LNG on the economy of the Pacific Northwest. In Dr. Romero's opinion, an LNG import terminal with a capacity of 1 Bcfd would increase natural gas supplies to the region by 10.3 to 51.5 percent, depending on utilization, and reduce gas prices by between 6.7 and 33.7 percent. A stable supply of natural gas in the future would benefit manufacturing and other industries, and result in higher disposable incomes for Northwest households. His "top-down" macroeconomic estimates suggested that a 10 percent reduction in natural gas prices could result in an increase in regional gross domestic product in 2012 between \$222 million and \$826 million, increase regional employment by between 5,100 to 20,300 jobs, and raise total household incomes between \$54 million and \$214 million (Romero, 2007).

A recent study by the ODE (2008b)⁷ indicated that natural gas from imported LNG may cost more than natural gas produced in North America and transported to the Pacific Northwest by interstate pipelines. Currently, Atlantic Basin LNG imported to East and Gulf Coast existing LNG terminals is generally priced 8 to 9 percent higher than North American produced natural gas. The cost of Pacific Basin LNG may even be higher than that. The ODE cited a case where a contract between Indonesia and Japan priced LNG at twice the cost of North American LNG. The same report by the ODE stated that: "natural gas use in Oregon is likely to rise over the next twenty years. New sources of natural gas will be needed to meet this demand." However, if new interstate pipelines are authorized and built, and transport domestically produced gas at substantially lower costs than imported LNG, then the market may not support the construction of LNG import terminals in Oregon.

The above discussion of project purpose and need is merely a brief summary, to satisfy the requirements of the CEQ regulations for implementing the NEPA, which state that an EIS should only "briefly specify the underlying purpose and need" for a proposed project (40 CFR 1502.13). The Commission will more fully consider the need for the Bradwood Landing Project when making its decision about the project, and will fully disclose its determinations in the project Order.

1.2 PURPOSE AND SCOPE OF THIS STATEMENT

Different federal actions are to be undertaken by the cooperating agencies producing this EIS. The FERC must decide whether or not to authorize the construction and operation of the onshore facilities proposed for the Bradwood Landing Project. The COE must decide whether or not to issue dredging and wetland permits. The Coast Guard must decide whether or not the waterway is suitable for LNG marine traffic. However, all of the cooperating agencies must consider the potential environmental impacts of NorthernStar's proposal as disclosed in this EIS prior to making their decisions.

⁷ The ODE report was conveyed to the FERC through a letter from the Governor of Oregon filed May 9, 2008. It is available for viewing by the public through the FERC's Internet webpage at www.ferc.gov, using the eLibrary feature, and looking up accession number 20080512-5063.

A draft EIS was prepared and issued for public review and comment on August 17, 2007. This document is a final EIS that has been prepared to respond to comments received on the draft EIS. All substantive changes between the draft EIS text and this final EIS are indicated by vertical bars that appear in the margins. The distribution list for the final EIS is provided in Appendix A.

Our principal purposes in preparing this EIS are to:

- identify and assess potential impacts on the natural and human environment that would result from the implementation of the proposed actions;
- describe and evaluate reasonable alternatives to the proposed actions that would avoid or minimize adverse effects on the human environment;
- identify and recommend specific mitigation measures, as necessary, to minimize the environmental impacts; and
- facilitate public involvement in identifying the significant environmental impacts.

The FERC will use the results of the EIS as an element in its review of NorthernStar's applications. After this final EIS is released, the FERC will determine whether the project should be authorized. Commission approval will only be granted if, after a consideration of both environmental and non-environmental issues, the FERC finds that the proposed project is in the public interest. The environmental impact assessment and mitigation development discussed herein will be important factors in this determination. Likewise, the Coast Guard will base its LOR on the environmental analysis contained in this EIS, in addition to consideration of waterway navigational suitability. The COE will use the results of this EIS in its review of NorthernStar's applications for permits pursuant to section 404 of the Clean Water Act (CWA) and section 10 of the Rivers and Harbors Act (RHA).

Our analysis in this EIS focuses on the facilities that are under the FERC's jurisdiction (i.e., the LNG import terminal and sendout pipeline proposed to be constructed by NorthernStar). Because it would be an integral element of the project, this EIS will also address the potential environmental impacts associated with a nonjurisdictional power line to be built to provide electric services to the LNG terminal. The waterway to the LNG terminal is included to address the Coast Guard's proposed action of issuing an LOR for the project.

The topics addressed in this EIS include geology; soils and sediments; water use and quality; wetlands; vegetation; wildlife and aquatic resources; threatened, endangered, and special-status species; land use, recreation, and visual resources; cultural resources; socioeconomics and traffic; air quality and noise; reliability and safety; and cumulative effects. The EIS describes the affected environment as it currently exists, discusses the environmental consequences of the proposed project, and compares the project's potential impact to that of alternatives. The EIS also presents our conclusions and recommended mitigation measures.

1.3 PERMITS, APPROVALS, AND REGULATORY REQUIREMENTS

The FERC, Coast Guard, and COE are required to comply with section 7 of the Endangered Species Act of 1973 (ESA), the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and section 106 of the National Historic Preservation Act (NHPA). As the lead federal agency for the Bradwood Landing Project, the FERC has undertaken the lead role for consultations under these statutes for itself and the cooperating agencies. The status of compliance with those acts is described in this EIS.

At the federal level, other agency permits and approvals include compliance with the CWA, RHA, Clean Air Act (CAA), Coastal Zone Management Act (CZMA), and Coast Guard regulations relating to LNG waterfront facilities. Table 1.3-1 lists the major federal, state, and local permits, approvals, and consultations identified for construction and operation of the Bradwood Landing Project.

1.3.1 Coast Guard Review

The Coast Guard exercises regulatory authority over LNG facilities that affect the safety and security of port areas and navigable waterways under Executive Order 10173; the Magnuson Act (50 United States Code (USC) § 191; the Ports and Waterways Safety Act of 1972, as amended (33 USC § 1221 et seq); and the Maritime Transportation Security Act of 2002 (46 USC § 701). The Coast Guard is responsible for matters related to navigation safety, vessel engineering and safety standards, and all matters pertaining to the safety of the facilities or equipment located in or adjacent to navigable waters up to the last valve immediately before the receiving tanks. The Coast Guard also has authority for LNG facility security plan review, approval, and compliance verification as provided in 33 CFR 105, and siting as it pertains to the management of vessel traffic in and around the LNG facility. As required by its regulations, the Coast Guard is responsible for issuing an LOR as to the suitability of the waterway for LNG marine traffic. Issuance of the LOR would be based on the following items:

- density and character of marine traffic;
- locks, bridges, and other manmade obstructions in the waterway;
- environmental effects of LNG carriers during transit from open water to the facility;
- maritime security (MARSEC)/port security considerations; and
- the following factors adjacent to the facility:
 - depth of water;
 - tidal range;
 - protection from high seas;
 - natural hazards, including reefs, rocks, and sandbars;
 - underwater pipes and cables; and
 - distance of berthed vessels from the channel and the width of the channel.

In accordance with 33 CFR 127.007, each applicant must submit a Letter of Intent (LOI) to the local Captain of the Port (COTP) to begin the LOR process. NorthernStar submitted an LOI to the Coast Guard for the project on January 18, 2005.

On June 14, 2005, the Coast Guard issued a *Navigation and Vessel Inspection Circular – Guidance on Assessing the Suitability of a Waterway for Liquefied Natural Gas (LNG) Marine Traffic* (NVIC 05-05). The purpose of this NVIC is to provide guidance to applicants seeking to construct and operate shore-side LNG import terminals regarding the timing and scope of the Coast Guard process necessary for the consideration of safety and security issues, including LNG marine traffic. NVIC 05-05 itemizes data to be included in a Waterway Suitability Assessment (WSA) to be produced by an applicant, and outlines the roles of the COTP and Federal Maritime Security Coordinators (FMSC) in the review and validation of the WSA by the Coast Guard.

NorthernStar submitted its Preliminary WSA to the Coast Guard on December 29, 2005, and in response to Coast Guard comments, a Follow-on WSA was produced in May 2006. The Coast Guard provided the FERC with its Waterway Suitability Report (WSR) on February 28, 2007. See section 4.11.5 of this EIS for additional discussion of marine safety.

1.3.2 COE Review

The COE is the primary agency responsible for issuing dredging and wetland permits pursuant to section 404 of the CWA and section 10 of the RHA.

1.3.3 Clean Water Act and Rivers and Harbors Act

The CWA (33 USC § 1344) addresses the issue of managing developments to improve, safeguard, and restore the quality of the nation's waters, including coastal waters, and to protect the natural resources and existing uses of those waters. Under section 404 of the CWA, the COE issues permits (after notice and opportunity for public hearings) for the discharge of dredged or fill material into waters of the United States at specified disposal sites. The U.S. Environmental Protection Agency (EPA) has the authority to review and veto COE decisions on section 404 permits. Section 10 of the RHA (33 USC § 403) regulates any work or structures that potentially affect the course, condition, or capacity of a navigable waterway. It requires authorization from the COE for building any wharfs, piers, jetties, or other structures or excavating or filling in any port, navigable river, or other waters of the United States.

NorthernStar must obtain Water Quality Certifications pursuant to section 401 of the CWA and National Pollutant Discharge Elimination System (NPDES) permits pursuant to section 402 of the CWA. The federal authority to issue these certifications and permits has been delegated to the Oregon Department of Environmental Quality (ODEQ) in Oregon and the Washington State Department of Ecology (WDE) in Washington.

On March 8, 2007, NorthernStar submitted its NPDES permit application to the ODEQ. In a letter dated April 18, 2007, the ODEQ informed NorthernStar that it would not process the application until after it receives a Land Use Compatibility Statement (LUCS) from Clatsop County. To cover its proposed actions in Oregon, NorthernStar submitted a Joint Permit Application (JPA) to the COE and ODEQ in October 2006, seeking permits under sections 401 and 404 of the CWA. NorthernStar revised its JPA in March 2007. To obtain permits under sections 401 and 404 of the CWA for its actions in Washington, NorthernStar submitted, also in October 2006, a Joint Aquatic Resources Permit Application (JARPA) to the COE and the WDE. This JARPA was revised in March 2007, then withdrawn by NorthernStar, and resubmitted in October 2007. The COE issued a notice of these applications on October 18, 2007 and participated in a public meeting with the ODEQ regarding the applications on February 13, 2008 (see table 1.3-1). Section 4.3.2 of this EIS contains a more detailed discussion of potential project-related impacts on surface water, including addressing compliance with the CWA.

1.3.4 Clean Air Act

The primary objective of the CAA, as amended, is to establish federal standards for various pollutants from both stationary and mobile sources and to provide for the regulation of polluting emissions via state implementation plans. In addition, the CAA is designated to prevent significant deterioration in certain areas where air quality exceeds national standards and to provide for improved air quality in areas that do not meet federal standards (nonattainment areas).

The EPA has regulatory authority under the CAA. The EPA provides review and oversight of these regulations but has delegated permitting authority to the ODEQ in Oregon and the Southwest Clean Air Agency (SWCAA) in southwest Washington. Emissions from all phases of construction and operation of the proposed LNG terminal and pipeline would be subject to applicable federal and state air regulations. Section 4.10.1 of this EIS has a detailed discussion of air quality issues.

NorthernStar submitted an Air Contaminant Discharge Permit application for the Bradwood Landing Project to the ODEQ on March 28, 2007, and a revised application on April 9, 2007. On April 10, 2007, the ODEQ advised NorthernStar that it found the application incomplete because it did not contain a LUCS from Clatsop County under OAR 340-216-0040(1(k)).

1.3.5 Endangered Species Act

Section 7(a)(1) and (2) of the ESA, as amended, require that federal agencies use their authorities to further the conservation of listed species and that any project authorized, funded, or conducted by a federal agency should not “jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined...to be critical” (16 USC § 1536(a)(1) and (2)(1988)). The lead federal agency, or the applicant as a non-federal party, is required to consult with the U.S. Department of the Interior Fish and Wildlife Service (FWS) and the U.S. Department of Commerce National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) to determine whether any federally listed or proposed endangered or threatened species or their designated critical habitat occur in the vicinity of the proposed project. If, upon review of existing data or data provided by the applicant, the federal agency determines that these species or habitats may be affected by the proposed project, it is required to prepare a biological assessment (BA) to identify the nature and extent of adverse impacts, and to recommend measures that would avoid the habitat and/or species, or would reduce potential impacts to acceptable levels.

The FERC submitted a BA for the Bradwood Landing Project to the NMFS and FWS on March 19, 2007. Because we have found that the project is likely to adversely affect some listed species, our BA requested that the FWS and NMFS develop Biological Opinions (BO) as to whether authorizing the Bradwood Landing Project may jeopardize the continued existence of any listed species. The FWS and NMFS provided comments on the BA in letters dated April 20, and May 11, 2007, respectively. The FERC staff and our third-party environmental contractor participated in a series of meetings and conference calls with representatives of the NMFS, FWS, and NorthernStar to address comments on our BA. The FERC intends to revise its BA in response to the FWS’s and NMFS’s comments, including new information provided by NorthernStar. The FERC will only allow project construction to proceed after we have completed formal consultations with the FWS and NMFS in compliance with the ESA and MSA. See section 4.6 of this EIS for details of our ESA analysis.

1.3.6 Magnuson-Stevens Fishery Conservation and Management Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a federal fisheries management plan. The MSA requires federal agencies to consult with the NMFS on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH (MSA §305(b)(2)). Although absolute criteria have not been established for conducting EFH consultations, the NMFS recommends consolidated EFH consultations with interagency coordination procedures required by other statutes, such as the NEPA, the Fish and Wildlife Coordination Act, or the ESA to reduce duplication and improve efficiency (50 CFR 600.920(e)). As part of the consultation process for this project, we consolidated an EFH Assessment with the BA, prepared pursuant to the ESA, on behalf of the FERC and the federal cooperating agencies for this project. See section 4.5.1.2 of this EIS for the status of the MSA review.

1.3.7 Marine Mammal Protection Act

All marine mammals are protected under the Marine Mammal Protection Act (MMPA) of 1972. This act was amended by the United States Congress in 1994. The MMPA prohibits, with certain exceptions, the taking of marine mammals in United States waters and by United States citizens on the high seas and the importation of marine mammals and marine mammal products into the United States. The term “take,” as defined in section 3 of the MMPA, means “to harm, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal” (16 USC § 1362(13)). “Harassment” is also defined in the MMPA (at USC § 1362(18)) and in regulations promulgated by the NMFS (at 50 CFR 216.3).

Sections 101(a)(5)(A) and (D) of the MMPA direct the U.S. Secretary of Commerce, through the NMFS, to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specific geographic region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of authorization is provided to the public for review. Authorization would be granted by the NMFS if it finds that the taking will have a negligible impact on the species or stock, will not have an unmitigatable adverse impact on the availability of the species or stock for subsistence uses (where relevant), and it prescribes permissible methods of taking, and requirements pertaining to the mitigation, monitoring, and reporting of such taking. NMFS has defined “negligible impact” as “an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.”

NorthernStar has stated that it will apply for an Incidental Harassment Authorization pursuant to MMPA section 101(a)(5)(D). The NMFS may use relevant portions of this EIS during its review, and may adopt measures to protect marine mammals outlined in this EIS. It may also require additional mitigation and monitoring measures to ensure that the taking result in the least practicable adverse impact on affected marine mammal species or stocks. The public would have an opportunity to comment to the NMFS in response to its Notice of Receipt of an application for an Incidental Harassment Authorization, or a request for the implementation of regulations governing incidental taking, and following the publication of the proposed rule.

Impacts from the Bradwood Landing Project on marine mammals are discussed in section 4.6.2. In addition, marine mammals listed under the ESA will be discussed in detail in the revised BA and EFH Assessment.

1.3.8 National Historic Preservation Act

Section 106 of the NHPA requires the lead federal agency to take into account the effects of an undertaking on historic properties, and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. Historic properties are cultural resources that are listed on or eligible for listing on the National Register of Historic Places (NRHP), including prehistoric or historic sites, districts, buildings, structures, objects, or properties of traditional religious or cultural importance. The ACHP promulgated regulations for the implementation of section 106 at 36 CFR 800. In accordance with those procedures, the FERC allowed NorthernStar, as a non-federal party, to assist in the preparation of information and analyses necessary for us to comply with the NHPA. Section 4.9 includes a summary of the status of investigations to comply with the NHPA.

1.3.9 Coastal Zone Management Act

In 1972, Congress passed the CZMA to “preserve, protect, develop, and where possible, to restore or enhance, the resources of the nation’s coastal zone for this and succeeding generations” and to “encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone” (16 USC § 1452, section 303 (1) and (2)).

Section 307 (c)(3)(A) of the CZMA states that “any applicant for a required federal license or permit to conduct an activity, in or outside the coastal zone, affecting any land or water use or natural resource of the coastal zone of that state shall provide a certification that the proposed activity complies with the enforceable policies of the state’s approved program and that such activity will be conducted in a manner consistent with the program.” In order to participate in the coastal zone management program, a state is required to prepare a program management plan for approval by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coast and Ocean Resource Management (OCRM). Once the OCRM has approved a plan and its enforceable program policies, a state program gains “federal consistency” jurisdiction. This means that any federal action (e.g., a project requiring federally issued licenses or permits) that takes place within a state’s coastal zone must be found to be consistent with state coastal policies before the federal action can take place.

The Columbia River Basin is exempt from the CZMA, except for the zone of significant tidal influence. The only part of the Bradwood Landing Project subject to federal CZMA review is the LNG import terminal at Bradwood. None of the proposed project facilities fall within the Washington coastal zone.

The Oregon Department of Land Conservation and Development (ODLCD) is the state’s designated coastal management agency and has established the Oregon Coastal Management Program (OCMP). The program’s mission is to work in partnership with coastal local governments, state and federal agencies, and other stakeholders to ensure that Oregon’s coastal and ocean resources are managed, conserved, and developed consistent with statewide planning goals. To accomplish this mission, the program combines various state statutes for managing coastal lands and waters into a single, coordinated package. These include: 1) the 19 Statewide Planning Goals, which are Oregon’s standards for comprehensive land use planning; 2) city and county comprehensive land use plans; and 3) state agencies and natural resource laws such as the Oregon Beach Bill and the Removal-Fill Law.

Under the provisions of the CZMA, NorthernStar must provide a certification to the FERC and the ODLCD that the project complies with and will be conducted in a manner consistent with the state’s approved management program (15 CFR 930.50 Subpart D). NorthernStar submitted its federal consistency certification to the ODLCD on December 8, 2006 with a request for a formal determination of consistency. In a letter to NorthernStar dated January 5, 2007, the ODLCD requested additional information before it would begin its consistency review. NorthernStar submitted a revised consistency certification on October 23, 2007. On November 21, 2007, ODLCD determined that its 6-month review period began with the submission of the revised consistency certification. On April 9, 2008, NorthernStar signed a Stay Agreement with the ODLCD that provides a 150-day extension period when NorthernStar can provide the ODLCD with additional information about its project. On May 9, 2008, the ODLCD issued a data request to NorthernStar seeking clarification about project elements. The ODLCD expects to make its decision regarding the project’s consistency with the CZMA on or before September 21, 2008. See section 4.7.2.4 of this EIS for further information regarding compliance with the CZMA.

1.3.10 U.S. Department of Defense Consultation

We have consulted with the U.S. Department of Defense (DOD), as required by the Energy Policy Act of 2005 (EPAct) and section 3 of the NGA, to determine if there would be any impacts associated with the project on military training or activities on any military installations. No comments or concerns were received from any branch of the military or a military installation in response to the FERC's scoping notice issued September 13, 2005.

In letters dated September 23, 2005 and January 11 2006, to appropriate property managers and installation supervisors at the Pentagon representing the Army, Air Force, and Navy, and the COE, we informed various offices of the DOD of the Bradwood Landing Project and requested any information on impacts on military installations. On August 17, 2007, the FERC provided the DOD with copies of the draft EIS, and requested comments. Since no effects have been identified, we conclude that there would be no impact on military installations associated with this project, and therefore, no concurrence from the Secretary of Defense is required under the EPAct.

1.3.11 Other State Permits and Approvals

In addition to the federal permitting authorities that have been delegated to the states, as discussed above, various laws and regulations promulgated by the States of Oregon and Washington have relevance to the Bradwood Landing Project. In addition to the permits, approvals, and consultations listed in table 1.3-1, the Coast Guard worked with representatives of the States of Oregon and Washington in reviewing the WSA for the project.

The FERC encourages cooperation between applicants and state and local authorities, but this does not mean that state and local agencies, through application of state and local laws, may prohibit or unreasonably delay the construction or operation of facilities approved by the FERC. Any state or local permits issued with respect to jurisdictional facilities must be consistent with the conditions of any Certificate the FERC may issue.⁸

Oregon

The ODE is the appropriate state agency designated by the Governor of Oregon to consult with the FERC on state considerations related to the Bradwood Landing Project according to the EPAct. On July 6, 2006, the ODE submitted a safety advisory report to the FERC for its consideration in reviewing the Bradwood Landing Project. On December 6, 2006, the ODE conveyed a Clatsop County Emergency Services Report, and requested that the Commission consider making the provision of resources outlined in the report a condition to the authorization for the project.

Under Oregon's Removal-Fill Law (Oregon Revised Statute (ORS) 196.795-990), permits are issued by the Oregon Department of State Lands (ODSL) for:

- projects requiring the removal or fill of 50 cubic yards or more of material in waters of the state;
- the removal or fill of any material regardless of the number of cubic yards affected in a stream designated as essential salmon habitat; and

⁸ See, e.g., *Schneidewind v. ANR Pipeline Co.*, 485 U.S. 293 (1988); *National Fuel Gas Supply v. Public Service Commission*, 894 F.2d 571 (2d Cir. 1990); and *Iroquois Gas Transmission System, L.P., et al.*, 52 FERC ¶ 61,091 (1990) and 59 FERC ¶ 61,094 (1992).

- the removal or fill of any material from the bed and banks of scenic waterways regardless of the number of cubic yards affected.

All permits include standard and special design and operating conditions that are intended to ensure the protection, conservation, and best use of the state's water resources and to prevent harm to fishery and recreational uses of the waters. A common condition is that the project be conducted during the "in-water work period" established by the Oregon Department of Fish and Wildlife (ODFW) for the specific waterbodies. For projects involving impacts on wetlands, compensatory mitigation to offset loss of wetland resources is required per Oregon Administrative Rule (OAR) 141-085-0121.

A JPA is used for the Oregon Removal-Fill Permit and the COE Permit under section 10 of the RHA and section 404 of the CWA as described above. However, the JPA must be submitted to both agencies and separate permits are issued.

The purpose of the Fish and Wildlife Habitat Mitigation Policy (HMP) (OAR 345-022-0060) is to apply consistent goals and standards to mitigate impacts on fish and wildlife habitat caused by land and water development actions. The policy provides goals and standards for general application to individual development actions, and for the development of more detailed policies for specific classes of development actions or habitat types. In implementing this policy, the ODFW will recommend or require mitigation for losses of fish and wildlife habitat resulting from development actions. Priority is given for native species. Section 4.5.2.4 includes a detailed discussion of NorthernStar's compliance with this policy.

Oregon permits and authorizations relevant to the Bradwood Landing Project are listed in table 1.3-1. On December 18, 2007, the State of Oregon filed consolidated comments on our draft EIS. We address those comments in Appendix K of this final EIS.

Washington

In Washington, state and county agencies conduct environmental reviews of proposed projects pursuant to the State Environmental Policy Act (SEPA) (Chapter 43.21C Revised Code of Washington (RCW)). The SEPA process involves the identification and evaluation of probable environmental impacts, and the development of mitigation measures that will reduce adverse environmental impacts. Cowlitz County is the lead SEPA agency for the Bradwood Landing Project and is responsible for compliance with SEPA procedural requirements as well as for compiling and assessing information on the environmental aspects of the proposal for all agencies with jurisdiction in Washington. As the lead SEPA agency, Cowlitz County is also responsible for the threshold determination⁹ and preparation and content of an EIS when required.

Cowlitz County could adopt this EIS for the Bradwood Landing Project if its independent review confirms that the document is adequate, meets the county's environmental review standards, and the requirements of the State of Washington Administrative Code (WAC) 197-11-610 and 197-11-630. If the county decides to adopt this EIS, it would fill out and circulate the adoption form in WAC 197-11-965 to agencies with jurisdiction and to persons or organizations that have expressed an interest in the proposal. No action may be taken on the proposal until 7 days after the statement of adoption form has been issued. Once the 7-day waiting period is completed, the state and local agencies could begin issuing permits.

⁹ A SEPA threshold determination is the formal decision as to whether or not the proposal is likely to cause a significant adverse environmental impact that requires review in an EIS.

The Growth Management Act was passed in 1990 to address what the Washington State Legislature referred to as uncoordinated and unplanned growth that posed a threat to the environment, sustainable economic development, and the quality of life in Washington. The Growth Management Act requires state mandated comprehensive planning for the most populated and fastest growing counties of the state. Because Cowlitz County is not such a county, it is not subject to most provisions of the act. However, the Growth Management Act also mandates that all counties develop and adopt an ordinance that classifies, designates, and protects critical areas. Cowlitz County has implemented a Critical Areas Ordinance, set forth as Chapter 19.15 of the Cowlitz County Code (CCC). Cowlitz County is currently in the process of updating this ordinance.

Critical areas may contain valuable natural resources; perform important ecological functions and processes; or, if developed, present potential hazards to life and property. In conjunction with other applications, the county reviews critical areas relative to the following:

- Wetlands – Provide numerous valuable functions, including but not limited to providing wildlife and fish habitat, water quality enhancement, flood and erosion control, and aquifer recharge and discharge.
- Geologic hazards – Pose a risk to public and private property and to the natural systems that make up the county’s environment. Such areas are susceptible to landslides, erosion, seismic activity, volcanic activity, or mining hazards. Future developments should be directed to more geologically stable areas and away from unsuitable ground.
- Aquifer recharge areas – Perform many important biological and physical functions that benefit the county and its residents, including storing and conveying groundwater. Protection of aquifer recharge areas is necessary to protect valuable groundwater resources.
- Fish and wildlife habitat conservation areas – Perform many physical and biological functions that include but are not limited to providing opportunities for food, cover, nesting, breeding, and movements for fish and wildlife; maintaining and promoting diversity of species and habitat; and helping to maintain air and water quality.
- Frequently flooded areas – Pose a risk to public and private property and public health. Regulation of these lands promotes efficient use of the land and water resources by allocating frequently flooded areas to the uses for which they are best suited and to discourage obstructions to flood flows.

Designated critical areas affected by the Bradwood Landing Project are identified and discussed in the applicable resource sections in section 4.0 of this EIS.

The Shoreline Management Act was passed by the Washington State Legislature in 1971. The Shoreline Management Act is the principal means of regulating shoreline land and water uses throughout the state and requires cities and counties to develop Shoreline Master Programs (SMP). The WDE reviews and formally adopts the programs. The SMPs must be consistent with statewide policies but contain specific regulations and policies that are tailored to local conditions to promote orderly and reasonable development of waterfront lands. The overall intent is to protect the resources and ecology of Washington’s largest streams, lakes, and marine waters. Shoreline permit decisions are made and issued by local governments; however, the WDE reviews those decisions. In addition, for shoreline conditional use or variance permits, the WDE is responsible for approving, denying, or approving with additional conditions, the local decision.

Requests for shoreline development permits in Cowlitz County are reviewed under the criteria established by the Shoreline Management Act through Cowlitz County's SMP adopted in 1977, and through the authority of Chapter 19.20 of the CCC. Detailed information on the designated shorelines crossed by the proposed pipeline is presented in section 4.3.2.1.

Other Washington permits and authorizations are listed in table 1.3-1. On December 18, 2007, Cowlitz County filed comments on our draft EIS. The Washington Department of Natural Resources (WDNR) provided comments in letters dated December 20, 2007 and January 3, 2008; the WDE commented on December 21, 2007; the WUTC provided comments in a letter dated December 11, 2007; and the Washington Department of Fish and Wildlife (WDFW) filed comments on January 2, 2008. We address these comment letters in Appendix K.

1.4 PUBLIC REVIEW AND COMMENT

The Commission developed its environmental Pre-filing Review Process to encourage the early involvement of interested stakeholders, facilitate interagency cooperation, and identify and resolve issues before an application is filed with the FERC. The FERC issued regulations for our Pre-filing Review Process on October 7, 2005, in Docket No. RM05-31-000, Order No. 665. However, those procedures did not apply to NorthernStar because it came in for Pre-filing before the regulations were issued. Instead, NorthernStar followed preliminary guidance provided by the FERC's Office of Energy Projects (OEP) (prepared on February 10, 2004).

On February 23, 2005, NorthernStar filed a request with the FERC to implement the Commission's Pre-filing Process for the Bradwood Landing Project. On March 7, 2005, the FERC granted NorthernStar's request and established a Pre-filing docket number (PF05-10-000) to place information related to the project into the public record.

The FERC introduced NorthernStar's proposal to various stakeholders by issuing a Pre-filing Process Review Notice on March 18, 2005. This notice was sent to elected federal, state, and local government officials; agency representatives; environmental and public interest organizations; Native American tribes; and local libraries and newspapers.

As part of the Commission's Pre-filing Process, NorthernStar initiated a public outreach program during the preliminary design stage of the project. An article about the proposed project appeared in the Daily Astorian on February 23, 2005. NorthernStar established an internet webpage that described the project, mentioned key management team members, outlined potential environmental impacts, and addressed frequently asked questions. NorthernStar contacted and/or met with federal and state regulatory and resource agencies and interested environmental groups, and took agency representatives on site visits. The general public was given an opportunity to learn more about the project at a series of open houses held by NorthernStar including those in Astoria, Oregon (May 19, 2005), Longview, Washington (September 28, 2005), and Knappa, Oregon (September 29, 2005). The FERC staff also was in attendance at NorthernStar's open houses to answer questions from the public. On May 14, 2005, NorthernStar hosted a public tour of the Bradwood LNG terminal location. NorthernStar presented information about the project to an audience of 125 at a special meeting of the Board of Wahkiakum County Commissioners on May 17, 2005.

TABLE 1.3-1

Major Permits, Approvals, and Consultations for the Bradwood Landing Project

Agency	Authority/Regulation/Permit	Agency Action	Status
FEDERAL			
FERC	NEPA 40 CFR 1500-1508 Sections 3 and 7 of the NGA 18 CFR 380 and Section 311 of EPAct 18 CFR 153, 157, 375, and 385 Order No. 687	Prepare EIS. Issue Approval of Place of Siting, Construction, and Operation of LNG Terminal Facilities (section 3a of NGA). Issue Certificate of Public Convenience and Necessity to construct, install, own, operate, and maintain a pipeline (section 7c of NGA).	FERC issued draft EIS on August 17, 2007. NorthernStar filed applications with the FERC on June 5, 2006.
ACHP	Section 106 of the NHPA 36 CFR 800	Has opportunity to comment on the undertaking.	Pending FERC review of final cultural resources reports, after consultations with State Historic Preservation Offices (SHPO).
U.S. Department of Agriculture, Natural Resources Conservation Service	Farmland Protection Policy Act	Determine if the project would result in the permanent conversion of prime farmland.	Pending.
Coast Guard	33 CFR 127	COTP issues an LOR determining the suitability of the waterway for LNG marine traffic.	NorthernStar submitted LOI to the Coast Guard on January 18, 2005. LOR pending completion of the NEPA review.
	33 CFR 165	Establish safety and security zones for LNG vessels in transit and while docked.	Coast Guard issued WSR on February 28, 2007. NorthernStar issued first annual WSA update on February 28, 2008.
	Ports and Waterway Safety Act Maritime Transportation Act 33 CFR 101, 103, 104, 105	Ensure navigation safety. Develop LNG Vessel Management and Emergency Plan. Review and approve Facility Security Plan.	Pending. Pending.
	NVIC 05-05	Validate WSA and produce WSR.	NorthernStar submitted follow-up WSA to the Coast Guard in May 2006. Coast Guard issued its WSR on February 28, 2007.
COE	Section 10 of the RHA	Issue permit for activities that will occupy, fill, or grade land in a floodplain, streambed, or channel of a stream or other waters of the United States.	NorthernStar submitted its JPA and JARPA to the COE on October 10, 2006; revised JPA on March 2, 2007. NorthernStar withdrew and resubmitted the same JARPA in October 2007.

TABLE 1.3-1 (cont'd)

Major Permits, Approvals, and Consultations for the Bradwood Landing Project

Agency	Authority/Regulation/Permit	Agency Action	Status
	Section 404 of the CWA	Issue permit for the placement of dredged or fill material into waters of the United States, including wetlands.	NorthernStar submitted its JPA and JARPA to COE on October 10, 2006; revised JPA on March 2, 2007. NorthernStar withdrew and resubmitted the same JARPA in October 2007. COE issued its Public Notice on October 18, 2007. COE participated in public meeting on application in February 2008. COE issued information request to NorthernStar on January 14, 2008. NorthernStar submitted responses on February 13 and April 1, 2008.
DOD	Section 311 of the EPA Act and Section 3 of the NGA	Provide information regarding project effects on military installations.	FERC sent letters to DOD dated September 23, 2005, January 11, 2006, and August 17, 2007.
EPA	Section 404 of the CWA	Can veto wetland permits issued by the COE.	NorthernStar submitted its JPA and JARPA to the COE on October 10, 2006; revised on March 2, 2007. NorthernStar withdrew and resubmitted the same JARPA in October 2007. EPA commented on the draft EIS in a letter dated December 19, 2007.
FWS	Section 7 of the ESA	Consider lead agency determination of effects on federally listed species and their habitat. Provide a BO if the project is likely to adversely affect such species or their habitat.	FERC submitted initial BA on March 19, 2007. FWS requested additional information in letter dated April 20, 2007. FERC's revised BA and EFH Assessment in preparation.
	Fish and Wildlife Coordination Act	Provide comments to prevent loss of and damage to wildlife resources.	Pending review of the FERC's revised BA and EFH Assessment.
	Migratory Bird Treaty Act	Review the proposed project for consistency with Executive Order 13186.	Pending review of this final EIS.
NMFS	Section 7 of the ESA	Consider lead agency determination of effects on federally listed species and their habitat. Provide a BO if the project is likely to adversely affect such species or their habitat.	FERC' submitted initial BA March 19, 2007. NMFS requested additional information in letter dated May 11, 2007. FERC's revised BA and EFH Assessment in preparation.
	MMPA 50 CFR 216	Consult on protected marine mammals.	Pending review of the FERC's revised BA and EFH Assessment and this final EIS. NorthernStar intends to apply for an Incidental Harassment Authorization post-FEIS.

TABLE 1.3-1 (cont'd)

Major Permits, Approvals, and Consultations for the Bradwood Landing Project

Agency	Authority/Regulation/Permit	Agency Action	Status
	MSA	Provide conservation recommendations for projects that may adversely impact EFH.	FERC's revised EFH Assessment will be included with revised BA.
DOT, PHMSA	LNG Facilities Petition for Approval	Issue approval that the new LNG facility meets standards governing siting, design, installation, personnel qualifications, and training.	Pending.
	Natural Gas Pipeline Safety Act 49 USC 601 49 CFR Parts 190-199	Administer national regulatory program to ensure the safe transportation of natural gas.	Pending.
U.S. Department of the Treasury, Bureau of Alcohol, Tobacco, and Firearms	Explosives User Permit 27 CFR 555	Issue permit to purchase, store, and use explosives during project construction.	Permit to be obtained by NorthernStar before construction.
STATE – OREGON			
Oregon Department of Agriculture (ODA)	Oregon Endangered Species Act Oregon Senate Bill 533 and Oregon Revised Statute (ORS) 564	Consult on Oregon listed plant species, and ODA would review botanical survey reports covering non-federal public lands where state listed plant species are likely to occur prior to ground disturbing activities.	Pending review of the FERC's revised BA and EFH Assessment and submittal by NorthernStar of preconstruction botanical species surveys.
ODE	Section 311 of the EPAct	Furnish an advisory report to the FERC on state and local safety considerations, and conduct operational safety inspections.	Letters from ODE to the FERC dated July 6, 2006 and December 6, 2006. Consolidated comments of all Oregon agencies on the draft EIS dated December 13, 2007. Provided report on LNG and natural gas review through the Governor on May 9, 2008.
ODEQ	Section 401 of the CWA	Water quality certification.	JPA for water quality and wetlands submitted by NorthernStar on October 10, 2006; revised on March 2, 2007. NorthernStar withdrew and resubmitted the same JARPA in October 2007. Public meeting on permit application held in February 2008.
	Section 402 of the CWA	Issue NPDES permits for discharge of hydrostatic test water, SCV condensate, and stormwater.	NPDES application submitted by NorthernStar on March 8, 2007. ODEQ requested LUCS in letter dated April 18, 2007.
	CAA	Issue air quality permit.	Air Contaminant Discharge Permit application submitted by NorthernStar on March 28, 2007; revised April 9, 2007. ODEQ requested LUCS in letter dated April 10, 2007.

TABLE 1.3-1 (cont'd)

Major Permits, Approvals, and Consultations for the Bradwood Landing Project

Agency	Authority/Regulation/Permit	Agency Action	Status
ODFW	Water Pollution Control Facility Permit under OAR 340-045 and ORS 4688 et seq.	Issue permit for the disposal of solid waste and waste water into public waters, including hydrostatic test water release.	Pending.
	Fish and Wildlife Coordination Act and the Oregon Endangered Species Act under OAR 635 and ORS 496, 506, and 509	Consult on sensitive species and habitats that may be affected by the project and, in general, regarding conservation of fish and wildlife resources. Fish passage approval from ODFW for stream crossings.	Pending review of the FERC's revised BA and EFH Assessment and NorthernStar's submittal of preconstruction fish and wildlife species surveys.
	Fish and Wildlife HMP OAR 345-022-0060	Consult on and approve fish and wildlife mitigation plan.	Pending review of revised Compensatory Mitigation Plan to be submitted by NorthernStar in May 2008.
Oregon Department of Forestry	Oregon Forest Practices Act OAR 629, ORS 477 and 527	Monitors timber harvests on private lands and protects non-federal public and private lands from wildfires.	
ODLCD	CZMA 15 CFR 930 ORS 196.435	Consider consistency with CZMA program policies.	NorthernStar submitted its consistency certification to the ODLCD on December 8, 2006 and submitted a revised consistency certification on October 23, 2007. On November 21, 2007, ODLCD determined that its 6-month review period began with the submission of the revised consistency certification. ODLCD participated in public meeting about application in February 2008. On April 9, 2008 ODLCD signed a Stay Agreement with NorthernStar, adding 150 days to the application review period. ODLCD issued a data request to NorthernStar on May 9, 2008.
SHPO	Section 106 of the NHPA ORS 338.920	Review cultural resources reports and comment on recommendations for NRHP eligibility and project effects. Issue permits for surveys on non-federal public lands and permits for excavations on non-federal public and private lands.	In a letter dated April 4, 2006, the SHPO commented on NorthernStar's first draft survey reports. NorthernStar filed revised reports with the FERC on November 16, 2006, and SHPO commented on those reports in a letter dated November 22, 2006. Final SHPO comments pending NorthernStar's submittal of results of post-Order cultural resources surveys.
ODSL	Submerged and Submersible Land Easement OAR 141-122	Grant submerged land easements (e.g., waterbody crossings).	Pending.

TABLE 1.3-1 (cont'd)

Major Permits, Approvals, and Consultations for the Bradwood Landing Project

Agency	Authority/Regulation/Permit	Agency Action	Status
	Sand & Gravel Lease or License OAR 141-014	Grant lease or license for removal of material (and payment of royalties) in connection with turning basin dredging.	Pending.
	Joint Removal-Fill Permit ORS 196.795-990	Approve removal or fill of material in waters of the state.	JPA submitted by NorthernStar on October 10, 2006 and revised on March 2, 2007. NorthernStar withdrew and resubmitted the same JARPA in October 2007.
	Compensatory Wetland Mitigation Rules OAR 141-085-0121	Review and approve wetland mitigation plans.	Pending review of the revised Compensatory Mitigation Plan to be filed by NorthernStar in May 2008.
Oregon Department of Transportation (ODOT)	Section 303(c) DOT Act 49 CFR 303	Consultation and clearance letter regarding recreational land disturbance and construction-related traffic impacts.	Pending.
Oregon Department of Water Resources (ODWR)	Access Permit ORS 184, OAR 734-051	Issue permits to cross state funded roadways.	Permit application pending.
	ORS 537, OAR 690-310	Issue permits to appropriate surface water and groundwater during project operation.	Applications for Permit to Use Surface Water and Permit to Use Ground Water submitted by NorthernStar on February 28, 2006. ODWR drafted proposed orders on September 4, 2007. Final orders pending.
	ORS 537, OAR 690-340	Issue limited licenses for temporary use of surface waters for hydrostatic testing and suction dredging.	Limited licenses (LL-947, LL-948, LL-949) issued April 25, 2006.
Oregon Public Utilities Commission	OAR 860-031	Inspect the natural gas facilities for safety.	Pending.
STATE – WASHINGTON			
SHPO	Section 106 of the NHPA	Review cultural resources reports and comment on recommendations for NRHP eligibility and project effects.	SHPO commented on definition of area of potential effect (APE) in a January 19, 2006 letter. NorthernStar filed a revised pipeline survey report with the FERC on November 16, 2006. The FERC requested consultation in a letter to the SHPO dated November 24, 2006. SHPO commented on revised report on November 27, 2006. Final SHPO comments pending NorthernStar's submittal of results of post-Order cultural resources surveys.

TABLE 1.3-1 (cont'd)

Major Permits, Approvals, and Consultations for the Bradwood Landing Project			
Agency	Authority/Regulation/Permit	Agency Action	Status
WDE	Section 401 of the CWA	Water Quality Certification.	NorthernStar submitted its JARPA on October 10, 2006 and revised its JARPA in March 2007. NorthernStar withdrew and resubmitted the same JARPA in October 2007. WDE commented on draft EIS in a letter dated December 21, 2007.
	Section 402 of the CWA	Issue NPDES permits for hydrostatic test water discharge and construction stormwater discharge.	NPDES applications to be submitted by NorthernStar prior to construction.
Washington State Department of Labor and Industries	Explosives User Permit WAC 291-52-64005	Issue permit to purchase, store, and use explosives during pipeline construction.	Permit to be obtained by NorthernStar before construction.
WDNR	Forest Practices Act RCW 76.09 and WAC 222	Issue Forest Practices Permit.	Permit application pending. WDNR commented on the draft EIS in letters dated December 20, 2007 and January 3, 2008.
	Aquatic Lands Use and Lease Authorization RCW 79.105 and WAC 332-30	Authorize use of state-owned aquatic lands for waterbody crossings.	Application pending.
Washington State Department of Transportation (WDOT)	State Highway Crossing Permit RCW 47.44 and WAC 468-34	Consider issuance of permits to cross state highways.	Permit application pending.
WUTC	WAC 480-93	Inspect the natural gas pipeline for safety.	Inspections would begin during construction. WUTC commented on the draft EIS in a letter dated December 11, 2007.

TABLE 1.3-1 (cont'd)

Major Permits, Approvals, and Consultations for the Bradwood Landing Project

Agency	Authority/Regulation/Permit	Agency Action	Status
LOCAL			
Clatsop County, Oregon	Multiple Land-use Permits and Approvals	Review consolidated application for compliance with local and state land use plans and regulations. Issue permits and approvals, including LUCS.	Initial consolidated application submitted by NorthernStar in December 2006; supplemental information provided February 2007. County determined application complete on February 14, 2007. County Planning Commission held public hearings on application in July 2007. In August 2007, the Planning Commission recommended approval of the application to the Board of County Commissioners. Board of County Commissioners held public hearings in October 2007. Preliminary approval by Board of County Commissioners in December 2007. Final decision accepting NorthernStar's proposed land use changes made by the Board of County Commissioners on March 20, 2008. County wrote letters to the FERC dated November 12, 2007 and February 22, 2008, and the FERC responded in a letter dated April 4, 2008.
	Section 311 of EPAct	Review and provide consultation regarding NorthernStar's Emergency Response Plan (ERP).	Draft ERP distributed February 2007. Final ERP pending.
Pacific County, Washington	Section 311 of EPAct	Review and provide consultation regarding NorthernStar's ERP.	Draft ERP distributed February 2007. Final ERP pending.
Wahkiakum, Washington	Section 311 of EPAct	Review and provide consultation regarding NorthernStar's ERP.	Draft ERP distributed February 2007. Final ERP pending. Wahkiakum County wrote a letter to the FERC dated December 18, 2007.
Cowlitz County, Washington	SEPA Chapter 43.21C RCW	Complete SEPA review of the proposed project.	County would do SEPA review concurrent with the NEPA review. County submitted comments on draft EIS in a letter dated December 11, 2007.
	Shoreline Management Act	Issue Shoreline Development Permit to cross waterbodies covered by the Shoreline Management Act.	NorthernStar submitted an Environmental Criteria Consistency Evaluation in October 2007.

TABLE 1.3-1 (cont'd)

Major Permits, Approvals, and Consultations for the Bradwood Landing Project

Agency	Authority/Regulation/Permit	Agency Action	Status
All Counties	Critical Areas Ordinance under State of Washington Growth Management Act	Review consistency of the project with the county Critical Areas Ordinance.	NorthernStar submitted an Environmental Criteria Consistency Evaluation in October 2007.
	Floodplain Management Ordinance	Consider issuance of permit to cross floodplains covered by the Floodplain Management Ordinance.	NorthernStar submitted an Environmental Criteria Consistency Evaluation in October 2007.
	Gas and Oil Pipeline Ordinance	Consider issuance of a General Permit under the Gas and Oil Pipeline Ordinance.	NorthernStar submitted an Environmental Criteria Consistency Evaluation in October 2007.
	Forest Lands Conversion Ordinance	Consider issuance of a Class IV-General Forest Practice Permit.	NorthernStar submitted an Environmental Criteria Consistency Evaluation in October 2007.
	Road Crossing Permits	Consider issuance of permits to cross county roads.	Permits to be obtained by NorthernStar before construction.
	Grading Permits	Consider issuance of permits for excavation and grading activities.	Permits to be obtained by NorthernStar before construction.
	Solid Waste Disposal	Consider approvals to dispose of solid waste generated by construction.	Permits to be obtained by NorthernStar before construction.

On September 13, 2005, the FERC and Coast Guard jointly issued a *Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Bradwood Landing LNG Project, Request for Comments on Environmental Issues, and Notice of Joint Public Meeting, and Site Visit* (NOI). The NOI was sent to 1,093 interested parties including federal, state, and local elected officials; government agency representatives; environmental and public interest groups; Native American tribes; local libraries and newspapers; landowners adjacent to the proposed LNG terminal; and property owners along the proposed pipeline route. The FERC's comment period for the NOI closed on October 17, 2005. A total of 60 letters were received during the NOI comment period.

The Coast Guard issued an NOI for preparing an LOR as to the suitability of the Columbia River for LNG marine traffic on September 9, 2005. The NOI requested comments specifically related to the maritime safety and security aspects of the proposed Bradwood Landing LNG facility. The Coast Guard's comment period for the NOI closed on October 6, 2005 and 22 letters were received. These letters were filed with the FERC public record on November 1, 2005.

On September 29, 2005, the Coast Guard and FERC staff conducted a joint public scoping meeting in Knappa, Oregon, to provide an opportunity for the general public to learn more about the proposed project. The meeting also allowed the public to comment on issues to be included in the EIS and issues related to the LOR. Thirty-seven people commented at the meeting. A transcript of these comments is part of the public record for the Bradwood Landing Project and is available for viewing on the FERC internet website (<http://www.ferc.gov>).¹⁰ FERC staff went on a site visit, open to the public, to selected points along the proposed pipeline route and the LNG terminal location on September 29, 2005. The FERC held a public informational meeting in Cathlamet, Washington on October 26, 2005 to answer questions regarding the Commission's Pre-filing and the NEPA review processes and to describe steps the public could take to participate in those processes. Notes from that meeting were placed into the public record for this proceeding.

In addition to the public notice and scoping processes discussed above, the FERC conducted agency consultations or participated in interagency meetings to identify issues that should be addressed in this EIS. On April 7, 2005, the FERC sent letters to the COE, Coast Guard, NMFS, EPA, FWS, and ODE requesting their cooperation in the preparation of the EIS. A letter was also sent to the WDE on June 24, 2005 requesting that they become a cooperating party, and our September 13, 2005 NOI invited any other federal, state, local, or tribal agency with jurisdiction or special expertise with respect to environmental issues to formally cooperate with us. The COE and Coast Guard agreed to be cooperating agencies. The NMFS, EPA, FWS, ODE, and WDE declined our invitation. Nevertheless, various agencies acted in a cooperative manner during the Pre-filing process, engaging in consultations, attending meetings, and filing comments on NorthernStar's draft environmental resource reports. Interagency meetings held during the Pre-filing period that were attended by the FERC staff are listed in table 1.4-1.

Throughout the public scoping period (coinciding with the Pre-filing Review Process) we received comments on a wide variety of environmental issues. Between March 7, 2005 and June 5, 2006, we received 102 letters about the project, including 43 letters from individuals, 18 letters from organizations, 2 letters from an Indian tribe, 12 letters from federal agencies, and 27 letters from state and local agencies. In these letters, the most frequently mentioned environmental topics were safety (15.8 percent of comments); socioeconomics (12.7 percent of comments); and biological resources, particularly with respect to salmon in the Columbia River (19.2 percent of comments). Table 1.4-2

¹⁰ Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number, excluding the last three digits, in the "Docket Number" field (i.e., CP06-365, CP06-366, CP06-376, and CP06-477). Be sure to select an appropriate date range.

summarizes the environmental issues identified during the Pre-filing public scoping process for the Bradwood Landing Project.

On June 5, 2006, NorthernStar formally filed applications seeking authorizations under section 3(a) and 7(c) of the NGA to construct and operate the Bradwood Landing Project. In response to the FERC's Notice of Application (issued June 15, 2006), a total of 38 parties submitted motions to intervene. Intervenor receive all documentation filed in a proceeding, and have the right to seek rehearing of the Commission's decision. The intervening parties are listed in table 1.4-3. Additionally, between the application's filing date of June 5, 2006 and July 13, 2007, when we finished writing text for the draft EIS, the FERC received 27 letters from individuals, 13 letters from organizations, 3 letters from another LNG developer, 9 letters from members of the U.S. Congress, 3 letters from federal agencies, 7 letters from state or local agencies, and 374 form letters commenting on the project.

After the applications were filed, the FERC staff continued to consult with various federal, state, and local agencies that have regulatory or permitting authorities. The FERC staff participated in a number of post-application interagency meetings, telephone conference calls, and site visits, as shown in table 1.4-1. All of the post-application interagency meetings related to preparation of documentation to comply with the NEPA and other environmental laws and regulations, and are, therefore, exempt from the Commission's ex-parte rules in accordance with section 385.2201(e)(1)(iv). In keeping with the FERC's regulations, notes of all post-application interagency meetings, telephone calls, and site visits were placed into the public record for this proceeding.

The FERC issued a Notice of Availability (NOA) of the draft EIS on August 17, 2007. The NOA established a 120-day period for comments on the draft EIS, ending on December 24, 2007 (later extended to December 26, 2007). A formal notice was also published by the EPA in the Federal Register on August 24, 2007, indicating that the draft EIS was available. The FERC mailed approximately 1,200 copies of the draft EIS to interested parties, including federal, state, and local officials and agencies; special interest groups; parties to the proceedings; area libraries and newspapers; and individuals and affected landowners who requested a copy of the draft EIS.

On October 5, 2007, the FERC issued a notice announcing the time, date, and location of four public comment meetings to take comments on the draft EIS. At the request of the State of Oregon, the FERC added two more public meetings, with details provided in a notice issued on October 25, 2007. Dates and locations of the public meetings are shown in table 1.4-1. A total of about 70 individuals spoke at the public meetings. Transcripts of the six public meetings are part of the public record for the Bradwood Landing Project.

Comments from the public meetings, as well as written comments on the draft EIS submitted by the public and agencies, are provided along with our responses in Appendix K. Excluding the oral comments from the public meetings, the FERC received a total of about 128 individual written letters commenting on the draft EIS (not including attachments, form letters, or filings by the applicants) by the comment closing date of December 26, 2007, including 4 letters from federal agencies, 15 letters from state and local agencies, and 15 letters from non-government organizations. The issues raised in comments on our draft EIS are listed in table 1.4-4. We have made changes in this final EIS, from the draft EIS text, both in response to comments received on the draft EIS and as a result of updated information that became available after issuance of the draft EIS. This final EIS is being mailed to the agencies, individuals, and organizations on the mailing list that is provided in Appendix A, and was submitted to the EPA for formal issuance of a NOA.

Prior to the publication of both the draft and final EIS, the FERC prepared an administrative draft that was distributed in whole or in part to the COE and the Coast Guard for review. Sections of the EIS were written with the cooperation and assistance of these agencies.

TABLE 1.4-1

Public and Interagency Meetings for the Bradwood Landing Project Attended by the FERC Staff

Date	Location	Purpose	Attendees
PRE-FILING MEETINGS			
March 8, 2005	Washington, D.C.	Applicant/Interagency Meeting	FERC, NorthernStar, and ODE
May 18, 2005	Portland, OR	Interagency Meeting	FERC, NorthernStar, EPA, Coast Guard, COE, NMFS, DOT, FWS, ODE, WDE, Oregon Public Utility Commission, Oregon Department of Geology and Mineral Industries (DOGAMI), ODEQ, ODFW, ODOT, WDNR, WDE, Port of Portland, Clatsop County, Wahkiakum County, and Cowlitz County
May 19, 2005	Bradwood, OR	Site visit	FERC, NorthernStar, DOT, EPA, ODOT, and WDE
May 19, 2005	Knappa, OR	Open House and ODOE Public Meeting	FERC, NorthernStar, ODOE, and Public
June 7, 2005	Salem, OR	Meeting with Oregon State Agencies	FERC, NorthernStar, ODE, ODFW, ODSL, ODLCD, Oregon Department of Justice, and DOGAMI
June 7, 2005	Portland, OR	Meeting with Federal Fishery Agencies	FERC, NorthernStar, FWS, and NMFS
June 8, 2005	Portland, OR	Meeting with COE	FERC, NorthernStar, and COE
July 7, 2005	Longview, WA	Meeting with Washington State Agencies	FERC, NorthernStar, Coast Guard, ODE, WUTC, WDE, WDNR, WDFW, Cowlitz County, Wahkiakum County, Port of Kalama, and Port of Longview
July 7, 2005	Portland, OR	Meeting with Fishery Agencies	FERC, NorthernStar, NMFS, ODFW, and WDE
August 25, 2005	Portland, OR	Interagency Meeting	FERC, NorthernStar, COE, FWS, ODFW, Columbia River Intertribal Fisheries Commission (CRITFC), WDE, Nez Perce Tribe, and ODE
September 28, 2005	Portland, OR	Interagency Meeting	FERC, NorthernStar, Coast Guard, COE, NMFS, FWS, EPA, WDFW, ODE, WDE, ODLCD, ODSL, and Cowlitz County
September 28, 2005	Longview, WA	Open House	FERC, NorthernStar, and Public
September 29, 2005	WA and OR	Site Visit	FERC, NorthernStar, and Public
September 29, 2005	Knappa, OR	Public Scoping Meeting	FERC, Coast Guard, NorthernStar, and Public
October 21, 2005	Portland, OR	Interagency Meeting	FERC, NorthernStar, Coast Guard, NMFS, COE, FWS, EPA, ODE, WDE, ODLCD, WDFW, ODFW, ODSL, and Cowlitz County
October 25, 2005	Kelso, WA	SEPA Meeting	FERC, NorthernStar, WDE, WDFW, and Cowlitz County
October 26, 2005	Portland, OR	Interagency Meeting	FERC, NorthernStar, Coast Guard, COE, NMFS, FWS, EPA, ODE, ODLCD, ODFW, ODSL, Cowlitz County, and CRITFC
October 26, 2005	Cathlamet, WA	Public Meeting	FERC, NorthernStar, and Public
November 16, 2005	Lacey, WA	Meeting with Washington State Agencies	FERC; NorthernStar; NMFS; FWS; EPA; WDE; WDNR; WDOT; Washington Department of Community, Trade, and Economic Development; WDFW; Washington SHPO; and Washington Attorney General's Office
November 17, 2005	Portland, OR	Meeting with CRITFC	FERC and CRITFC
January 24, 2006	Portland, OR	Meeting with Warm Springs Tribe	FERC and Warm Springs Tribal Council
January 25, 2006	Portland, OR	Interagency Meeting	FERC, NorthernStar, COE, NMFS, FWS, EPA, ODE, ODLCD, ODFW, ODEQ, ODSL, WDNR, WDE, WDFW, Cowlitz County, CRITFC, Nez Perce Tribe, and Port of Portland

TABLE 1.4-1 (cont'd)

Public and Interagency Meetings for the Bradwood Landing Project			
Date	Location	Purpose	Attendees
POST-APPLICATION MEETINGS			
September 12, 2006	Cathlamet, WA	Vessel Transit Visit	FERC and Coast Guard
September 12, 2006	Portland, OR	Meeting with COE	FERC and COE
September 13, 2006	Portland, OR	Cryogenic Conference	FERC, Coast Guard, NorthernStar, ODE, Oregon Office of the State Fire Marshall, WDNR, Clatsop County, Port of Astoria, and other parties
September 13, 2006	Bradwood, OR	Site Visit	FERC, NorthernStar, WDNR, Clatsop County, CRITFC, Nez Perce Tribe, and public
December 13, 2006	Longview, WA	Meeting with Washington State Agencies	FERC, FWS, WDE, WUTC, WDFW, WDNR, and Cowlitz County
December 13, 2006	Kelso, WA	SEPA Meeting	FERC, NorthernStar, and Cowlitz County
December 14, 2006	Portland, OR	Interagency Meeting on BA	FERC, NorthernStar, Coast Guard, COE, FWS, NMFS, ODFW, ODLCD, CRITFC, and Nez Perce Tribe
August 2007 through January 2008	NA	Series of Conference Calls to Discuss BA and EFH Assessment	FERC, NMFS, FWS, and NorthernStar
November 5, 2007	Clatskanie, OR	Public Comment Meeting on the DEIS	FERC and Public
November 6, 2007	Clatskanie, OR	Public Comment Meeting on the DEIS	FERC and Public
November 6, 2007	Cathlamet, WA	Public Comment Meeting on the DEIS	FERC and Public
November 7, 2007	Longview, WA	Public Comment Meeting on the DEIS	FERC and Public
November 7, 2007	Longview, WA	Public Comment Meeting on the DEIS	FERC and Public
November 8, 2007	Knappa, OR	Public Comment Meeting on the DEIS	FERC and Public

TABLE 1.4-2

**Environmental Issues Identified During the Pre-filing Public Scoping Process
for the Bradwood Landing Project**

Specific Issue/Comment	EIS Section Where Comments are Addressed
PURPOSE AND NEED (3.6 percent of comments)	1.0
Purpose and need for proposed project; economic viability of LNG, natural gas market.	
Environmental costs versus need; local benefits.	
Need for multiple LNG import facilities.	
ALTERNATIVES (7.0 percent of comments)	3.0
Alternative energies and alternative energy sources.	
LNG terminal at alternative onshore sites.	
Alternative pipeline routes.	
Offshore LNG terminal alternatives.	
Alternative LNG storage tank designs and vaporization technologies.	
GEOLOGY (5.5 percent of comments)	4.1
Geologic stability of proposed LNG terminal site; potential for earthquakes and tsunamis.	
Full geotechnical analysis needed.	
Geo-stabilization may need to be increased due to area seismic conditions.	
Potential for flooding to impact project and vice versa.	
SOILS AND SEDIMENTS (2.3 percent of comments)	4.2
Environmental impacts of dredged material placement; best management practices for dredging.	
Potential contamination of soils and sediments.	
Sediment sampling plan is needed.	
Increased erosion due to project.	
Control of the wake from LNG carriers.	
Feasibility of dredging Clifton Channel.	
WATER RESOURCES (7.8 percent of comments)	4.3
Dredging impacts on water quality of Columbia River.	
Impacts on waterbodies (e.g., waterbody crossings); the number of waterbody crossings should be minimized.	
WETLANDS (5.7 percent of comments)	4.4
Impacts on wetlands; wetland delineation required.	
Wetland crossings should be minimized; compensatory wetland mitigation plan should be developed.	
BIOLOGICAL RESOURCES (19.2 percent of comments)	4.5 and 4.6
Direct, indirect, and cumulative impacts on endangered and threatened species, EFH, and other non-listed species.	
Short-term and long-term impacts on fishery resources in Columbia River and Hunt Creek.	
Direct and indirect habitat impacts from dredging and pier construction.	
Impacts on Native American tribal fisheries.	
Project should follow Oregon's Fish and Wildlife HMP.	
BA and EFH Assessment should be prepared.	
Impacts from increased ship traffic, changes in water and air temperature, noise, light, exotic and invasive species, spills of pollutants, and withdrawal of river water.	
LAND USE (4.0 percent of comments)	4.7
Consistency with current land use and zoning.	
Residences are within 0.5 mile of LNG terminal and less than 1,000 feet from LNG carriers.	
Project is within Oregon's coastal zone.	
Impacts on recreation, national historic sites, forestry resources, property rights.	

TABLE 1.4-2 (cont'd)

**Environmental Issues Identified During the Pre-filing Public Scoping Process
for the Bradwood Landing Project**

Specific Issue/Comment	EIS Section Where Comments are Addressed
VISUAL RESOURCES (3.6 percent of comments)	4.7
Visual impacts on residents within 5 miles.	
Alteration/degradation of existing shoreline aesthetic.	
Light pollution.	
SOCIOECONOMICS (12.7 percent of comments)	4.8
Impacts on recreational and commercial fishing, tourism, and property values.	
Additional costs of providing security and emergency response services.	
Project would provide increased revenues and jobs to the area.	
Use of eminent domain; environmental justice issues.	
Economic costs of reduced/constrained shipping on the Columbia River.	
TRANSPORTATION (5.7 percent of comments)	4.8
LNG marine traffic impacts on other ship traffic, railroad traffic, commercial fishing, and recreational boating and fishing.	
Increased vehicle traffic on LNG terminal access road.	
Impacts on local traffic if Astoria Bridge is closed during LNG carrier transits.	
Areas of the LNG carrier safety and security zones need to be defined.	
AIR QUALITY / NOISE (5.5 percent of comments)	4.10
Air emissions from LNG terminal and ships need to address: dust and odors, acidification of regional watersheds, and total air emissions for the life of the project.	
Air quality impacts need to be determined for both Washington and Oregon.	
Impacts of super-cooled air.	
Assess noise impacts on residents within 5 miles of project.	
Accurate assessment of background noise and total noise levels is needed.	
Underwater blasting should be avoided.	
Assess noise impacts (such as pile driving) on aquatic species; provide noise mitigation.	
RELIABILITY AND SAFETY (15.8 percent of comments)	4.11
LNG carrier and terminal are targets for terrorists.	
LNG carrier navigation issues on Columbia River; proximity of populated areas along transit channel; safety and security zone issues.	
Risks and consequences of LNG spill; history of LNG accidents.	
Limited evacuation routes; limited emergency response services.	
CUMULATIVE IMPACTS (1.7 percent of comments)	4.12
Cumulative impacts on biological resources in the Columbia River.	
Cumulative effects for vegetation, wildlife, aquatic species, and their habitats.	
Cumulative impacts on global warming.	

TABLE 1.4-3

Parties Intervening on the Bradwood Landing Project

Interveners	Date Intervention Filed with FERC	Protest or Neutral
FEDERAL AGENCIES		
NMFS	July 5, 2006	Neutral
U.S. Department of the Interior	July 6, 2006	Neutral
NATIVE AMERICAN		
Nez Perce Tribe	June 29, 2006	Neutral
CRITFC	July 7, 2006	Neutral
STATE AGENCIES		
WDE	July 5, 2006	Neutral
WDFW	July 5, 2006	Neutral
WDNR	July 6, 2006	Neutral
WUTC	July 6, 2006	Neutral
ODE	July 7, 2006	Neutral
COUNTIES		
Columbia County, Oregon and the Columbia County Development Agency	July 5, 2006	Neutral
Clatsop County, Oregon	July 6, 2006	Protest
Cowlitz County, Washington	July 6, 2006	Neutral
Wahkiakum County, Washington	July 6, 2006	Neutral
LOCAL GOVERNMENT		
Port of St. Helens	June 30, 2006	Neutral
City of Astoria	July 5, 2006	Neutral
City of Warrenton	July 5, 2006	Neutral
Knappa-Svensen-Burnside Rural Fire Protection District	July 5, 2006	Neutral
Port of Kalama	July 5, 2006	Neutral
City of Clatskanie, Oregon	July 6, 2006	Neutral
Port of Astoria	July 6, 2006	Neutral
Port of Vancouver	July 6, 2006	Neutral
PRIVATE COMPANIES		
Port Westward LNG, LLC	June 20, 2006	Neutral
Northwest Natural	June 30, 2006	Neutral
GTN	July 5, 2006	Neutral
Greenwood Resources	July 6, 2006	Neutral
Williams Northwest	July 6, 2006	Neutral
Renewable Resources	July 6, 2006	Neutral
Southwest Gas Corporation	July 6, 2006	Neutral
PGE	August 29, 2006	Neutral
ORGANIZATIONS/GROUPS		
Columbia Riverkeeper, Sierra Club, Landowners and Citizens for a Safe Community, Rivervision, Wahkiakum Friend's of the River, Friends of Living Oregon Waters, Willapa Hills Audubon Society, Fisherman's Protective Union, Peter Huhtala, and Christian Bock	July 6, 2006	Neutral
Salmon For All	July 10, 2006	Neutral
Northwest Industrial Gas Users	July 6, 2006	Neutral
INDIVIDUALS		
Roy and Minerva Christison and Greg Roy Christison	June 19, 2006	Neutral
Taryn Edwards	June 19, 2006	Neutral
Lawrence and Wanda Derby	June 22, 2006	Neutral
Stephen Rasmussen	June 28, 2006	Stated opposition, but not official protest
William and Doris Dragich Trust	July 6, 2006	Stated opposition, but not official protest
Stephen Fulton	July 7, 2006	Neutral

TABLE 1.4-4

Topics of Comments on the Draft EIS

Topic	Percentage of Comments
Purpose and Need	4
Project Description	1
Pipeline Construction Techniques	1
Palomar Pipeline	1
Alternatives	7
Geology	7
Soils and Sediments	2
Dredging	1
Water Resources	4
Wetlands	3
Upland Vegetation	3
Aquatic Wildlife, Salmonids, and EFH	7
Terrestrial Wildlife	1
Threatened and Endangered Species	1
Mitigation	1
Land Use	3
Socioeconomics	8
Transportation	1
Cultural Resources	1
Air Quality	1
Noise	1
Safety and Security	14
Cumulative Impacts	13
Wording of the EIS	3
EIS Process	1
State Permits/Approvals	1
Miscellaneous	9

2.0 DESCRIPTION OF PROPOSED ACTION

The FERC is the federal agency responsible for authorizing applications to construct and operate onshore LNG import and interstate natural gas transmission facilities. The COE is responsible for issuing dredging and wetland permits for the project. The Coast Guard is responsible for determining the suitability of the waterway for LNG marine traffic. All of the cooperating agencies agree that the action to be studied in this EIS consists of NorthernStar's proposal to construct and operate an LNG import terminal at Bradwood and the related 36.3-mile-long natural gas sendout pipeline connecting the terminal with the Williams Northwest interstate pipeline system. In addition, the EIS will address the potential environmental impacts related to LNG marine traffic in the waterway from the outer limit of the United States territorial sea to the proposed LNG terminal location, including portions of the shoreline within the "Zones of Concern."¹ It will also analyze the environmental impacts associated with the construction and operation of associated nonjurisdictional facilities, including a 1.5-mile-long power line to the LNG terminal.

2.1 PROJECT COMPONENTS

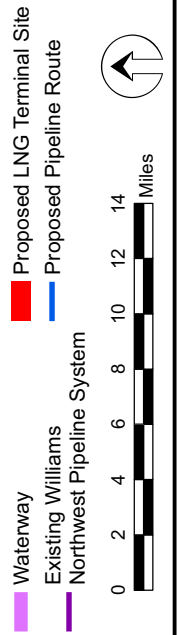
NorthernStar proposes to construct and operate a new LNG import, storage, and vaporization terminal on the southern shore of the Columbia River at Bradwood, Oregon. In addition, NorthernStar proposes to construct and operate a new natural gas pipeline extending from the LNG terminal to an interconnection with the Williams Northwest pipeline north of Kelso, Washington. This project would allow LNG to be imported from areas with natural gas reserves throughout the world to the LNG terminal by ocean-going LNG carriers. The LNG carriers would enter United States territorial waters about 12 nautical miles (13.8 statute miles) off the coast of Oregon and proceed an additional 38 (statute) miles up the Columbia River to Bradwood. At the LNG terminal, the LNG carriers would be berthed and LNG would be unloaded, stored, vaporized back into natural gas, and delivered to the sendout pipeline. NorthernStar's sendout pipeline would convey the natural gas to local users (at Wauna and Port Westward), the local distribution system of Northwest Natural, and the interstate grid through Williams Northwest pipeline system for transportation to markets throughout the Pacific Northwest. No expansions to the Northwest Natural distribution system or Williams Northwest pipeline system would be required to accommodate the new volumes of natural gas to be delivered by the proposed project.

Figure 2.1-1 illustrates the general location of the project. The text below describes LNG carriers, the waterway to the LNG terminal, LNG terminal facilities, pipeline and associated aboveground facilities, and NorthernStar's proposed wetland and habitat mitigation sites. Section 4 of this EIS will address specific environmental resources that may be potentially impacted by the construction and operation of the proposed facilities.

¹ The "Zones of Concern" are described in Enclosure 11 of the Coast Guard's NVIC 05-05. These zones are based on the report *Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water*, December 2004 (SAND2004-6258) prepared by the U.S. Department of Energy's Sandia National Laboratories. The Zones of Concern are more fully discussed in section 4.11 of this EIS.



Figure 2.1-1
Bradwood Landing Project
 General Project Location



2.1.1 LNG Carriers

There are currently 15 LNG exporting nations, which combined represent about 33 percent of the world's natural gas reserves. According to the FERC's regulations for applications under section 3 of the NGA, NorthernStar is not required to reveal market data about its LNG import terminal. NorthernStar has indicated that it expects to receive LNG shipments from countries around the Pacific Basin, and perhaps from the Middle East. LNG exporting countries in the Pacific Basin include Indonesia, Malaysia, and Australia. At this time, NorthernStar has not identified the specific sources of LNG supplies, or provided details about the specific LNG carriers that would be used to transport the LNG from their source to the proposed LNG import terminal. NorthernStar has stated that it expects about 125 LNG carriers per year to unload cargos at its terminal, with LNG carriers ranging in size from 100,000 to 200,000 m³ in capacity. Because we do not know the point of origin of the LNG shipments, we cannot discuss any details about the trans-oceanic voyages of the LNG carriers on their way to the Bradwood Landing LNG import terminal. The narrative below is general in nature, describing typical attributes of LNG carriers. Additional information on LNG carrier regulations and safety measures is presented in section 4.11.5.

Ships that transport LNG are specially designed to carry cold liquids for long distances. LNG carriers combine features of conventional ship design with specialized materials and systems that can safely contain super-cooled liquids. There are currently about 218 LNG carriers operating world-wide, ranging in capacity from 1,100 m³ to 154,000 m³ (LNG Express, 2007). A typical modern LNG carrier would be about 975 feet long, 12 to 15 stories above water, with a beam of about 140 feet across, and a draft about 39 feet deep. Figures 2.1.1-1 and 2.1.1-2 illustrate typical LNG carriers.

As part of the waterway suitability review process, the Coast Guard used criteria developed by Sandia National Laboratories to define the outer limits of the hazard zones for assessing potential risks associated with the project. The Sandia analysis was based on LNG vessels with a capacity of 148,000 m³. Therefore, the proposed action, including the Coast Guard's issuance of an LOR, is based on the assumption that LNG vessels traveling to the Bradwood Landing LNG facility would have capacities of no greater than 148,000 m³. Should NorthernStar wish to receive larger LNG vessels in the future, the Sandia analysis would have to be revisited to determine any changes to the Sandia hazard zones, the WSA/WSR would have to be reviewed to determine if the safety and security measures are adequate to accommodate the larger LNG vessels, and supplemental review under NEPA and other applicable laws and regulations would be required.

2.1.1.1 Profile

LNG carriers have a distinctive appearance compared with other transport ships. An LNG carrier has a high freeboard (i.e., that portion of the ship above water) when compared with vessels such as an oil tanker because of the comparatively low density of the cargo. Because of the high freeboard, wind velocity can adversely affect the maneuverability of the ship, particularly at slow speed, such as during docking.

2.1.1.2 Hull System

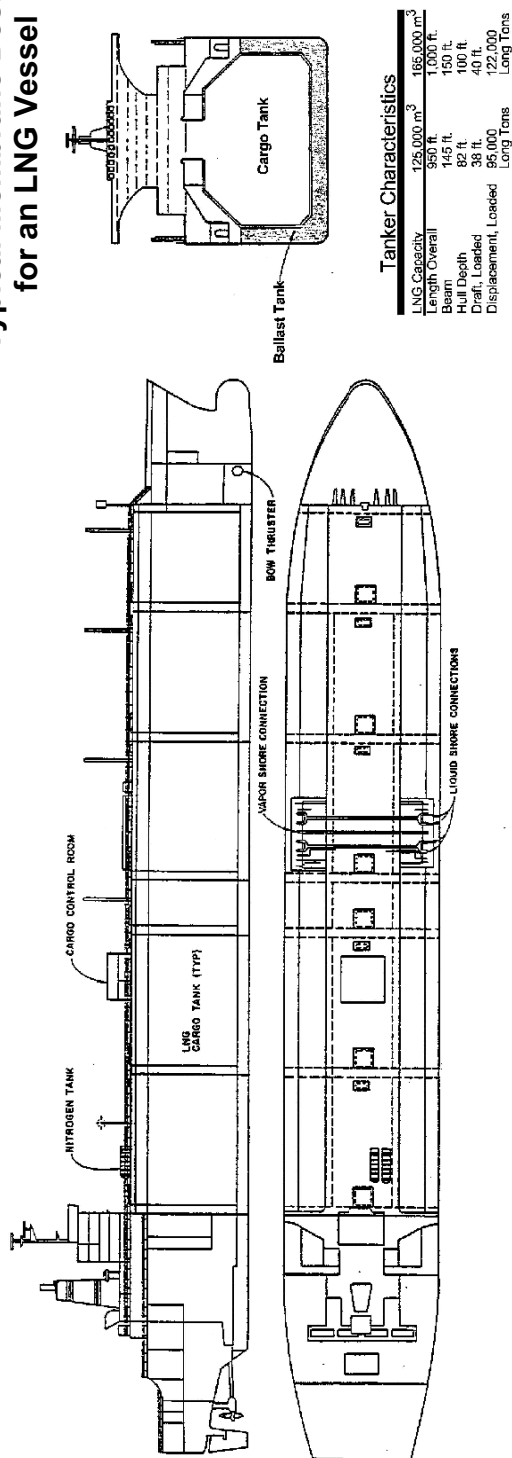
All LNG carriers are constructed with double hulls, which increases the structural integrity of the hull system and provides protection for the cargo tanks in case of an accident. The space between the inner and outer hulls is used for water ballast. The segregated ballast tanks prevent ballast water from mixing with any residue in the cargo tanks. The International Maritime Organization's (IMO) *Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* and Coast Guard regulations require that LNG carriers meet a Type IIG standard of subdivision, damage stability, and cargo tank location.



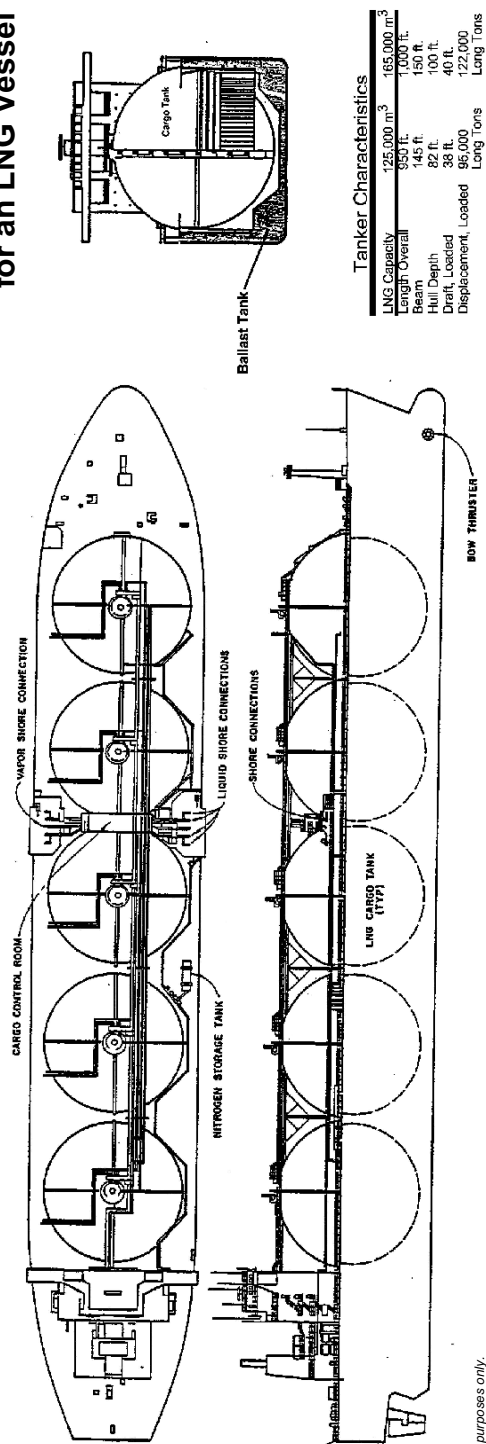
This information is for environmental review purposes only.

Figure 2.1.1-1
Bradwood Landing Project
LNG Carrier with Membrane Type Containment System

Typical Membrane Design for an LNG Vessel



Typical Spherical Design for an LNG Vessel



This information is for environmental review purposes only.

Figure 2.1.1-2
Bradwood Landing Project
Typical Designs for an LNG Carrier

The Type IIG design ensures an LNG carrier could withstand flooding of any two adjacent compartments without any adverse effect upon the stability of the ship. Type IIG design also requires that the cargo tanks must be a minimum of 30 inches from the outer hull and a minimum distance above the bottom of the ship equal to the beam of the ship divided by 15, or 6.5 feet, whichever is less. This distance is intended to prevent damage to the cargo tanks in case of low energy-type accidents that might occur in harbors and during docking. Most large LNG carriers have a distance of 10 to 15 feet between the outer hull and cargo tank.

2.1.1.3 Containment Systems

The LNG containment system on LNG carriers consists principally of the cargo tank (sometimes called a primary barrier), the secondary barrier, and insulation. The containment system also includes cargo monitoring and control and safety systems.

Three basic tank designs have been developed for LNG cargo containment: prismatic free-standing, spherical, and membrane. The earliest form of LNG containment is the prismatic free-standing tank. It consists of an aluminum alloy or 9 percent nickel steel, self-supporting tank that is supported and restrained by the hull structure. Insulation consists of reinforced polyurethane foam on the bottom and the sides, with fiberglass on the top. The spherical tank design, also known as the Moss design, uses an unstiffened, spherical, aluminum alloy tank that is supported at its equator by a vertical cylindrical skirt, with the bottom of the skirt integrally welded to the ship's structure. This free-standing tank is insulated with multi-layer closed-cell polyurethane panels. In the membrane containment system, the membrane is supported by the inner hull through the insulation. Two forms of membrane are commonly used: the Technigaz membrane using stainless steel and the Gas-Transport membrane using Invar. An LNG carrier with a membrane type containment system is shown on figure 2.1.1-1. Figure 2.1.1-2 depicts typical spherical and membrane designs for LNG vessels.

2.1.1.4 Pressure/Temperature Control

A basic goal of all LNG containment systems is to maintain the LNG cargo at or near atmospheric pressure and at the boiling temperature of the LNG (about -260 °F). Any heat leak through the containment insulation results in vaporization of LNG, allowing the tank to remain at a constant temperature. The resultant vapor, referred to as BOG, is removed to maintain the tank pressure. The vapor ranges from 0.15 to 0.25 percent (by volume) per day and is used to supplement the bunker fuel in the ship's boilers. The Coast Guard does not permit routine venting of BOG to the atmosphere in the United States. Thus, all LNG carriers that trade in the United States are fitted with an internalized combustion energy system that allows the ship's boiler to consume all of the BOG to fuel the ship's steam propulsion system. As a result, LNG carriers have reduced emissions when compared with conventional oil-fired ships.

2.1.1.5 Ballast and Cooling Water

Sufficient ballast water capacity must be provided to permit the ship to return to the loading port safely under various sea conditions. LNG cargo tanks are not used as ballast tanks because these tanks remain at cryogenic temperatures and contain a minimal amount of LNG during the return voyage. Consequently, LNG carriers must be designed to provide adequate ballast capacity in other locations.

Ballast water tanks are arranged within the LNG carrier's double hull. To reduce the potential for leakage, the ballast tanks, cofferdams, and void spaces are typically coated to reduce corrosion. LNG carriers are also periodically inspected to examine the coating and to renew it as necessary.

A ballast control system, which permits the simultaneous ballasting during cargo transfer operations, is also incorporated into each LNG carrier. This allows the LNG carrier to stay within a specific range of drafts during all phases of its operation. Under normal operating conditions, ballast water would be taken onto the ship while the LNG carrier is offloading at the LNG import terminal. Ballast water is typically only discharged during loading operations at the LNG export terminal or during mid-ocean ballast water exchanges during the transit from the import terminal to the export terminal. No ballast water would be discharged near the LNG import terminal.

LNG carriers unloading at LNG terminals also need cooling water for the engines that generate electrical power for the offloading pumps and other onboard systems. A combined 20 to 50 million gallons of ballast and engine cooling water is typically taken on during LNG carrier offloading operations. For the Bradwood Landing Project, NorthernStar would construct and install a system capable of delivering filtered river water to the LNG carriers. This system would use a screened water intake located at the ship berth (see figure 2.1.3-3) that would avoid the entrainment and impingement of juvenile fish. The intake water supplied to the LNG carrier would be provided through one of two arrangements. In one arrangement, water supplied to the system would be used first to fill the ballast tanks. Water would then be circulated from the ballast tanks to cool the engines and then returned to the ballast tanks. This arrangement would be used in cases where there are concerns of high static head pressure on the cooling water circuit components. Alternatively, water supplied to the system would be first used to cool the engines and then sent to the ballast tanks. Each of these arrangements provides the benefit of minimizing the total water intake and avoiding discharge of warm water to the Columbia River. In rare instances when the ballast tanks fill before the need for shore-based cooling water is over, the ballast water would be circulated through the engines for cooling after the shore-based water supply is turned off, until the ship is ready to leave the wharf.

NorthernStar has stated it would offer reasonable contract incentives to the LNG suppliers to retrofit the LNG carriers with the piping and equipment necessary to connect with the filtered water supply. The extent of the required modifications would vary depending on the age of the LNG carrier and its type of propulsion (i.e., steam or diesel). In cases where LNG carriers calling at the proposed Bradwood Landing terminal are not properly retrofitted to use the berth's filtered water intake system, NorthernStar would develop appropriate performance standards and detailed operating procedures. We are recommending that NorthernStar develop a plan for delivering screened cooling and ballast water to LNG carriers at the Bradwood Landing terminal. This issue is discussed in more detail in section 4.5.2.1.

2.1.1.6 Ship Safety Systems

The LNG carriers proposed for use in this project would need to comply with all federal and international standards regarding LNG shipping. As such, ships that transport LNG to the proposed import terminal would be fitted with an array of cargo monitoring and control systems. The systems include provisions for pressure monitoring and control, temperature monitoring of the cargo tanks and surrounding ballast tanks, emergency shutdown (ESD) of cargo pumps and closing of critical valves, monitoring of tank cargo levels, and gas and fire detection.

The ships that transport LNG to the terminal would be fitted with many navigation and communication systems, including:

- two separate marine radar systems, including automatic radar plotting;
- automatic identification system;
- communication systems in accordance with the Global Maritime Distress and Safety System;
- echo depth finders; and
- global positioning system for navigation.

All LNG carriers also have redundant, independent steering control systems that are operable from the bridge or steering gear room to maintain rudder movement in case of a steering system failure.

2.1.1.7 Fire Protection

All LNG carriers arriving at the proposed terminal would be constructed according to structural fire protection standards contained in the *International Convention for the Safety of Life at Sea* (SOLAS). This would be done under the review and approval procedures of the Coast Guard.

LNG carriers using the terminal would also be fitted with active fire protection systems that meet or exceed design parameters in Coast Guard regulations and international standards, such as the *Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* and SOLAS including:

- a water spray (deluge) system that covers the accommodation house and central room, and all main cargo control valves;
- a traditional fire suppression system that provides water to fire monitors on deck and to fire stations found throughout the ship;
- a dry chemical extinguishing system for LNG fires; and
- a carbon dioxide (CO₂), Halon, or equivalent fixed inert gas extinguishing system for protecting the machinery, ballast pump room, emergency generators, cargo compressors, etc.

According to the OWRD (Appendix K, comment SA1-38), use of water for testing fire suppression systems would require a permit from the OWRD, but use of water for firefighting does not require a permit.

2.1.1.8 Crew Qualifications and Training

All officers and crews of the LNG carriers would comply with the *International Convention Standards of Training, Certification and Watch Keeping for Seafarers*. Key members of the crew must have specific training in the handling of LNG and the use of the safety equipment. Officers must receive simulator training in the handling of the carrier and the cargo systems specific to the conditions at the project site. In addition, each LNG carrier would enter the Columbia River under the navigational control of a Columbia River Bar Pilot. Upon transiting past the Astoria-Megler Bridge, a Columbia River Pilot would take navigational control from the Columbia River Bar Pilot.

2.1.1.9 Ship Selection

The specific identity of LNG carriers that would unload at the terminal would depend on the commercial terms of the LNG purchase agreements. Transportation could be provided by either the LNG buyer or supplier. The different contractual arrangements for LNG transport can result in carriers of different sizes and countries of origin being used to transport LNG to the project. The Coast Guard would restrict the size of the LNG carriers operating on the Columbia River to a maximum cargo size of 148,000 m³ until additional risk analyses addressing larger vessels have been completed (see section 4.11.5).

Carriers using the terminal would comply with the Coast Guard regulations for LNG carriers. This compliance is demonstrated by the operator of the LNG carrier having proper certificates authorizing the transport of LNG as follows:

- United States Flag LNG Carrier – The Coast Guard Certificate of Inspection (COI) must be valid and endorsed for the carrier to transport LNG (46 CFR 154). A Coast Guard COI is issued for a period of 5 years and retention of the COI depends upon the continued maintenance of the vessel in a safe operating condition and satisfactory completion of required annual inspections during the 5-year COI period.
- Foreign Flag LNG Carrier – The carrier must have a valid Certificate of Compliance (COC) issued by the Coast Guard. The certificate is issued after the carrier has proved that it complies with the Coast Guard regulations and after it has been satisfactorily inspected by a Coast Guard Marine Safety Office (46 CFR 154). A COC is valid for a 2-year period and remains valid pending satisfactory completion of an annual mid-period examination between certificate renewals.

Both United States and foreign flagships must be annually inspected by the Coast Guard and the flag state. Coast Guard officers from Sector Portland, Oregon would be responsible for boarding the LNG carriers prior to the Columbia River Bar crossing to perform security inspections and to assure compliance with safety standards. NorthernStar would continually monitor unloading operations at the LNG terminal to ensure that the operations are according to their established procedures and to ensure that the carriers are maintained to safety standards.

2.1.2 Waterway for LNG Marine Traffic

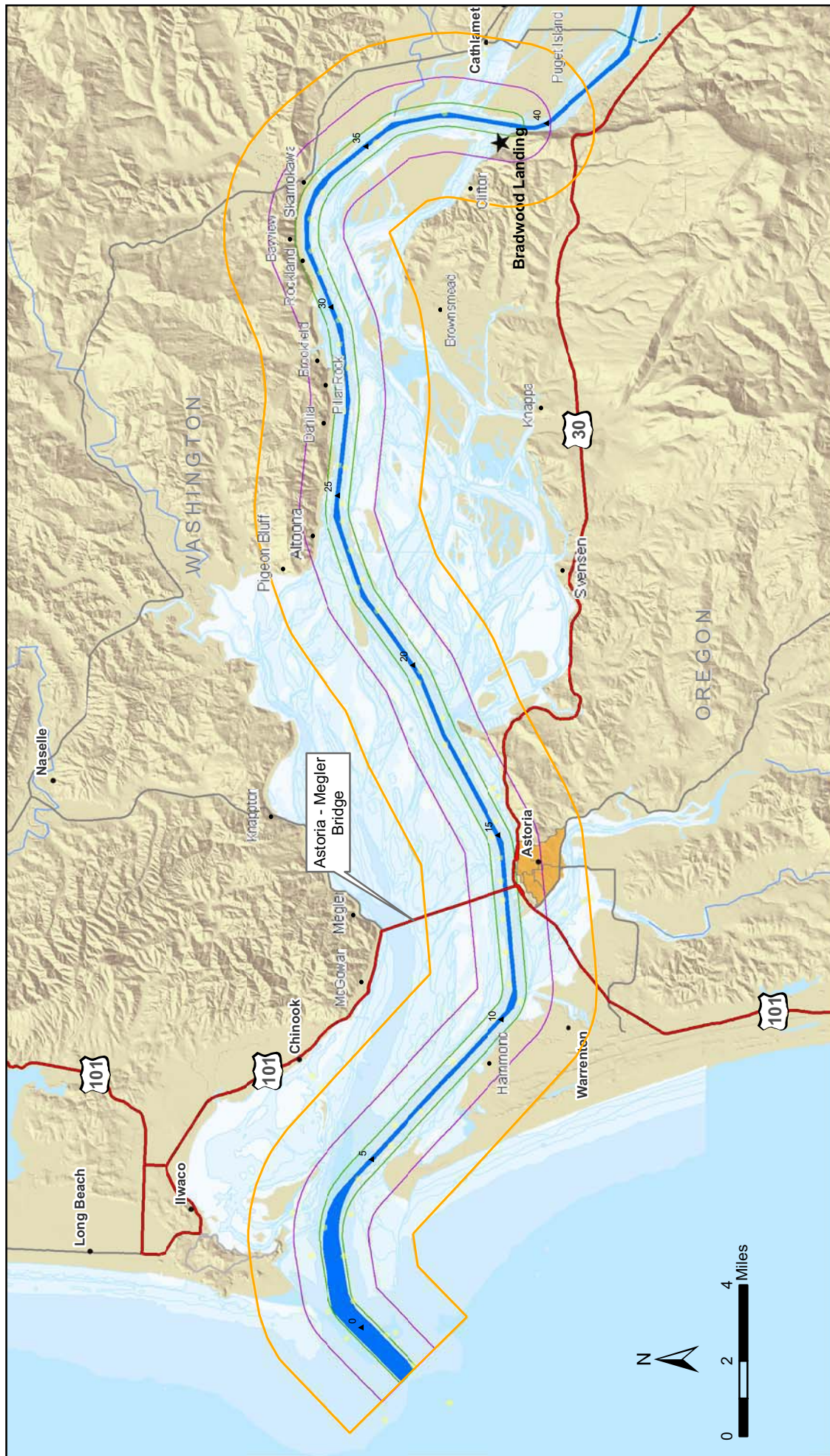
The Coast Guard defines the waterway for LNG marine traffic for this project as extending from the outer limits of the United States territorial waters, 12 nautical miles off the coast of Oregon, and up the Columbia River about 38 miles to the proposed location of the Bradwood Landing LNG import terminal (see figure 2.1.2-1). The Columbia River has an existing dredged federal navigation channel all the way to Portland, Oregon. Improvements to the navigation channel have recently begun to increase the depth to 43 feet; these improvements are expected to be completed before the proposed LNG terminal would go into operation. The COE completed an EIS for its Columbia River dredging project in 1999, which was supplemented in 2003 (COE, 1999; 2003).

2.1.2.1 Waterway Characteristics

The Columbia River originates in British Columbia, Canada, and flows some 745 miles south and west to empty into the Pacific Ocean west of Astoria, Oregon. The federally-maintained navigation channel extends from the mouth up the Columbia River about 104 river miles to Portland, Oregon and Vancouver, Washington and also extends about 12 river miles up the Willamette River at Portland (Port of Portland, 2007a). Near its mouth (Columbia River Mile (CRM) 3) the navigation channel is 600 feet wide and 40 feet deep, as a result of a federal channel deepening project completed in 1976. Along its navigable route there are commercial ports at Astoria, St. Helens, and Portland, Oregon, and Longview, Woodland, Kalama, and Vancouver, Washington. The COE dredged about 28 miles of the Columbia River channel to 43 feet deep in 2005 (Port of Portland, 2007b). Recent navigation charts published by the COE indicate that water depths adjacent to the proposed LNG terminal site range from 22 feet to over 50 feet.

Tides

Average tides on the Columbia River range from 6.6 feet at Tongue Point, east of Astoria, Oregon to 3.3 feet at Longview, Washington. Tides are a specific consideration in scheduling the entry and exit of deep-draft ships into and out of the river. Downstream of CRM 40, ocean tides control surface water elevations, but river discharges have little effect.



★ Bradwood Landing Site
 ▲ River Mile Marker

Medium Density Population
 (1000 - 9000 persons per square mile)

500 Meter Zone of Concern (Zone 1)
 1600 Meter Zone of Concern (Zone 2)
 3500 Meter Zone of Concern (Zone 3)
 Navigation Channel

Figure 2.1.2-1
Bradwood Landing Project
 Waterway for LNG Marine Traffic

Data Source: ESRI Data & Maps, Series Issue: 2005 Note: Waterway continues to U.S. Territorial Seas boundary at 12 nautical miles from coast.

Currents and Freshets

Currents at the Columbia River Bar can be significant, with sudden and unpredictable changes. Ebb currents on the north side of the bar attain velocities of 6 to 8 knots. In the entrance, the currents are variable, and at times reach a velocity of over 5 knots on the ebb; on the flood they seldom exceed a velocity of 4 knots. Ebb currents of 1 to 3 knots occur elsewhere in the river. The current velocity at the proposed LNG terminal is normally about 1 knot.

The current can increase considerably during freshets, the seasonal influence of river flow as continental snowfall melts and drains into the river. The annual high-water freshet stage occurs on the Columbia River in late May. The COE monitors river depth for possible bottom changes that might affect shipping. In addition, the Northwest River Forecast Center has six stage recording stations on the Columbia River to predict river stages up to 6 days in advance, for the use of pilots.

Weather and Ice

Incidents of rain and fog are greater at the mouth of the Columbia River. Winds are channeled by topography to follow the river. Wind direction is generally from the east through southeast in winter, and wind speeds reach 20 miles per hour or more about 5 to 10 percent of the time. Visibility is diminished by fog to below 0.5 mile about 3 to 6 days per month. Winds during the summer remain west to northwest and are typically light. Ice forms occasionally on the river but is seldom heavy enough to affect navigation.

2.1.2.2 Natural Hazards in the Waterway

The Columbia River Bar is located at the mouth of the Columbia River where the current dissipates into the Pacific Ocean, depositing sediments as the river slows. Characterized by the frequent presence of large, standing waves, the Columbia River Bar is exposed to the full force of storm-generated swells and wind waves from winter weather off the Pacific Ocean. The large ocean waves are further accentuated by the fact that they are entering shallow water, and during ebb tides the opposing current builds them further into a standing wave that can approach 35 feet in height. These large swells present several dangers to ship traffic. If they are too large they can overpower the steering ability of the ship, making it impossible to control. In some circumstances the heavy seas that roll on deck create a hazard to structures and equipment. A deeply loaded ship can pitch and roll so heavily that striking the bottom in a trough becomes a concern. During storm conditions, the Columbia River Bar Pilots will not transit a vessel across the bar if conditions are unsafe.

Geographic hazards characterizing the local marine environment include shallows and shoaling in way of the approaches and vicinity of Lower and Upper Desdemona Shoals, Harrington Point Range, Miller Sands Range, Pillar Rock (Lower and Upper), Welch Island Reach, Skamokawa Channel, Steamboat Reach and Puget Island Range and Turn. Characteristics that contribute to natural hazards are largely a function of channel width and natural constraints (i.e., sand, rock, and depth) defining the lateral edges of the channel.

Bar pilots consider two factors relating to how physical conditions in the Lower Columbia River affect transit: 1) wave conditions at the river mouth, and 2) underkeel clearance in the channel between CRM 6 and 13, which is susceptible to shoaling. Safe conditions at the river mouth would be when waves are less than 10 feet high, a condition that exists about 95 percent of the time. Entrance to the channel would be closed to ships with drafts of 36 feet for about 960 hours per year based on wave forecasts. Ships with drafts deeper than 36 feet must schedule departure from upriver ports to arrive at

Astoria during required tide conditions. About half of the 40-foot draft ships must delay departures to wait for suitable tide stages in the estuary.

The ports along the Columbia River are primarily protected from the high seas by topographical features and characteristics of the mouth of the river. Key features include Clatsop Spit on the south side of the mouth and Cape Disappointment on the north. Additional protection is offered on the south by the South Jetty. This jetty is a manmade artifice running generally westerly from Clatsop Spit for a distance of approximately 2 miles. Protection on the north side of the mouth is offered by the North Jetty, which is a manmade artifice running generally westerly from the southwestern tip of Cape Disappointment for a distance of approximately 0.5 mile. The protection from the high seas becomes apparent along the navigation channel southeast of CRM 5 and in the partially protected waterway more enclosed by Clatsop Spit and the Washington State coastline on the south and north, respectively.

2.1.2.3 Human-Created Obstructions in the Waterway

There is only one bridge across the Columbia River between its mouth and Bradwood. The Astoria-Megler Bridge along U.S. Highway 101 connects Astoria, Oregon with Point Ellice, Washington. The bridge is 4.1 miles long, and when completed in 1966, it was hailed as the longest continuous truss in the world. Over the navigation channel this bridge has an air clearance 205 feet high and 1,070 feet wide. No power lines cross over the river along the route to the proposed LNG terminal.

2.1.2.4 Aids to Navigation in the Waterway

There are two anchorages adjacent to Astoria, the Astoria North Anchorage and the Astoria South Anchorage. The anchorages are located on either side of the ship channel. Anchorages are used for temporarily locating ships before proceeding upstream or to sea. All designated anchorages are primarily used to accommodate ships over 200 feet in length. However, these anchorages would not be suitable for use by LNG carriers. Anchorages for LNG carriers along the LNG marine waterway would not be necessary because an LNG carrier would not enter the Columbia River if the berth at the LNG terminal was not available and would not depart the terminal if the bar was likely to be closed. There is also a turning basin at Astoria.

The COE has installed fields of timber piles to control channel alignment for navigation and provide bank protection. The COE maintains 236 pile dike fields along the entire length of the Columbia River navigation channel. In addition, the COE has used in-water dredged fill material to reduce the channel cross-section. Upstream of CRM 20, nearly half the shoreline of the channel is composed of dredged fill material. Dredged material has also been used by the COE to create islands to control channel alignment. These islands are usually protected by pile dike fields.

2.1.2.5 Current Marine Traffic on the Waterway

Currently, ships using the Columbia River transport both foreign and domestic cargoes. Exports include logs, lumber, forest products, grain, flour, chemicals, fruit, fish, general and containerized cargo, and general merchandise. Imports include coal, petroleum products, bulk salt, bulk cement, alumina, manufactured products, and general and containerized cargo. About 1,700 commercial ships were counted entering the Columbia River in 2003. Most commercial traffic would proceed past the proposed LNG terminal on their way to ports up river, with the exception of cruise ships that stop at Astoria during the summer.

The Columbia River is also visited by commercial and recreational fishing boats. It has been estimated that Oregon and Washington anglers combined made over 400,000 total fishing trips on the

lower Columbia River (from Bonneville Dam to Buoy 10) in 2005 (ODFW, 2006b). Marinas serving boaters on the Lower Columbia are located at Hammond, Warrenton, and Astoria in Clatsop County, Oregon; Rainer in Columbia County, Oregon; Ilwaco in Pacific County, Washington; Cathlamet in Wahkiakum County, Washington, and Longview and Kalama in Cowlitz County, Washington.

2.1.2.6 Safety Measures Currently in Place for Existing Vessel Traffic

With the exception of recreational and fishing vessels, all ships over 100 feet in length moving up or down the Columbia River must be accompanied by a licensed pilot. Pilotage service is provided by the Columbia River Bar Pilots from the boarding area offshore to Astoria, and by the Columbia River Pilots for river transits east of Tongue Point.

2.1.2.7 Population Adjacent to the Waterway

The Warrenton/Astoria area in Clatsop County, Oregon, is the major population center along the LNG marine traffic route. In 2006, the population of Warrenton was estimated at 4,460, while about 9,970 people resided in Astoria. The majority of the shoreline along the LNG marine traffic route is rural, and sparsely populated. In Wahkiakum County, Washington, Cathlamet is the largest town, with a population estimated at 555 in 2006. About 800 people live on Puget Island.

2.1.2.8 Coast Guard Review of Waterway Suitability for LNG Marine Traffic

The Coast Guard is responsible for issuing an LOR regarding the suitability of the waterway for LNG marine traffic. Following the guidance in NVIC 05-05, NorthernStar produced a WSA that was reviewed and validated by the Coast Guard. During the validation process, the Coast Guard consulted with a variety of stakeholders, including state and local emergency responders, marine pilots, towing industry representatives, members of the Port Waterway Safety Committee, and the Area Maritime Security Committee. The WSA is designated as Sensitive Security Information as defined in 49 CFR 1520. Because any unauthorized disclosure of these details could be employed to circumvent the proposed security measures, they are not releasable to the public, and the WSA is not a part of the FERC public record in this proceeding.

The Coast Guard issued its WSR for this project on February 28, 2007 (see Appendix G). The COTP indicated in the WSR that in order to make the Columbia River suitable for LNG marine traffic additional measures would be necessary to responsibly manage navigation, safety, and security risks. These measures are discussed in detail in section 4.11.5.4.

As previously indicated, the Coast Guard used criteria developed by Sandia National Laboratories to define the outer limits of the hazard zones for assessing potential risks associated with the proposal as part of the waterway suitability review process. Because the Sandia analysis was based on LNG vessels of 148,000 m³, the proposed action, including the Coast Guard's issuance of an LOR, is based on the assumption that LNG vessels traveling to the Bradwood Landing LNG facility would have capacities of no greater than 148,000 m³. Should NorthernStar wish to receive larger LNG vessels in the future, the Sandia analysis would have to be revisited to determine any changes to the Sandia hazard zones, the WSA/WSR would have to be reviewed to determine if the safety and security measures are adequate to accommodate the larger LNG vessels, and supplemental review under NEPA and other applicable laws and regulations would be required.

2.1.3 LNG Terminal Facilities

The LNG import terminal facilities would include an LNG carrier turning basin/maneuvering area in the Columbia River, berth and unloading facilities, two LNG storage tanks, vaporization and vapor handling systems, and support facilities. The terrestrial portion of the LNG terminal would occupy about 40 acres of land within a 411-acre site controlled by NorthernStar. A layout of the proposed LNG terminal is provided on figure 2.1.3-1.

2.1.3.1 Maneuvering Area and Berth

The maneuvering area and turning basin would be approximately 2,000 feet by 2,000 feet in size, covering about 58 acres in the Columbia River off of the existing navigation channel northeast of Bradwood. Only about 46 acres of the 58-acre maneuvering area would require dredging. The remainder is area that would be occupied by the berthing structures or is naturally deep. At this point the navigation channel is 600 feet wide and 40 feet deep; however, the channel is in the process of being deepened to 43 feet by the COE. The final design for the maneuvering area and turning basin was adopted after NorthernStar considered the results of a vessel maneuvering simulation study conducted in 2005 at the COE Engineering Research and Development Center Ship and Tow Simulator in Vicksburg, Mississippi (Waterway Simulation Technology Inc. (WST), 2005).

In order to create the maneuvering area, NorthernStar would dredge approximately 700,000 cubic yards of sediments from the Columbia River bottom, allowing for a 1-foot overdredge to -43 feet Columbia River Datum (CRD) (see figure 2.1.3-2). Additional information on the dredging associated with the proposed project is presented in section 2.4.1.2.

The berth at the LNG terminal would be located about 1,200 feet away from the existing navigation channel in the Columbia River. It was designed to handle LNG carriers with cargo capacities ranging from 100,000 to 200,000 m³. The terminal would be capable of offloading one LNG carrier at a time. NorthernStar anticipates that its terminal would be visited by about 125 LNG carriers per year, with an average of 10 to 11 ships per month. Typically, it would take less than 24 hours for an LNG carrier to dock at the terminal, unload, and depart from the berth.

Maneuvering and docking of LNG carriers would be accomplished with three 60-ton bollard pull Z-drive tugboats, which would be operated by a third party marine services provider. The WSR requires that all three tugs would remain on standby while an LNG carrier is unloading; either moored along side or tied to a nearby mooring dolphin.

The ship berth would be approximately 36 feet wide and 330 feet long and would extend into the Columbia River a total of about 300 feet from the shore to the outer edge of the unloading platform. Figures 2.1.3-3 and 2.1.3-4 depict a plan and cross section of the berth. The berth would include four breasting structures, six mooring dolphins, an unloading platform, and a pipeway/roadway trestle from the unloading platform to the shore. The platform would be constructed of reinforced concrete beams and slabs supported on steel piles. A control office would be located on the berth platform to monitor carrier unloading operations, including a display screen to track the velocity and angle of approach of the LNG carrier to the berth. An instrument and communication cable would connect the office instrument control system to the LNG carrier's unloading control system.

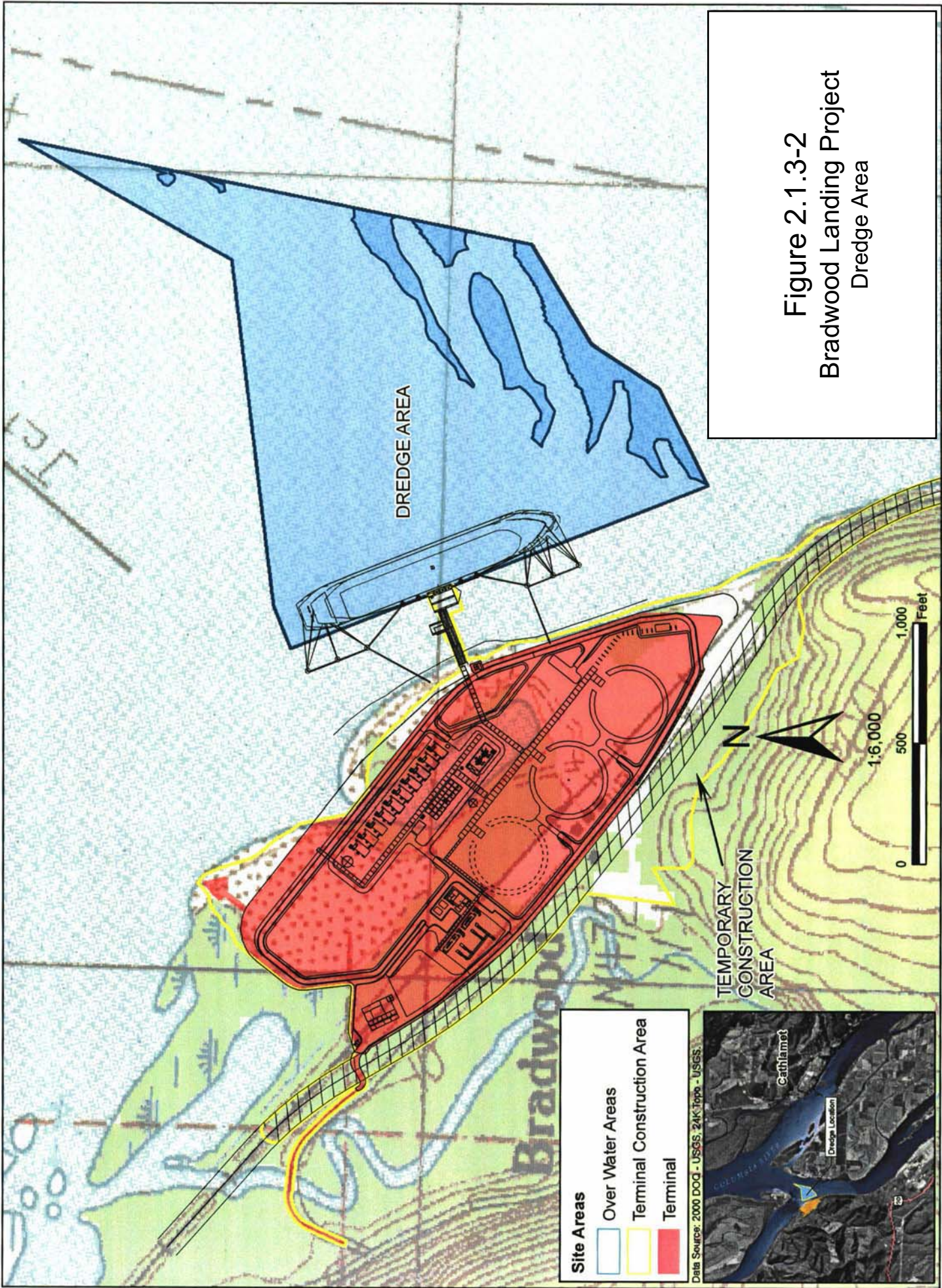
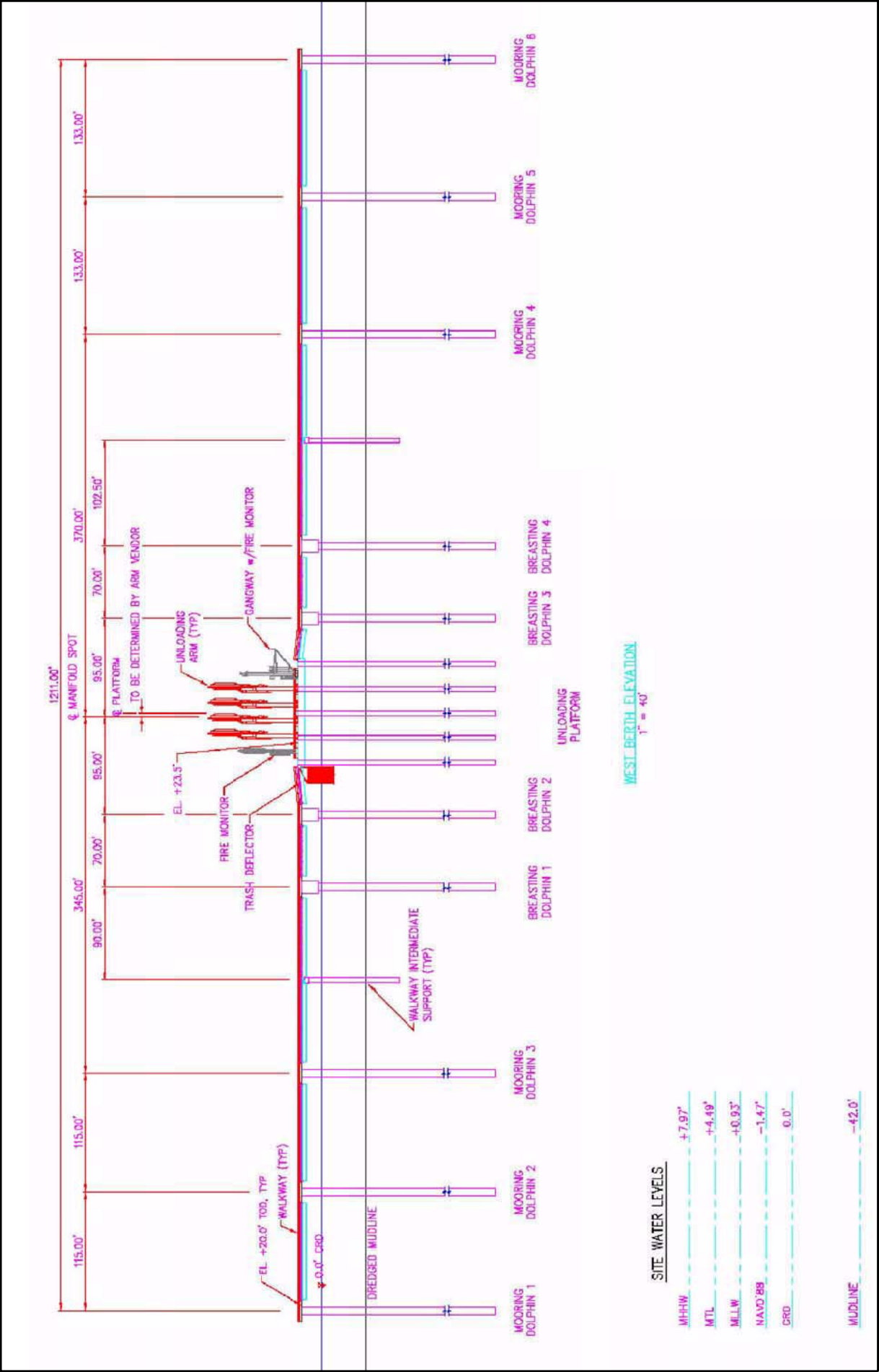


Figure 2.1.3-2
Bradwood Landing Project
Dredge Area



WEST BERTH ELEVATION
1" = 40'

SITE WATER LEVELS

MHHW	+7.97'
MTL	+4.49'
MLW	+0.93'
NAVD'89	-1.47'
CRD	0.0'
MUDLINE	-42.0'

Figure 2.1.3-4
Bradwood Landing Project
Ship Berth Cross Section

The breasting structures and mooring dolphins would be constructed of steel pipe piles with concrete caps. The breasting structures would be equipped with fenders. Quick-release hooks would be provided on the mooring dolphins for the bow and stern breast lines to hold the LNG vessel onto the berth. The mooring hooks would have strain gauges that send data on mooring line tension to the berth control office. The extreme up and downriver mooring dolphins would have navigation lights marking the extent of the structure in the river. Other floodlighting at the berth would be angled downward and shielded, so as not to affect other vessel traffic in the navigation channel and to reduce stray light shining into the water. Catwalks would connect the platform to the wharf head and to the mooring structures. Ladders would be installed on the mooring structures to provide access for small craft docking at the facility.

A small craft berth would be provided against the northwest mooring dolphin. The water around the berth is of sufficient depth to handle the shallow drafts of tugboats and other small service craft that may need to dock at the berth, so no additional dredging would be necessary in this area.

The wharf head would be a reinforced concrete beam structure, about 115 feet wide by 125 feet long, supported by steel pipe piles. The approachway would be about 20 feet wide, to permit a small mobile rubber-tired crane to transit to the unloading arms. The pipeway would be about 19 feet wide. Outside of the pipework, the deck of the approachway and wharf head would be sloped to allow storm-water to run off into the river. The pipework area would be curbed and underlain by a concrete trough to collect an LNG leak or spill and convey the liquid to an onshore spill containment pit.

Table 2.1.3-1 summarizes the location, number, length, diameter, and water depth of piles that would be used to construct the marine terminal.

TABLE 2.1.3-1				
Pile Location, Number, Length, Diameter and Water Depth Summary				
Location	Number of Piles	Length (feet)	Diameter (inches)	Approximate Water Depth (feet)
Mooring dolphins on the north	3	160	96	20
Mooring dolphins on the south	3	160	96	32-37
Breasting dolphins on the north	2	160	84	27
Breasting dolphins on the south	2	160	84	31
Platform	20	150	54	30
Trestle	9	150	54	3 or 22-25
Abutment	3	100	24	Onshore
Walkway support on the north from platform to dolphin	1	100	48	23
Walkway support on the north from mooring dolphin to shore	1	100	48	10
Walkway support on the south from platform to dolphin	1	100	48	32
Walkway support on the north from mooring dolphin to shore	1	100	48	2

2.1.3.2 Unloading and Transfer Facilities

Once berthed, pumps onboard the LNG carrier would deliver LNG through unloading arms and transfer pipelines to the onshore LNG storage tanks. Dockside personnel would connect the unloading arms to the ship manifolds. Cool-down of the unloading arms would be started by introducing a small LNG flow, either using a bypass line around the discharge of one of the carrier's pumps or using a

dedicated small capacity pump on the carrier, through the unloading arms and into the carrier berth KO drum.

The unloading platform at the ship berth would include four 16-inch-diameter cryogenic marine unloading arms. Two of the arms would be dedicated for unloading LNG to the transfer pipelines, one would be for vapor return to the LNG carrier, and one would be a hybrid arm usually used for unloading but also capable of returning vapor as a backup. Each unloading arm would be fitted with powered emergency release coupling valves to isolate the arm and the carrier in the event of a non-scheduled separation and to minimize LNG spillage. Each arm would be operated by a hydraulic system and a counterbalance weight would be provided to reduce the deadweight of the arm on the shipside connection and to reduce the power required to maneuver the arm into position.

The berth and unloading facilities would be designed in accordance with applicable codes and standards, including but not limited to the Oil Companies International Marine Forum, Society of International Gas Tanker and Terminal Operators, International Navigation Association, American Petroleum Institute (API), and American Society of Civil Engineers, to ensure the safe transfer of LNG from the ships to the onshore storage tanks. The LNG unloading rate would be controlled from the carrier. The unloading arms would have a combined unloading rate capacity of 12,000 m³/hour (52,834 gallons per minute (gpm)). It would take about 14 hours to unload a 160,000 m³ capacity LNG carrier.

LNG would be transferred via the unloading arms from the carrier at berth to the LNG storage tanks onshore by cryogenic pipelines that run from the unloading platform down the approachway to the wharf head. The transfer pipeline system would be composed of a 32-inch-diameter LNG unloading line and a 6-inch-diameter LNG recirculation cool-down line. These pipelines would be approximately 800-feet-long from the unloading manifold to the point where the 32-inch-diameter unloading line would divide. One branch of the unloading line would proceed southwest for 40 feet to connect to the western storage tank, while the other branch of the unloading line would continue an additional 440 feet to the eastern storage tank. The 6-inch-diameter cool-down line would recirculate LNG from the send-out pumps to the unloading arms and back to the process area. This system would keep the transfer pipelines cold during periods when an LNG carrier is not being unloaded.

An LNG sampling package would be installed on the unloading line to allow for sampling and analysis of the composition of the LNG. The transfer line coming off the wharf would also be equipped with emergency isolation valves.

2.1.3.3 Vapor Handling System

The pressure in the LNG carrier during unloading would be maintained through a system that allows vapor to flow back from the storage tanks to the carrier. A desuperheater would be installed on the wharf to control the temperature of the vapor returned to the ship to about -220 °F by injecting LNG into the vapor via the wharf transfer line. A vapor return KO drum would also be located on the wharf, to prevent liquid slugs downstream of the desuperheater and act as a drain pot for the unloading arms. Once unloading activities are completed, but before recirculation, LNG would be drained from the unloading arms to the vapor return KO drum and back to the LNG carrier by pressuring with gaseous nitrogen. After the LNG carrier has disconnected, the vapor return KO drum would be drained into the unloading line.

Ambient heat input into the LNG storage tanks would result in vaporization of LNG, allowing the tank to remain at a constant temperature. The resultant vapor, referred to as BOG, is removed by the vapor handling system to maintain the tank pressure. During unloading operations, BOG would be displaced by LNG entering the tanks and would need to be removed.

The BOG vapor handling system would consist of pipework, compressors, and a condenser. A vapor return line would convey vapor displaced from the storage tanks back to the LNG carrier. A pressure control valve on the line would maintain the required pressure at the vapor return arm.

The terminal design includes two 50-percent reciprocating BOG compressors. The BOG compressors are sized for a maximum capacity of 7.68 MMcfd. The compressors would operate in a duty/standby arrangement. The purpose of the BOG compressors is to raise the BOG pressure to a level at which the BOG could be condensed by the BOG condenser. The BOG compressors would also serve to control storage tank pressure during LNG carrier off-loading and during periods of low sendout. A desuperheater would be installed on the BOG compressor suction line to ensure that temperatures are kept below -250 °F. A KO drum would be provided on the BOG compressor suction to separate any injected liquid that is not vaporized in the compressor suction flow.

The BOG condenser would serve two functions: it would condense BOG into LNG and it would provide buffer capacity to the sendout pumps. The upper section of the condenser would include pressure control valves that would allow excess pressure to be vented or “padding gas” to return from the sendout line. The lower portion would produce buffer liquid for the send-out pumps, sized for a send-out rate of 1,500 MMcfd. Under normal operating conditions most of the LNG would by-pass the BOG condenser, but when sendout is at a minimum almost all the LNG would be routed through the top of the BOG condenser.

The terminal would contain one ignitable vent stack. The BOG header would be protected by a pressure controller, which would allow relief to the process vent, if required. Under normal operations, only inert purge gas (nitrogen) would be vented. The vent is designed for a maximum rate of 68,670 pounds per hour.

2.1.3.4 LNG Storage Tanks

LNG unloaded from the ships would be stored in two 160,000-m³ (1,006,000 barrel) full-containment storage tanks at a temperature of -260 °F and maximum internal pressure of 4.2 pounds per square inch gauge (psig). These would be on-ground type tanks, built on a reinforced concrete slab supported on a piled foundation, with base heating systems to prevent frost heave. Each storage tank would have a 9 percent nickel-steel inner container and a secondary pre-stressed concrete outer container, a reinforced concrete domed roof, a reinforced concrete outer container bottom, and an aluminum insulated support deck suspended from the outer container roof over the inner container. Each storage tank would be designed so that both the primary and secondary containers could both independently contain LNG. The diameter of the outer containers would be approximately 259 feet and the height to the top of the storage tank domes would be approximately 170 feet. Figure 2.1.3-5 shows the conceptual design of NorthernStar’s proposed storage tanks.

The load-bearing insulation beneath the inner container would consist of cellular glass. The space between the inner container and the outer container would be filled with expanded perlite insulation compacted to reduce long-term settling. The outer concrete container would be lined on the inside with carbon steel plates, as a barrier to moisture migration from the atmosphere reaching the insulation inside the outer container. This liner would also prevent vapor from escaping from inside the tank during normal operations. The storage tanks would meet the requirements of National Fire Protection Association (NFPA) 59A and 49 CFR 193. The inner container would be designed and constructed according to the requirements of API Standard 620. There would be no penetrations through the sidewalls or bottoms of the storage tanks. All piping into and out of the tanks would be from the top. There would be two fill lines on the roof of each tank.

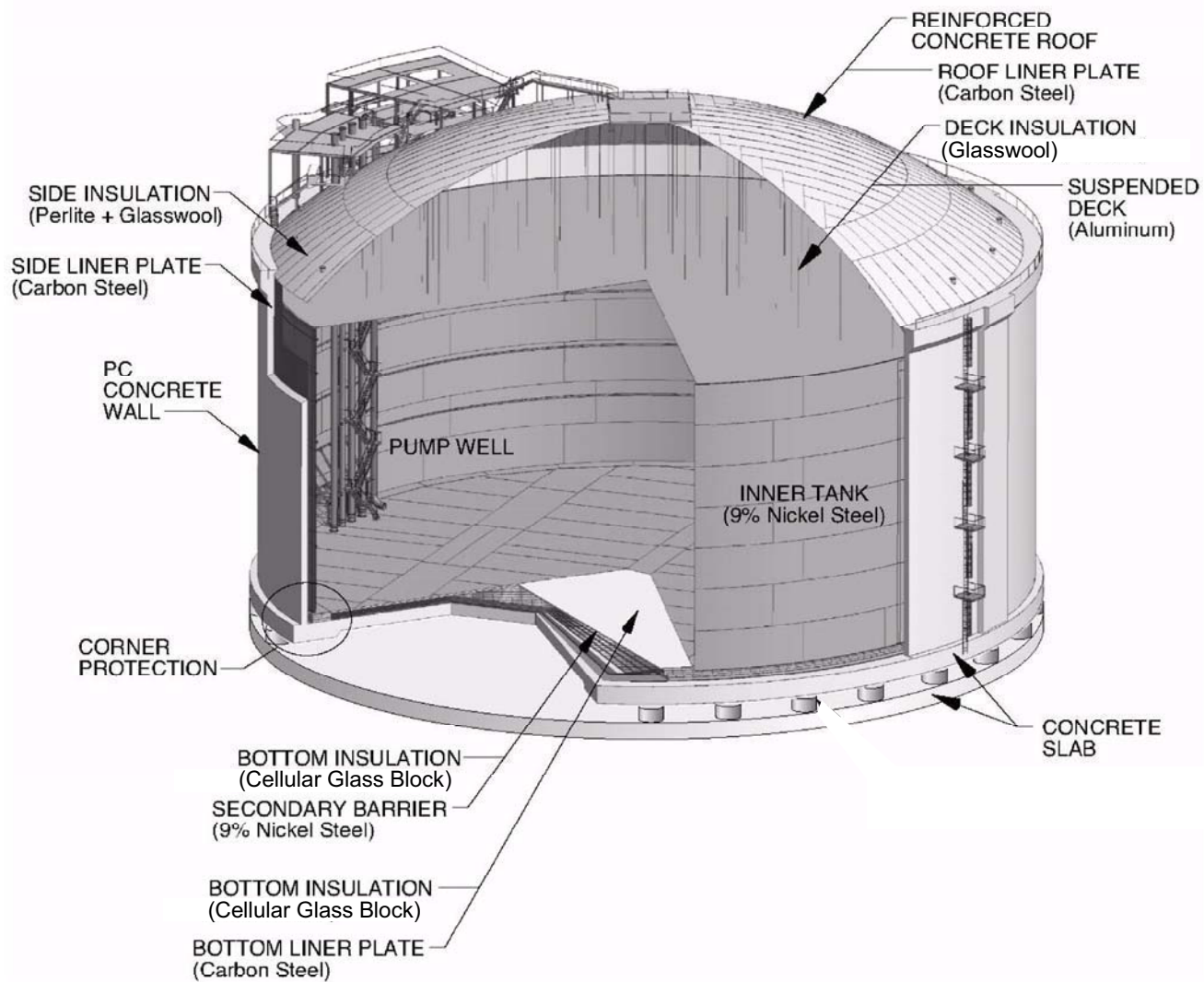


Figure 2.1.3-5
Bradwood Landing Project
 Conceptual Design of LNG Storage Tanks

Each storage tank would be equipped with three vertical submerged in-tank LNG pumps (six total). The in-tank LNG pumps would each have a capacity of 2,353 gpm at 145 psig. At the normal sendout rate, four pumps (two pumps per tank) would operate (leaving one spare pump for backup in each tank). The in-tank pumps would move LNG through the BOG condenser or the bypass and on to the sendout pumps.

2.1.3.5 Vaporization System

The five sendout pumps would take their feed from the BOG condenser outlet or the bypass line. During normal discharge, four sendout pumps would operate (with one as a back-up spare), each with a capacity of 2,398 gpm. The sendout pumps would discharge LNG to the vaporizers at a pressure of 1,320 psig.

The terminal would have seven SCVs, arranged in parallel, to re-gasify the LNG. Only six of the SCVs would operate under the nominal sendout rate of 1.0 Bcfd. With all seven SCVs in operation, the facility would have a peak sendout capacity of 1.3 Bcfd.

Within the SCVs, the LNG would pass through a warm water bath in high-pressure tubing, and be converted to a gaseous state. NorthernStar would use its on-site well to provide up to 0.2 million gallons of water for the initial filling of the SCVs. Produced water from the first SCVs filled would be used as much as practical to fill subsequent SCVs. Sendout gas would be burned to heat the water in the SCVs. The SCVs would operate at a pressure of about 1,291 psig. The natural gas produced would be at about 40 °F at sendout from the SCVs.

During normal operations, the SCVs would generate about 160 gpm of condensate water at a 1.3 Bcfd sendout rate. Excess water produced by the SCVs would pass to an overflow effluent pit where the hydrogen ion concentration (pH) of the water would be neutralized with alkaline chemicals. From the effluent pit, the SCV overflow water would be discharged into the Columbia River via a diffusion pipe.

2.1.3.6 Support Facilities

Buildings

The LNG terminal would include the following on-site service buildings:

- administration/warehouse;
- control;
- instrument air package shelter;
- switchrooms;
- power factor correction room;
- compressor building;
- wharf control/switch room;
- gatehouse/security building; and
- firewater pumphouse.

Pipe Racks

Pipe racks supporting LNG piping would be of reinforced concrete construction. Piping would be of welded steel.

Fuel Gas System

A system would be installed to supply and distribute natural gas as required to the fuel burning equipment at the LNG terminal. The primary source of natural gas for the fuel system would be recompressed BOG recovered from the LNG storage tanks. The fuel system would operate at a nominal pressure of 35 psig and would supply natural gas to be burned to warm the water bath within the SCVs. Natural gas used for space heating would be odorized with a small on-site odorization unit.

Nitrogen System

Nitrogen would be used during terminal start-up to purge the LNG storage tanks, process equipment, and piping. A nitrogen system would be installed at the LNG terminal to service the unloading arms and vapor return system.

Electrical System

The electricity for the LNG terminal would be supplied from the external grid of the local utility company (see section 2.2.1). A 1.5-mile-long 115-kV overhead electric line would connect the terminal to the existing Bonneville Power Administration (BPA) system. A new electric switch yard and substation would need to be built within the Bradwood Landing LNG terminal site. NorthernStar would also install an 800 kW diesel-powered standby generator to provide backup power for critical loads. This generator would provide service to instrumentation, air compressors, and plant lighting. The generator would be started using an electrical starter powered by a battery. In addition, there would be dual redundant uninterruptible power supplies (UPS) using static batteries and backup batteries located in separate specially designed battery rooms throughout the terminal in case of a power outage. UPS systems would be put into the plant control room and on the wharf. Electrical equipment would comply with the appropriate electrical area classifications as defined in NFPA 59A *Standards for the Production, Storage, and Handling of LNG* (NFPA 59A). A plant grounding system would be installed according to applicable industry standards, such as the Institute of Electrical and Electronics Engineers Standard 142.

Lighting

Exterior lighting would be provided at the terminal using high-pressure sodium type bulbs. Lighting fixtures would be installed on building exteriors, at the wharf, on the tank stairways and roof platforms, in the process area, and along the access roadway.

Water System and Wastewater Management

Non-potable water for construction and operational activities would be obtained from an on-site water well (see figure 2.1.3-2). During the 3-year construction period, NorthernStar estimates that a total of about 12.3 million gallons of groundwater from that well would be used for concrete making, initial testing of SCVs, hydrostatic testing of piping, equipment/vehicle washing, and personal/sanitary use. During operation of the LNG terminal, about 1.1 million gallons of groundwater would be used annually for landscape irrigation and personal/sanitary use. Bottled, potable water would be delivered to the terminal for operational staff use. Section 4.3.1 discusses the use of groundwater and potential project-related groundwater impacts.

Because most of the LNG terminal site would remain unpaved, stormwater would either directly infiltrate into the ground or would be collected in shallow infiltration ditches and routed to unlined settling ponds for infiltration into the ground. The stormwater retention ponds would be large enough to hold the volume of runoff generated from a 100-year storm. Stormwater within the tertiary earthen berm

surrounding the LNG storage tanks would be collected via swales and open channels and directed to spill impoundment basins. Water collected in the spill impoundment basins would be pumped into the on-site stormwater retention ponds. Stormwater management is discussed in further detail in sections 4.3.1 and 4.3.2. Sanitary wastewater from the LNG terminal would be treated and disposed of using an underground, on-site septic tank and drainfield, or other permitted treatment system if final site conditions are not suitable for a drainfield.

During construction of the terminal, about 75 million gallons of water from the Columbia River would be used for hydrostatic testing and ground improvements. During operation of the terminal, the fire suppression system would be tested weekly, and use about 4,400 gpm of water for about 1 hour for each test. Surface water use at the terminal and potential impacts are discussed in section 4.3.2.3.

All intakes at the proposed LNG terminal that withdraw water from the Columbia River would be screened in accordance with the NMFS and ODFW requirements. Intakes for hydrostatic test water may be temporary pump locations, which would be screened to comply with intake velocity and mesh requirements. Permanent intakes, such as fire suppression water, would be fitted with custom-sized screens to avoid entrainment or impingement of larval and juvenile fish. The screens would be cylindrical, with one closed end pointed upstream and the screens on the side of the cylinder. The screens would be kept free of debris by periodic backflushing with compressed air. Water intake locations are shown on figure 2.1.3-3.

Water used for hydrostatic testing and testing of the fire suppression system would be returned to the Columbia River. Condensate from the vaporizers would be discharged to the Columbia River from a subsurface outfall/diffuser mounted on the dock at a maximum rate of 160 gpm. Water discharge locations at the terminal are shown on figure 2.1.3-3.

Natural Gas Sendout Facilities

As described further in section 2.1.4, the LNG terminal would have facilities associated with the natural gas sendout pipeline, including a meter station, MLV, and pig launcher.

Safety and Security Systems

The proposed LNG terminal would include a fire detection and protection system, including automated detection of an LNG leak or spill, and LNG or non-process fires, fire suppression water, fire control equipment, fire proofing, and means of de-pressurizing an LNG carrier at dock. The fire protection system would include a firewater main capable of serving hydrants, the wharf spray curtain, and individual spray equipment; high expansion foam available at the spill impoundment basins; automatic dry chemical extinguishers at the relief valve discharge piping; and portable fire extinguishers located throughout the terminal.

The terminal is located within a 411-acre parcel to be acquired by NorthernStar. The terminal would be surrounded by a security fence, with appropriate lighting. Access into and out of the facility would be controlled through a gatehouse, and limited again at the wharf.

Construction Worker Parking, Access Roads, and Hunt Creek Bridge

NorthernStar would provide a parking lot for construction workers southeast of the Taylorville interchange at Highway 30, and proposes to bus workers into the LNG terminal. Access for workers and construction equipment from Highway 30 would be by way of existing county-maintained paved two-lane Clifton Road, for 2.4 miles to Bradwood Road. Clifton Road would be widened to a total of 28 feet with

shoulders, resulting in two 12-foot paved travel lanes with 2-foot gravel shoulders on each side of the road. An east-bound turning lane and a west-bound deceleration lane would be installed on Highway 30 at the intersection of Clifton Road. See section 4.8.2.7 for a further discussion of transportation and traffic to the LNG terminal.

An existing 1,150-foot-long, privately-owned gravel access road (Bradwood Road) enters the LNG terminal site from Clifton Road over a bridge that crosses Hunt Creek. Bradwood Road would need to be paved and widened for use during construction and operation of the proposed project. Similarly, the existing bridge over Hunt Creek is not adequate to withstand the anticipated vehicle loads associated with construction-related traffic and would be replaced with a 24-foot-wide bridge.

Railroad Relocation

There are existing train tracks within the proposed Bradwood Landing LNG terminal parcel. These tracks are operated by Portland & Western Railroad, Inc. (PWRR), on a right-of-way owned by the Oregon Department of Transportation (ODOT). No regularly scheduled trains currently run along the portion of this railroad through the Bradwood Landing terminal site. NorthernStar proposes to remove about a 4,200-foot-long section of the railroad through its parcel and relocate it up to 250 feet south of the present location of the tracks, and has entered into an agreement with PWRR and ODOT for this action.

2.1.4 Pipeline and Associated Aboveground Facilities

The Bradwood Landing Project would include construction and operation of an underground welded steel natural gas sendout pipeline and associated aboveground facilities. These facilities, including interconnects, meter stations, MLVs, and pig launchers and receivers, are shown on detailed maps contained in Appendix B.

2.1.4.1 Sendout Pipeline

A 36.3-mile-long sendout pipeline would extend from the LNG terminal at Bradwood, Oregon to an interconnection with Williams Northwest pipeline system north of Kelso, Washington. The pipeline would consist of about 18.9 miles of 36-inch-diameter pipe and 17.4 miles of 30-inch-diameter pipe (see table 2.1.4-1). The pipeline would be made of API SL-X-70 strength carbon steel, with a maximum allowable operating pressure of 1,280 psig. For the 36-inch-diameter pipe, the wall thickness would be 0.550-inch for Class 1 and 2 locations and 0.659-inch for Class 3 locations. For the 30-inch-diameter pipe, the wall thickness would be 0.458-inch for Class 1 and 2 locations and 0.550-inch for Class 3 locations. Section 4.11.9 explains these classifications in more detail.

TABLE 2.1.4-1				
Pipeline Facilities Associated with the Bradwood Landing Project				
Facility	Pipe Diameter (inches)	MP Range	Length (miles)	County, State
Natural Gas Sendout Pipeline	36	0.0 – 6.2	6.2	Clatsop, Oregon
		6.2 – 18.9	12.7	Columbia, Oregon
			18.9	
Subtotal			18.9	
	30	18.9 – 19.4	0.5	Columbia, Oregon
		19.4 – 36.3	16.9	Cowlitz, Washington
			17.4	
Subtotal			17.4	
Project Total			36.3	

The pipeline would originate at a pig launcher and meter station within the Bradwood Landing LNG terminal tract. The pipeline would exit the LNG terminal to the south, using horizontal directional drill (HDD) methods between mileposts (MP) 0.1 to 1.3 to pass under cliffs fronting the Columbia River, then proceed southwest of the Wauna Mill near MP 3.0, and easterly to the north of the community of Westport at about MP 6.0. The pipeline would cross through the alluvial plain lowlands adjacent to the southern shore of the Columbia River from Westport to Port Westward at about MP 18.0 in Columbia County, Oregon. HDD methods would be used to install the pipeline under the Columbia River from Port Westward, with the exit point on a hillside between the mouths of Mill Creek and Abernathy Creek at about MP 19.8 in Cowlitz County, Washington. From Bunker Hill, the pipeline would continue easterly, passing south of Eufaula Heights at about MP 26.0, generally following the route of the existing Kelso Beaver Pipeline (KB Pipeline) where practical. Realignment away from the KB pipeline route have been necessary where the KB pipeline was constructed in areas containing geological hazards such as poor slope stability, or to reduce waterbody crossing impacts. North of the community of Lexington, HDD methods would be used to cross under Highway 411 and the Cowlitz River at about MP 34.0. The pipeline would cross under the railroad and Interstate Highway 5 (using the HDD method), north of the community of Ostrander at about MP 35.5, and terminate at a new meter station to be constructed adjacent to the existing Williams Northwest pipeline system.

2.1.4.2 Aboveground Facilities

The aboveground facilities would consist of a sendout meter station, four interconnects with meter stations, six MLVs, two pig launchers, and two pig receivers. No compression is planned for the proposed pipeline because the pressure of the natural gas exiting the LNG terminal would be sufficient to overcome line losses and meet the interconnection and delivery point requirements. Table 2.1.4-2 lists the proposed aboveground facilities.

TABLE 2.1.4-2			
Aboveground Facilities Associated with the Pipeline for the Bradwood Landing Project			
Facility	Approximate MP	Associated and/or Collocated Facility	County, State
Meter Station			
Sendout Meter Station	0.0	LNG terminal, MLV, pig launcher	Clatsop, Oregon
Interconnects/Meter Stations			
Georgia-Pacific Wauna Mill Delivery Point	3.7	Not Applicable (NA)	Clatsop, Oregon
Northwest Natural Interconnect	11.4	NA	Columbia, Oregon
PGE Beaver Power Plant Delivery Point	18.9	NA	Columbia, Oregon
Williams Northwest Interconnect	36.3	MLV, pig receiver	Cowlitz, Washington
MLVs			
MLV #1	0.0	LNG terminal, pig launcher	Clatsop, Oregon
MLV #2	3.7	NA	Clatsop, Oregon
MLV #3	18.8	Pig receiver, pig launcher	Columbia, Oregon
MLV #4	26.3	NA	Cowlitz, Washington
MLV #5	31.7	NA	Cowlitz, Washington
MLV #6	36.3	Williams Northwest Interconnect, pig receiver	Cowlitz, Washington
Pig Launchers and Receivers			
Pig Launcher	0.0	LNG terminal, MLV	Clatsop, Oregon
Pig Receiver	18.8	Pig launcher, MLV	Columbia, Oregon
Pig Launcher	18.8	Pig receiver, MLV	Columbia, Oregon
Pig Receiver	36.3	Williams Northwest Interconnect, MLV	Cowlitz, Washington

Sendout Meter Station

A sendout meter station would be located at MP 0.0 within the LNG terminal. This facility would be used to meter and sample natural gas after it leaves the vaporizers and before it is sent to the sendout pipeline. The meter station would include two meter runs, consisting of a custody-transfer flow meter, a pressure regulator, isolation block valves, and associated instrumentation and controls. Similar to other interstate pipelines in the region, the natural gas would not be odorized before it is sent to the sendout pipeline.

Interconnects/Meter Stations

At MP 11.4, in Columbia County, Oregon, NorthernStar's pipeline would interconnect with Northwest Natural's existing bidirectional intrastate pipeline facilities capable of transporting gas to Northwest Natural's Mist underground natural gas storage facility. NorthernStar's pipeline would interconnect with Williams Northwest existing interstate pipeline facilities at the terminus of the pipeline at about MP 36.3, in Cowlitz County, Washington. NorthernStar also proposes to construct interconnects at two delivery points, at MP 3.7 (Wauna Mill) in Clatsop County, Oregon, and at MP 18.9 (PGE Beaver Power Plant) in Columbia County, Oregon.

Meter stations, consisting of a custody-transfer flow meter, a pressure regulator, isolation block valves, and all associated instrumentation and controls, would be installed at each interconnect and delivery point to measure the flow of natural gas from NorthernStar's pipeline to the downstream entity. Each interconnect and delivery point would consist of one or more meter runs located inside fenced and gated sites. Permanent entrance drives would be installed from existing roads to the proposed facilities.

Mainline Block Valves

Aboveground pipeline MLVs would be installed at MP 0.0 at the LNG terminal and at the terminus of the pipeline at MP 36.3 where it interconnects with the Williams Northwest facilities. An MLV would also be installed where the pipeline transitions from 36 inches in diameter to 30 inches in diameter at MP 18.8. Intermediate MLVs would be installed at MPs 3.7, 26.3, and 31.7. The MLVs would isolate pipeline segments from the rest of the system in order to contain unplanned pipeline system releases and to provide controlled venting during a planned pipeline system blow-down. The MLVs would be remotely operated and monitored. All MLVs would be installed in accordance with DOT safety requirements based on area population classifications.

Pig Launchers and Receivers

A pig launcher would be installed at MP 0.0 at the LNG terminal. A pig launcher and receiver would be installed where the pipeline transitions from 36 inches in diameter to 30 inches in diameter at MP 18.8. A pig receiver would be installed at the Williams Northwest interconnect at MP 36.3. These facilities would allow monitoring of the pipeline using internal inspection tools.

2.1.5 Wetland and Habitat Mitigation Sites

In order to compensate for temporary or permanent impacts on wetlands, wildlife habitats, and salmonid habitats that could not otherwise be mitigated, NorthernStar produced a *Preliminary Engineering Design Draft Mitigation Plan* (Compensatory Mitigation Plan), with the third version filed on August 3, 2007.² The compensatory mitigation sites were identified only after all other forms of impact mitigation (i.e., avoidance, minimization, rectification, and reduction) were considered and, when

² NorthernStar submitted its Mitigation Plan – 3rd Revision for the Bradwood Landing Terminal and Pipeline to the FERC on August 3, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, by selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

appropriate, implemented. The locations of the sites are illustrated on figure 2.1.5-1. NorthernStar proposes to restore habitat at the middle Svensen Island, Petersen Point, and Delameter Creek Mitigation Sites. In addition, NorthernStar would preserve habitat at the Hunt Creek Mitigation Site and would preserve and provide limited enhancement to the lower Svensen Island Mitigation Site. Wetland impacts and mitigation are discussed in section 4.4.1 and terrestrial habitat impacts and mitigation are discussed in sections 4.4.2 and 4.5.

Since the filing of its Compensatory Mitigation Plan, NorthernStar has received input from agencies and stakeholders through site visits in both Oregon and Washington and through comments on the draft EIS and other comment periods associated with permits required for the project. In addition, numerous discussions have taken place between the FERC staff, NMFS, FWS, and NorthernStar regarding the mitigation proposed by NorthernStar as it relates to the BA and EFH Assessment (see table 1.4-1). As a result of this additional input on its proposed mitigation, NorthernStar is revising its Compensatory Mitigation Plan. The revised Compensatory Mitigation Plan will be filed with the FERC upon completion and will be included in the FERC's revised BA and EFH Assessment. Because NorthernStar's Compensatory Mitigation Plan has not been finalized, **we recommend that:**

- **NorthernStar should continue to consult with the COE, NMFS, FWS, ODFW, ODSL, WDE, and other appropriate agencies to finalize its Compensatory Mitigation Plan. NorthernStar should file the final Compensatory Mitigation Plan along with agency comments and appropriate approvals with the Secretary prior to construction of the LNG terminal and pipeline facilities.**

2.2 NONJURISDICTIONAL FACILITIES AND INTERRELATED ACTIVITIES

In addition to the facilities discussed in section 2.1, the Bradwood Landing Project would require construction of facilities that do not fall under the Commission's jurisdiction. These include electric transmission facilities and three lateral pipelines. Although these facilities are not regulated by the FERC, they are related to the project and their potential environmental impacts are considered in this EIS.

Another action not directly regulated by the FERC is NorthernStar's proposed SEI. We consider the SEI to be an interrelated and interdependent action, and therefore it is discussed below.

2.2.1 Power Line

As previously mentioned, the electricity for the LNG terminal would be supplied from the external grid of the local utility company. A 1.5-mile-long 115 kV power line would be constructed on a 100-foot-wide right-of-way to bring 25 megawatts (MW) of power to operate the LNG terminal (see figure 2.2.1-1). The power line would interconnect with the existing (BPA) system and would be constructed, owned, operated, and maintained by PacifiCorp. Five new standard H-frame pole towers would be constructed and one existing BPA tower would be rebuilt to support the 1.5-mile-long power line. The 60- to 105-foot-tall towers would be secured about 11 feet into the ground, resulting in a total aboveground height of approximately 50 to 95 feet. The power line would terminate at a substation located within the LNG terminal site. A 115 kV metering station would also be constructed near the LNG terminal substation on the project site. Necessary communication and redundant backup equipment would be placed in a National Electrical Manufacturers Association-rated outdoor cabinet attached to the structure. Existing roads could be used to access the 100-foot-wide construction right-of-way for the power line, but approximately 465 feet of additional access would be required for construction and maintenance of the H-frame pole towers. Some limited improvements to the existing access roads, such as widening and surfacing with aggregate, may be necessary to allow passage of construction and maintenance vehicles. NorthernStar proposes to use crushed rock aggregate supplied only from approved permitted upland sources. An analysis of the environmental impacts associated with construction and operation of the power line is provided in section 4 of this EIS.

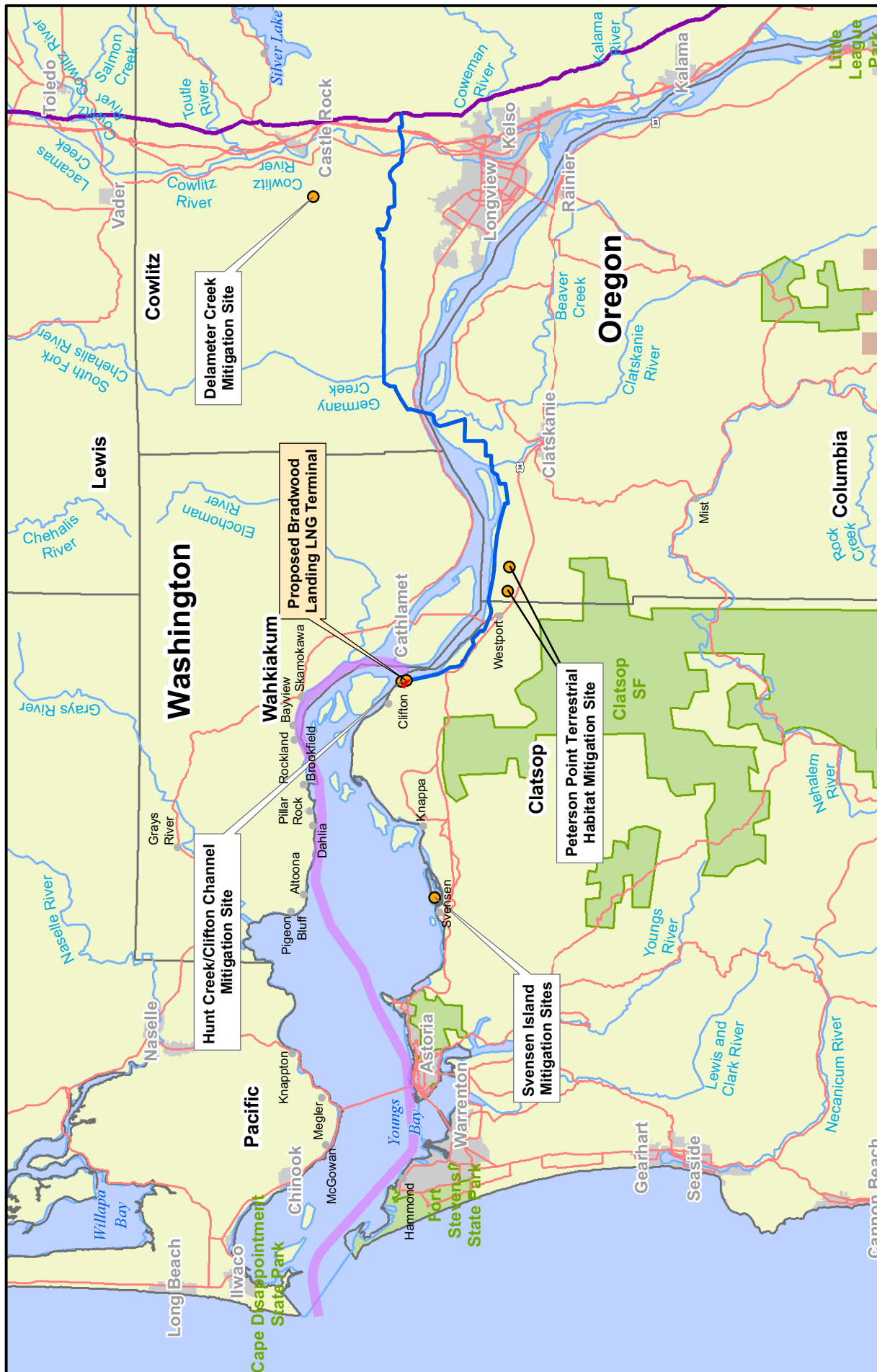
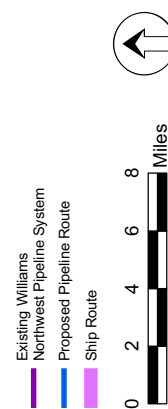
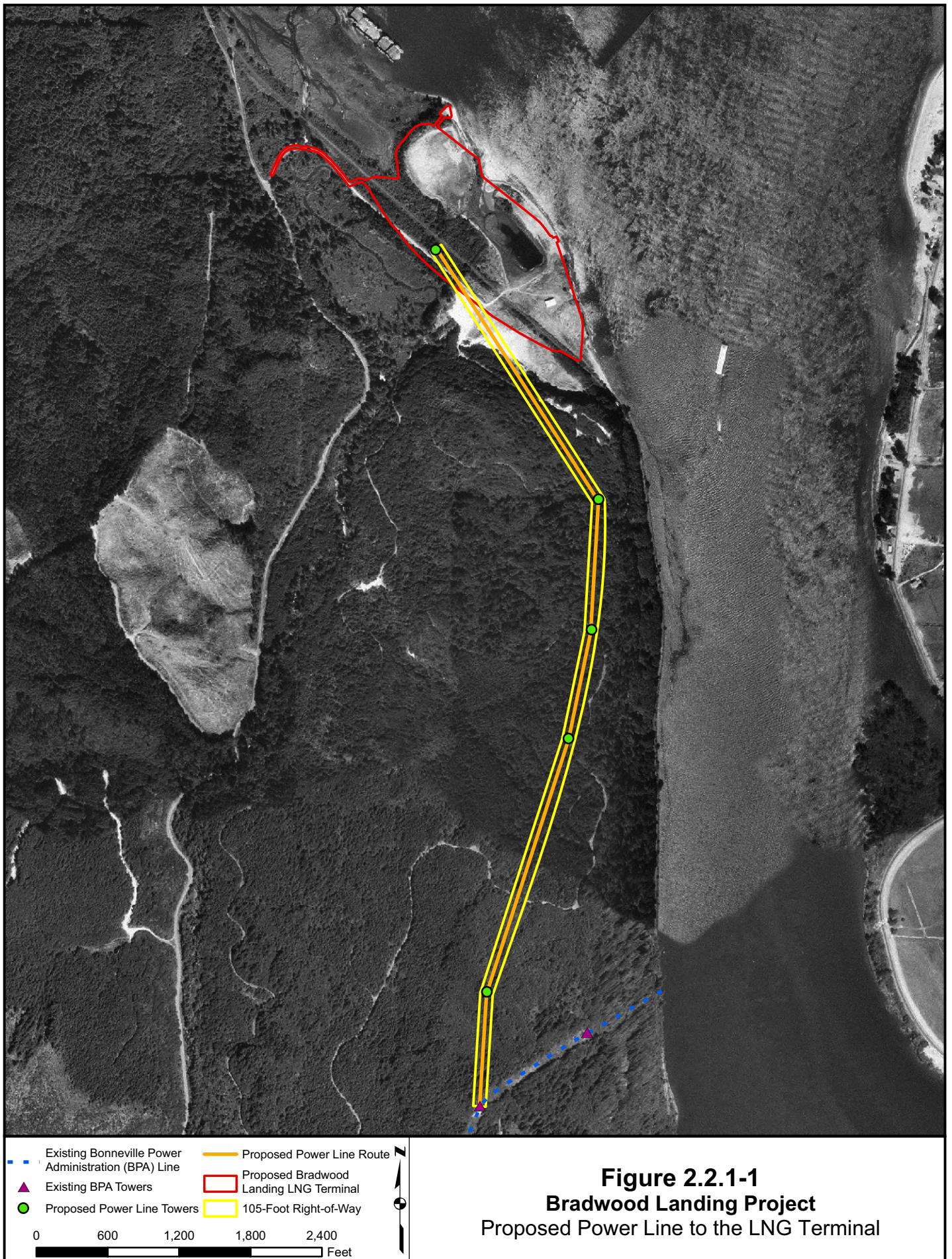


Figure 2.1.5-1
Bradwood Landing Project
 Mitigation Site Locations





2.2.2 Pipeline Laterals

NorthernStar has identified three potential lateral pipelines that would be constructed in association with the proposed project. These facilities would be constructed by entities other than NorthernStar and are tentative at this time. Preliminary, conceptual information on these three laterals is provided below.

As previously discussed, NorthernStar proposes to construct metering facilities associated with the interconnect/delivery point at MP 3.7 for the Wauna Mill. Georgia-Pacific would obtain the necessary permits and construct the lateral pipeline necessary to connect the metering facilities at the delivery point to the tie-in with its existing natural gas supply system. It is anticipated that the lateral would be 4 inches in diameter and about 0.2 mile long.

Northwest Natural would construct a lateral pipeline from the proposed interconnect with NorthernStar's pipeline at MP 11.4 to its existing pipeline. The lateral would be about 1.4 miles long and 24 inches in diameter. Northwest Natural would obtain the necessary permits to construct and operate its lateral pipeline.

At MP 18.9, NorthernStar would construct metering facilities associated with the interconnect/delivery point for the PGE Beaver Power Plant. An approximately 0.6-mile-long, 12-inch-diameter lateral pipeline would be constructed by PGE from the interconnect/delivery point to its existing natural gas supply system. The lateral pipeline would be constructed entirely within PGE property. PGE would obtain the necessary permits to construct and operate its lateral pipeline.

Based on our review of the information provided by NorthernStar on these potential lateral pipelines, it is likely that environmental impacts associated with these nonjurisdictional facilities would be minimal. However, to ensure that potential issues are adequately addressed, **we recommend that:**

- **Prior to pipeline construction, NorthernStar should file with the Commission the following information on the nonjurisdictional lateral pipeline facilities:**
 - a. **final routing and design information, including maps depicting the location of the facilities;**
 - b. **documentation of consultations with the appropriate agencies and the status of federal, state, or local permits or approvals required for their construction; and**
 - c. **status and copies of agency clearances (or copies of any surveys and reports prepared) for wetlands, threatened and endangered species, and cultural resources.**

2.2.3 Salmon Enhancement Initiative

NorthernStar proposes to implement an SEI to contribute to the recovery of salmon and the lower Columbia River ecosystem. NorthernStar proposed the SEI as a voluntary action that would be above and beyond the mitigation measures used to avoid, minimize, rectify, reduce, and/or compensate for environmental impacts that are required by the regulations. However, various permit requirements would ensure its implementation if the project is authorized. NorthernStar's SEI would entail providing funding for habitat preservation, enhancement, and restoration projects on the lower Columbia River that would total approximately \$59 million over the life of the Bradwood Landing Project. The National Fish and

Wildlife Foundation's Western Partnership Office in Portland, Oregon would serve as the fiscal agent for SEI funds. The long-term implementation of the SEI is outside of the FERC's regulatory authority. Potential impacts on federally listed species due to the SEI are described in section 4.6.2.2 and will be included in the revised BA and EFH Assessment.

2.3 LAND REQUIREMENTS

Table 2.3-1 summarizes the land requirements for the facilities associated with the Bradwood Landing Project.

TABLE 2.3-1		
Summary of Land Requirements Associated with Construction and Operation of the Bradwood Landing Project		
Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
LNG Terminal		
Offshore Maneuvering Area	58.0	58.0
Marine Berth	5.5	1.0
Onshore LNG Terminal Facilities		
Onshore Portion of Wharf head	1.0	0.8
Transfer Pipelines	3.5	3.5
LNG Storage Tank Area	15.5	14.5
Vaporizers and Process Area	6.2	6.2
Meter Station	0.2	0.2
Buildings	1.0	0.5
Water Storage and Treatment Areas	5.5	4.5
Access Road	0.6	0.6
Railroad Relocation	9.4	0.0
Buffer	6.0	1.0
Other	13.0	7.3
Construction Worker Parking Lot	5.0	0.0
Power Line ^a	16.9	16.9
LNG Terminal Subtotal	148.2	115.9
Pipeline		
Pipeline Right-of-Way ^b	475.8	232.8
Temporary Extra Workspace	54.0	0.0
Pipe Storage and Contractor Yards	18.4	0.0
Aboveground Facilities	4.8	1.2
Access Roads	0.0	0.0
Pipeline Subtotal	553.0	234.0
Project Total	701.2	349.9
^a Based on a 100-foot-wide right-of-way for both construction and operation of the power line and a 100-foot-wide construction area for access roads.		
^b Based on an 85- to 120-foot-wide construction right-of-way for the main pipeline, and a 100-foot-wide construction right-of-way for the interconnects. Permanent rights-of-way would be 50 feet wide.		

2.3.1 Waterway for LNG Carrier Transit and Turning Basin

As previously mentioned above, LNG carriers heading to the Bradwood Landing LNG terminal would transit some 38 miles up the Columbia River from its mouth within an existing navigation channel. The states of Washington and Oregon share jurisdiction and ownership of the river and its bottom. The

navigation channel is maintained by the COE. The navigation channel was dredged to a depth of 40 feet by the COE in 1976, and in 2006 the COE began to deepen the channel to 43 feet under a project it authorized in 2004. For most of its length from the mouth of the Columbia River to Bradwood at CRM 38 the federal navigation channel is 600 feet wide. NorthernStar is not proposing to make any modifications to the navigation channel in the Columbia River. However, NorthernStar is proposing to construct a turning basin/maneuvering area adjacent to the existing navigation channel. This maneuvering area would be about 2,000 feet by 2,000 feet in size and cover about 58 surface acres in the Columbia River. To create the maneuvering area, NorthernStar would have to dredge about 46 of the 58 acres and remove approximately 700,000 cubic yards of sediment from the river bottom.

2.3.2 LNG Terminal Facilities

The terrestrial portion of the LNG terminal would be located within a 411-acre parcel that NorthernStar currently controls on the southern shore of the Columbia River and adjacent to the southeastern end of the Clifton Channel in Clatsop County, Oregon. This place, called Bradwood Landing, was formerly the site of a series of historic timber mills that operated between about 1843-1852, 1910-1920, and 1930-1962. The mill and town at Bradwood was abandoned, and structures were destroyed or removed by the early 1980s. Wooden pilings along the river's edge associated with the former Bradwood saw mill, as well as a former mill pond, are still present. Between 1966 and 2002, the COE used the site for placement of about 873,000 cubic yards of dredged material from maintenance of the Columbia River navigation channel.

The marine berth at the LNG terminal would occupy about 1 acre within the Columbia River, including the unloading platform and mooring dolphins. The operational size of the terrestrial portion of the LNG terminal would be about 40 acres. Another 17.8 acres would be used for the power line right-of-way (see section 2.2.1). A layout of the proposed facilities is provided on figure 2.1.3-1. Figure 2.3.2-1 depicts the LNG terminal construction area. Additional information on the land use and requirements for the LNG terminal site is provided in section 4.7.2.1.

2.3.3 Pipeline and Associated Aboveground Facilities

NorthernStar's proposed sendout pipeline would be installed within a region dominated by forest, with secondary uses that include cropland, pasture, and rangeland (section 4.7 provides more details about land use). About 19.4 miles of the pipeline would be within the State of Oregon (Clatsop and Columbia Counties) and about 16.9 miles of the pipeline would be within the State of Washington (Cowlitz County).

Construction of the pipeline facilities would disturb a total of about 553.0 acres of land, including the pipeline construction right-of-way, temporary extra workspace, two pipe storage and contractor yards, aboveground facilities, and access roads. Of this total, 475.8 acres would be disturbed by the pipeline construction right-of-way, 54.0 acres would be disturbed by temporary extra workspace, 18.4 acres would be disturbed by two pipe storage and contractor yards, and 4.8 acres would be disturbed by aboveground facilities. Modifications or improvements to existing roads used to access the project would not be required.

Approximately 234.0 acres of the 553.0 acres used for construction would be required for operation of the project. Of this total, 232.8 acres would be for the pipeline permanent right-of-way and 1.2 acres would be for the aboveground facilities. The remaining 319.0 acres would be allowed to revert to its former use. Additional information on the land use and requirements for the pipeline facilities is provided in section 4.7.3.1.

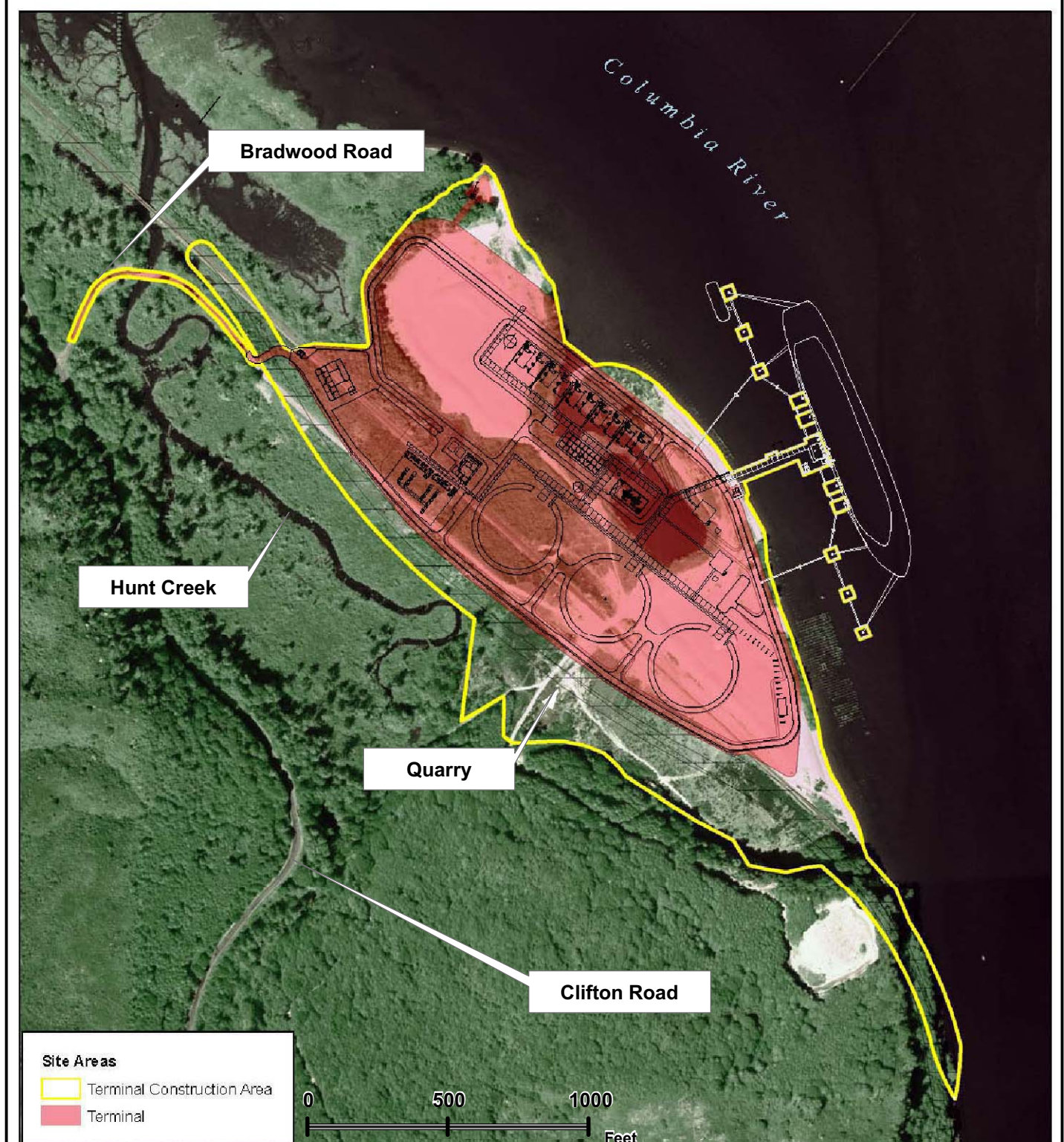


Figure 2.3.2-1
Bradwood Landing Project
Proposed LNG Terminal Construction Area

About 8.0 miles (22 percent) of the 36.3-mile-long pipeline route would be constructed adjacent to the existing KB pipeline. The remaining 28.3 miles (78 percent) would be constructed on newly created right-of-way.

NorthernStar proposes to use a 100-foot-wide construction right-of-way for the majority of the pipeline route. NorthernStar has also indicated that an additional 20 feet of construction right-of-way width may be needed for stockpiling topsoil wherever topsoil must be segregated from subsoil (e.g., in agricultural and residential lands). The 20 feet of additional width is based on the segregation of up to a 12-inch-thick layer of topsoil from directly over the pipe trench and under the spoil pile (trench plus spoil side).

Where the Bradwood Landing pipeline would be adjacent to the existing KB pipeline, the proposed temporary construction right-of-way would overlap onto the existing pipeline's permanent right-of-way. The overlap would be up to 10 feet on the spoil side of the pipe trench, but no closer than 15 feet from the existing pipeline. This would allow room to keep construction equipment off the operating pipeline, thus avoiding potentially damaging the existing pipeline.

In wetlands where the pipeline crossing would exceed 100 feet in length, NorthernStar proposes to use a 100-foot-wide construction right-of-way to account for the slumping of saturated segregated spoil piles. NorthernStar would reduce the construction right-of-way to a width of 85 feet in wetlands where the crossing length is 100 feet or less. The 85-foot limitation on the construction right-of-way width would not apply to wetlands in actively cultivated or rotated cropland. Based on the information provided by NorthernStar, the proposed 85-foot and 100-foot-wide right-of-way is necessary and justified to allow for safe and efficient construction of the pipeline in wetlands. Pipeline impacts on wetlands are further discussed in section 4.4.1.3.

Following construction, a 50-foot-wide permanent right-of-way would be retained for operation and maintenance of the pipeline. The typical right-of-way cross sections that NorthernStar would use for the pipeline route are provided in Appendix D.

In addition to the construction right-of-way, NorthernStar would require temporary extra workspace outside the standard construction right-of-way at locations where additional excavation, soil placement requirements, or equipment management and staging would make it impracticable to carry out all construction operations within a 100-foot-wide corridor. These would include feature (e.g., road, railroad, waterbody) crossings; areas with steep side slopes or severe terrain; areas requiring topsoil segregation; tie-ins to existing pipelines and laterals; HDD entry and exit points; and staging and fabrication areas for HDD pull sections. NorthernStar has identified 43 temporary extra workspaces areas that are required for the project, affecting approximately 54.0 acres.

To support construction of the pipeline, NorthernStar proposes to use two pipe storage and contractor yards, one in Oregon (Yard A) and one in Washington (Yard B). Yard A would be located adjacent to the proposed pipeline at approximate MP 4.4, on land owned by Georgia Pacific and used previously for dredged material disposal (DMD) (see figure 2.3.3-1). Yard B would be located in Longview on current commercial property (see figure 2.3.3-2). Combined, the yards would affect 18.4 acres of previously disturbed land.

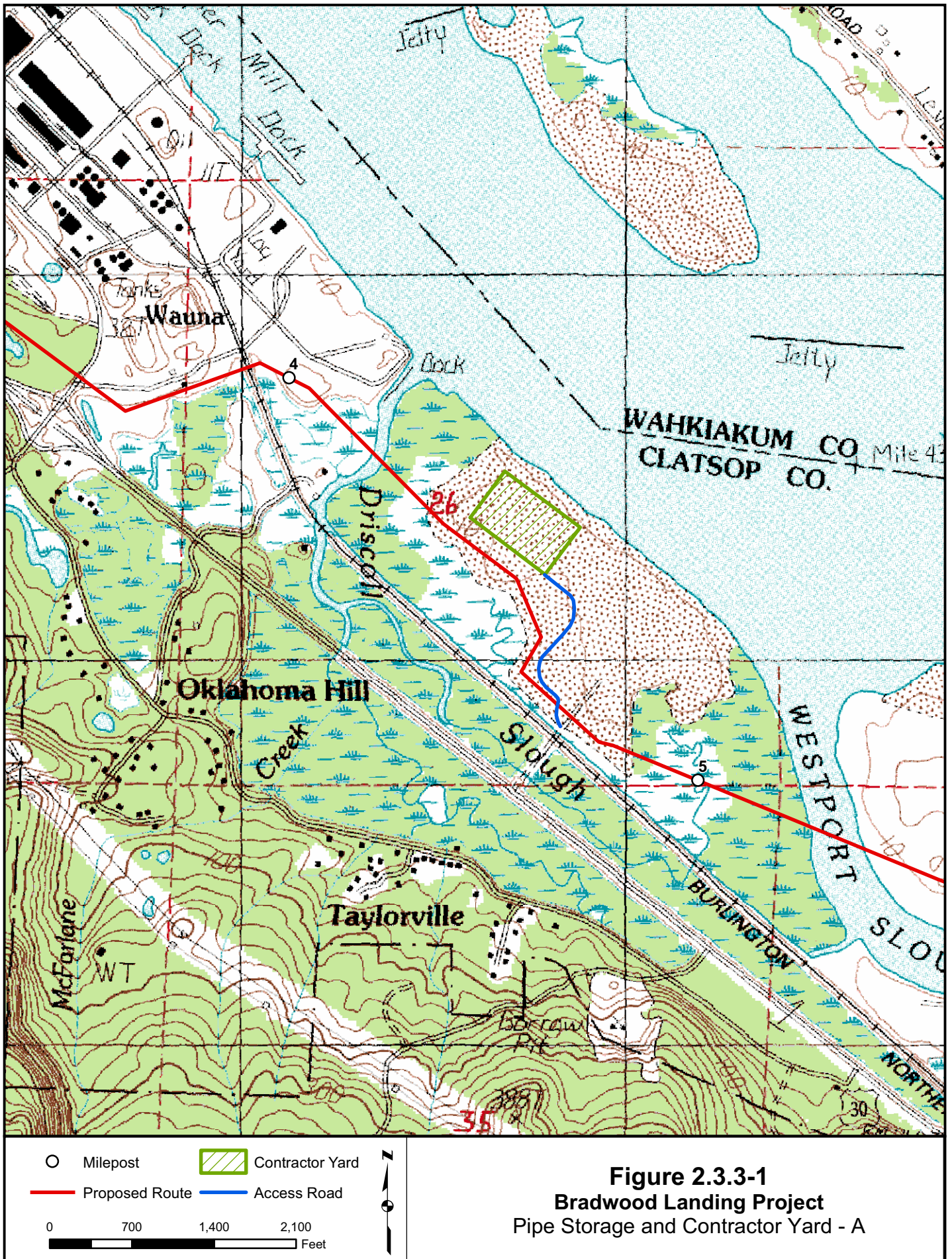
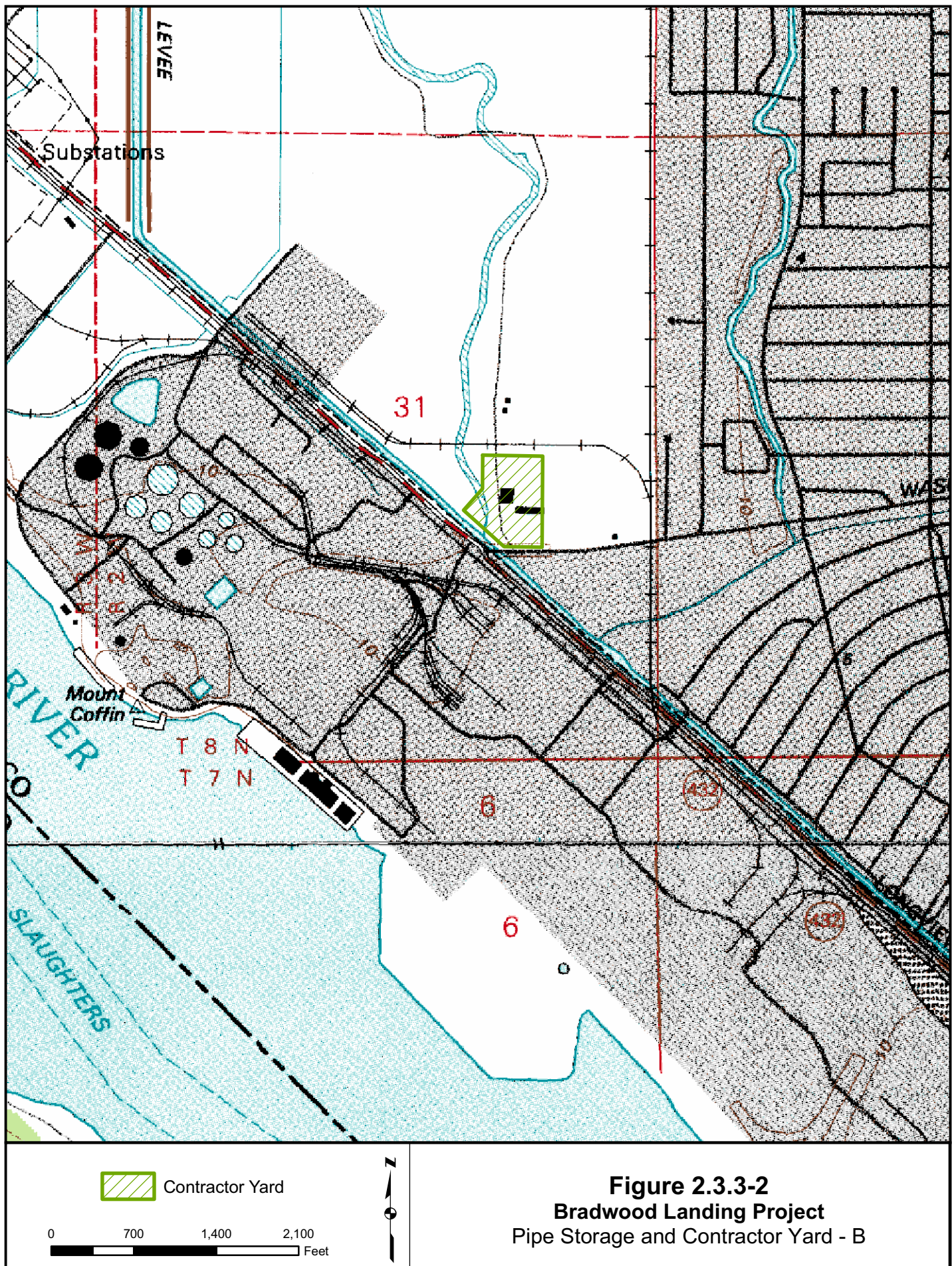


Figure 2.3.3-1
Bradwood Landing Project
 Pipe Storage and Contractor Yard - A



NorthernStar proposes to construct: 1) one pig launcher within the LNG terminal at MP 0.0, one pig launcher/receiver at MP 18.8, and one pig receiver at the pipeline terminus at MP 36.3; 2) meter stations at each of the following locations: the LNG terminal (MP 0.0), the delivery point to the Wauna Mill (MP 3.7), the interconnection with the Northwest Natural intrastate pipeline to the Mist storage facility (MP 11.4), the delivery point to the PGE Beaver Power Plant at Port Westward (MP 18.9), and the terminus of the pipeline at the interconnection with the Williams Northwest pipeline (MP 36.3); and 3) four MLVs at MPs 3.7, 18.8, 26.3, and 31.7. For each of these facilities, about 4.8 and 1.2 acres would be required for construction and operation, respectively.

NorthernStar would access the construction right-of-way via 32 existing public and private roads that intersect the right-of-way. The majority of roads are classified as dirt roads.

2.4 CONSTRUCTION PROCEDURES

This section describes the general procedures proposed by NorthernStar for construction of the LNG terminal and pipeline facilities. Refer to section 4.0 for more detailed discussions of proposed construction and restoration procedures as well as additional measures that we are recommending to mitigate environmental impacts.

The proposed LNG terminal and natural gas pipeline would be designed, constructed, operated, and maintained in accordance with federal safety standards that are intended to ensure adequate protection for the public and to prevent LNG and natural gas pipeline accidents or failures.

Under the provisions of the Natural Gas Pipeline Safety Act of 1968, as amended, NorthernStar would design, construct, operate, and maintain the LNG terminal facilities in accordance with the DOT's *Liquefied Natural Gas Facilities: Federal Safety Standards* (49 CFR 193). The facilities would also be required to meet NFPA 59A. These standards specify siting, design, construction, equipment, and fire protection requirements for new LNG facilities. The ship unloading facilities and any appurtenances located between the LNG carriers and the last valve immediately before the LNG storage tank would be required to comply with applicable sections of the Coast Guard regulations in *Waterfront Facilities Handling Liquefied Natural Gas* (33 CFR 127) and Executive Order 10173.

The proposed pipeline facilities would be designed, constructed, operated, and maintained in accordance with DOT regulations in *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards* (49 CFR 192). Among other design standards, these regulations specify pipeline material selection; minimum design requirements; protection from internal, external, and atmospheric corrosion; and qualification procedures for welders and operations personnel. In addition, NorthernStar would comply with the siting and maintenance requirements in 18 CFR 380.15 and other applicable federal and state regulations.

2.4.1 LNG Terminal Facilities

NorthernStar would construct the terminal facilities in accordance with its *Erosion and Sediment Control Plan – Bradwood Landing Terminal* (terminal ESC Plan). The terminal ESC Plan was developed in accordance with the requirements necessary for submittal of the General 1200-C NPDES permit application issued by the ODEQ. The terminal ESC Plan includes Best Management Practices (BMP) as recommended by the ODEQ's 2005 *Erosion and Sediment Control Manual*. In addition to erosion and sediment control measures, this plan describes specifications for hazardous material transportation, handling, storage, spill prevention, and spill response. A final terminal ESC Plan would be completed following preparation of the specific phased construction plans.

NorthernStar would construct the pipeline facilities in accordance with the FERC staff's *Upland Erosion Control, Revegetation, and Maintenance Plan* (Plan) and *Wetland and Waterbody Construction and Mitigation Procedures* (Procedures), with FERC-approved alternative measures (see section 4.4.1.3). The intent of the FERC staff's Plan and Procedures is to assist applicants by identifying baseline mitigation measures for minimizing the extent and duration of disturbances on soils, wetlands, and waterbodies associated with projects under the FERC's jurisdiction throughout the country. As general guidelines, the Plan and Procedures may be less stringent than state and local guidelines that are based on state or local concerns, issues, and/or regulations. NorthernStar has also drafted an *Erosion and Sediment Control Plan for Oregon – Bradwood Landing Pipeline* (pipeline ESC Plan) and a *Construction Stormwater Pollution Prevention Plan for Washington – Bradwood Landing Pipeline* (SWPPP).³ These plans incorporate elements of the FERC's Plan and Procedures, state and county requirements and provisions, stormwater pollution prevention plans, and spill prevention and response procedures. Drafts of these plans were included in NorthernStar's JPA and JARPA. The pipeline ESC Plan and SWPPP are discussed further in section 4.2.3.2.

Construction of the LNG terminal facilities would include site preparation; construction of the ship berth and unloading facilities along the shoreline of the Columbia River; and construction of the LNG storage, process, and support facilities. Associated construction activities would include dredging of the ship berth and maneuvering area in the Columbia River.

Typical construction activities would occur between 7 AM and 7 PM, 5 days per week. During concentrated periods, construction may include longer hours and additional days of the week to complete a particular construction phase more efficiently. Pile driving may occur between the hours of 7 AM and 10 PM (for about 60 days spread over a period of up to 120 days) and dredging may occur 24 hours per day (for a period of approximately 48 to 72 days). These extended hours allow for the construction activities to be completed under a compressed schedule, reducing the number of total construction days for pile driving and dredging. This is a typical approach to construction because it limits the length of time people who live in the vicinity may be affected.

The LNG terminal components and equipment would be brought to the site by truck or rail. Depending on their sizes, various facility components would arrive in different states of assembly. Some equipment would be self-contained and require no assembly. On-site workshops, staging, and laydown areas would be equipped and sized appropriately to complete the final assembly. No major fabrication of facility components is anticipated on site.

A brief explanation of some of the primary construction tasks is provided below.

2.4.1.1 Site Preparation

Site work at the LNG terminal would begin with clearing and grubbing, followed by rough grading of the entire site to allow for safe passage of construction equipment and materials. Approximately 50,000 cubic yards of soil and vegetation would be relocated to an on-site area along the cliff. During grading, appropriate erosion control measures would be installed, including temporary drainage ditches, catchment ponds, and silt fences. Aggregate (crushed rock) needed for project construction, including road improvements, would be sourced from an existing permitted quarry, and may

³ NorthernStar included its terminal ESC Plan and pipeline ESC Plan as part of its JPA, and included its SWPPP as part of its JARPA. NorthernStar's JARPA was filed with the FERC on November 6, 2006, and supplemented with a filing on November 22, 2006. NorthernStar also filed its JPA on November 22, 2006, and filed revisions to the JPA with the FERC on April 5, 2007. These documents are available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range. The FERC's Plan and Procedures are also available to the public on the FERC's Internet web page by clicking on Industries, Gas, Environment, Guidelines.

include material from an existing permitted basalt quarry located within the proposed LNG terminal site. Concrete would be supplied by an on-site batch plant.

Existing dredge piles on the property would be distributed across the site to serve as the base for the LNG terminal. NorthernStar proposes to use up to 700,000 cubic yards of the material dredged from the ship maneuvering area in the Columbia River to raise the base for the terminal to the desired elevation of 20 to 25 feet North American Vertical Datum (NAVD) 88, with a perimeter berm at an elevation 5 feet higher. The proposed elevation for the LNG terminal was designed to be well above the 100-year floodplain, which is at 13.23 feet NAVD.

NorthernStar would pipe the dredged materials to the LNG terminal site using hydraulic cutterhead dredging equipment. Dredged material would be piped to the more distant areas of the site first. The water that conveys the dredged material would separate from the material as it is deposited on the site. NorthernStar expects that all or most of the dredge water would percolate into the sandy soil at the site. NorthernStar would construct a berm to prevent any dredge water from washing into adjacent wetlands, Hunt Creek, or the Columbia River. Any dredge water that does not percolate into the soil would drain to the low point within the berm, which would be the former lumber mill log pond, where it would accumulate. Any silt in the water would settle out in the pond. Additional details regarding the dredge water are provided in section 4.3.2.3.

The berm used to contain the dredged material would become the permanent 5-foot containment berm that surrounds the entire site. In most places, concrete would be mixed with the sand to strengthen the berm and minimize its footprint. A paved perimeter road would be constructed on top of the berm. Once the dredged material has been compacted and stabilized and geotechnical improvements have been made, the facilities would be constructed. Because many of the construction activities would overlap with each other, the site would be subdivided into work areas assigned to the contractor and major subcontractors.

The material that is dredged from the ship berth and maneuvering area that is not placed at the LNG terminal site would be placed at the Wahkiakum County Sand Pit site, located at the northern end of Puget Island. Wahkiakum County is currently seeking a permit to receive 205,000 cubic yards of material for beach protection at the Sand Pit site. Project dredge material would be placed at the Sand Pit site up to the maximum permitted amount available at the time of dredging. This placement area and other alternative dredged material placement sites considered by NorthernStar are described in section 3.1.9.2.

Access Roads and Hunt Creek Bridge

Clifton Road would be widened to a 24-foot paved surface with 2-foot shoulders on each side of the road. The first one-third mile would be a relatively straight-forward construction along relatively flat terrain. The majority of the next mile would require blasting rock from the uphill slope to widen the road prism by about 10 feet. The next 0.8 mile would require mechanically removing some ground from the uphill slope to widen the road prism. The final one-third mile, stopping 200 feet before the Bradwood Road intersection, would require that a Gabion retaining wall be constructed to widen the road prism. Additional culverts and drainage ditches would be installed to improve the drainage.

As discussed in section 2.1.3.6, Bradwood Road enters the LNG terminal site from Clifton Road over a bridge that crosses Hunt Creek. NorthernStar would need to improve and widen this 1,150-foot-long gravel access road for use during construction and operation of the proposed project. Bradwood Road would be surfaced in asphalt and widened from between 15 and 19.5 feet to 24 feet by clearing and grading the area directly adjacent to the existing roadway. The proposed roadway would generally follow the existing alignment, except immediately west of Hunt Creek Bridge; here the road would swing wider

onto the old second bridge alignment, where the old compacted, graded road area and pilings are still visible. The proposed roadway would be slightly wider than its current width and would extend approximately 170 feet past the existing alignment after crossing Hunt Creek as the roadway enters the LNG terminal. The roadway would not be curbed except where the new bridge's extruded concrete curb extends onto Bradwood Road.

The existing bridge over Hunt Creek is not adequate to withstand the anticipated loads associated with construction-related traffic. NorthernStar would replace the bridge with a new one built of four 75-foot-long, 3-foot-high, pre-cast concrete deck bulb T-girders (see figure 2.1.3-2). These would be supported on four 12-inch-diameter concrete-filled steel piles that would be placed above the mean higher high water (MHHW) elevation and driven using a vibratory hammer and completed with a cast-in-place pile cap. The new bridge deck elevation would be 2.4 feet above the 100-year flood elevation. The bridge decking would be asphalt. Cast-in-place concrete aprons would be added at the ends of the bridge to match the existing grade. Each side of the bridge would be curbed and have curb-mount rails. The bridge would be sloped to one side, and an additional 25 feet of extruded concrete curb would be constructed on each side beyond the concrete apron. This curb is designed to guide stormwater well beyond the ends of the bridge where it can be discharged into existing vegetation. Because the abutments would be placed well beyond the lateral extent of MHHW and the 2-year flood elevation, and because the lower reaches of Hunt Creek are largely tidally influenced by backwater from the Columbia River, within-channel flow velocities are expected to be sufficiently low, and bank and scour protection would not be necessary.

The abutments would be constructed outside of the lateral extent of both MHHW (at 9.45 feet NAVD 88) and the 2-year flood elevation on Hunt Creek (at 11.43 feet NAVD 88) to avoid in-water work. No in-water work is expected, with the possible exception of shortening the existing wooden piles if they interfere with the placement of the new bridge beams. In that event, the obstructing piles would be cut from a boat at a tide state above mean water level.

Railroad Line Realignment

An existing PWRR line runs through the proposed LNG terminal site. NorthernStar would need to remove a 4,200-foot-long portion of the existing tracks and relocate the railroad up to 250 feet south of its current alignment, still within the parcel controlled by NorthernStar. The right-of-way for the new railroad alignment would be 100 feet wide (i.e., 50 feet on each side of the centerline), consistent with the current right-of-way. Existing or new ballast would be moved or placed in the new right-of-way location and old tracks would be replaced by stronger new tracks. An undisturbed vegetation buffer zone would be maintained between the railroad realignment construction activities and the edge of Hunt Creek that would be at least 30 feet wide. The railroad line is in service, but not currently in use, which would allow for the possibility of delivering construction materials for the project by train.

Blasting

Blasting at the existing on-site rock quarry may be used to generate rock to be crushed for aggregate and sand to produce concrete and foundation bedding. Blasting would be conducted in accordance with all applicable federal, state, and local regulations. These regulations include *State of Oregon 2004 Fire Code Amendments*; *Explosives, Oregon's Revised Statutes, November 10, 2004*; and the Safe Explosives Act (27 CFR 555) or other more current regulations. NorthernStar would employ mitigation measures, as necessary, to minimize potential fly rock (i.e., using blasting nets/curtains) and to minimize vibration, noise, and safety impacts (i.e., coordinating with landowners in the project area). These mitigation measures would be detailed in a Blasting Management Plan, which NorthernStar would develop prior to beginning construction.

2.4.1.2 Maneuvering Area and Ship Berth

NorthernStar proposes to dredge about 700,000 cubic yards of material from approximately 46 acres within the 58-acre maneuvering basin area. The area would be dredged to a total depth of -43 feet CRD, which includes a 1-foot overdredge allowance. The sides of the dredged area would be cut to a 3 (horizontal) to 1 (vertical) slope. The dredging of the berth and maneuvering area would be performed using a hydraulic cutterhead (suction) dredge. Periodic dredging would be performed to maintain the berth and maneuvering area at the design water draft (see section 2.7.2).

The ship berth is expected to be constructed from the water using an offshore construction spread. The piling for the wharf would be constructed using an impact pile driver and a vibratory pile driver during the in-water work window. A 50-ton derrick barge and a 25-ton truck crane would be the primary construction equipment required, along with several barges used to stage rebar, forms, and other materials. The concrete would be pumped from shore through piping. Friction collars would be installed on the piles and the concrete forms, and rebar would be positioned to receive the concrete. Concrete would be delivered from shore into the completed forms to extend the wharf out into the water until the ship berth is constructed. Expandable foam would be used to seal the forms and ensure that uncured concrete is fully contained. Construction contractors would employ proven methods to ensure that uncured concrete and alkaline water from uncured concrete does not enter the river. The forms for the remote breasting and mooring dolphins would be constructed in a similar manner.

All in-water work associated with construction of the ship berth and unloading facilities is expected to take place between November 1 and February 28 (see section 4.5.2.1.).

2.4.1.3 LNG Storage and Support Facilities

One of the most technical aspects of the project would be installation of the LNG storage tanks and associated process and support facilities because specialized materials and construction techniques are necessary. Temporary construction pads would be completed before mobilization of the LNG storage tank components to serve as a laydown and staging area. Most of the equipment and components would be prefabricated and would require additional assembly, placement, and positioning once on site. Major pieces of construction equipment, including high lift and tower cranes, would be required for the erection of LNG storage tanks and other large components.

LNG Storage Tank Installation

The civil work for the foundation and pilings for the LNG storage tanks would follow immediately after the base soils have been stabilized. This process would involve vibroflotation to improve the liquefaction resistance of the soils. Vibroflotation, also known as vibrocompaction, is the compaction of loose granular soils by penetration of a vibratory probe. Water is typically jetted to aid the compaction process. The resulting void that develops is filled with clean sand or gravel that is compacted by the probe. The LNG storage tank foundations would consist of a 32-inch-thick reinforced concrete pile cap located on ground on a piled foundation. The piles, consisting of 402, 30-inch-diameter auger-cast concrete piles or driven steel piles approximately 165 feet long, would be located under each LNG storage tank.

The outer walls of the LNG storage tanks would consist of pre-stressed reinforced concrete with a wall thickness of at least 2 feet. A carbon steel prefabricated dome roof structure would be erected on top of the concrete tank outer wall to form a weather-protected space inside of the concrete outer tank. The base insulation and inner 9 percent nickel steel tank would then be constructed within this protected environment. Concrete would be poured over the steel dome to form the final roof structure.

Once the steel roof structure has been erected and welded in place, installation of the base insulation, secondary bottom, and inner 9 percent nickel steel tank would commence. Internal components consisting of vapor barrier, in-tank pump columns, instrument wells, bottom and top fill pipes, piping for purging and cool down, access ladders, and tank instrumentation would also be installed. Exterior equipment would include roof platforms, walkways, access stairway, and emergency escape ladder and piping.

Insulation of the LNG storage tanks would consist of base insulation, shell insulation, and suspended roof insulation. The base insulation material would consist of load-bearing cellular glass blocks and a concrete ring beam beneath the inner tank shell. After the inner tank is hydrostatically tested, the tank would be washed and cleaned. A resilient blanket would be installed on the outside of the inner wall of the tanks. Once the tank is completely sealed and the exterior is completely dry, expanded perlite would be used to fill in the annular space between the inner and outer tanks. A fiberglass blanket would be installed on the suspended deck above the inner tank to complete the insulation system.

Other Facility Construction

The other facilities such as processing areas, pipe racks, control rooms, utility areas, warehouse, instrument buildings, administrative offices and the gate house would be constructed concurrently with the LNG storage tanks. Foundations and pad areas would be established for each facility, and they would be constructed according to local building code requirements. These facilities would be ready for operation by the pre-commissioning stage.

Final Grading and Site Restoration

Areas disturbed during construction of the LNG terminal would be finish graded at an elevation of approximately 20 feet NAVD 88 using a layer of compacted crushed stone fill or other appropriate material. Unless covered by equipment, gravel, or other covering, areas disturbed during construction of the LNG terminal site would be restored in accordance with NorthernStar's terminal ESC Plan. Restoration of the shoreline would follow a conceptual plan that identifies specific revegetation practices depending on the vegetation zone (i.e., emergent zone, riparian low scrub zone, riparian shrub zone, and upland herbaceous zone). Revegetation of the shoreline would include using potted plants, emergent plugs, and broadcast seed mixes to establish native herbaceous and woody species within these zones.

2.4.1.4 Testing

NorthernStar would conduct testing of the LNG storage tanks and other facilities in accordance with applicable federal and state codes and standards. Some of the tests to be carried out are described below.

Hydraulic Testing of the LNG Storage Tanks

The inner container of the LNG storage tanks would be hydrostatically tested in accordance with the requirements of API 620. NorthernStar proposes to obtain the hydrostatic test water from the Columbia River using the terminal's permanent surface water intake and pumping station. The pumping station would be equipped with two 400 horsepower pumps, an electric primary pump and a diesel backup. The pumps would not operate simultaneously. The maximum water intake rate of each pump would be 4,400 gpm. Construction activities would be scheduled to enable water used to test the first tank to be reused to test the second tank, thus limiting the amount of water needed for hydrostatic testing of the tanks to approximately 30 million gallons. However, if construction does not proceed as planned, the two tanks may need to be tested at different times, in which case the amount of water needed for

hydrostatic testing of the tanks would be approximately 60 million gallons. The river water used for hydrostatic testing of the tanks would be filtered before use to remove suspended solids and tested for bacteria. If bacteria concentrations are high enough to cause corrosion of the steel tanks, the water would be chlorinated before use.

After hydrostatic testing of the LNG storage tanks is completed, the water would be discharged to the Columbia River through a temporary outfall extending approximately 300 feet offshore. If the water has been chlorinated, it would be dechlorinated before being discharged. NorthernStar does not expect that the hydrostatic test water from the tanks would need to be further treated before discharge to the river. However, all batches of tank hydrostatic test water would be sampled and analyzed before discharge and treated as necessary to enable safe discharge to the river.

Pneumatic Testing of the LNG Storage Tanks

Each tank would also be pneumatically tested at a pressure of 1.25 times the design pressure for 1 hour in accordance with API 620.

Hydraulic/Pneumatic Testing of Piping Systems

Piping systems would be tested in accordance with established codes either hydraulically or pneumatically, as applicable. In general, cryogenic piping would be tested with dry air or nitrogen at 1.1 times the design pressure. Non-cryogenic piping would be tested with water at 1.5 times the design pressure. Water required for the hydrostatic testing of piping (approximately 1.5 million gallons) would be obtained from the on-site groundwater well. The well water would not be treated before it is used for hydrostatic testing of piping.

After use, the hydrostatic test water from the piping would be discharged to the ground or occasionally to the Columbia River through a temporary outfall. NorthernStar does not expect that the hydrostatic test water from the piping would need to be treated before discharge to the river. However, all batches of water used for hydrostatic testing of piping would be sampled and analyzed before discharge and treated as necessary to enable safe discharge to the river.

2.4.2 Pipeline and Associated Aboveground Facilities

Construction of the proposed pipeline would primarily involve standard cross-country pipeline construction techniques as described in section 2.4.2.1. Special construction techniques would also be used when constructing the pipelines across wetlands; waterbodies; roads and railroads; foreign pipelines; and agricultural, residential, commercial, and industrial areas. Rugged terrain also may require special construction techniques. These special construction techniques are described in section 2.4.2.2. Construction of the aboveground facilities associated with the pipeline is discussed in section 2.4.2.3.

2.4.2.1 General Pipeline Construction Techniques

Figure 2.4.2-1 shows the typical steps of cross-country pipeline construction. Standard pipeline construction proceeds in the manner of an outdoor assembly line composed of specific activities that make up the linear construction sequence. These operations collectively include survey and staking of the right-of-way, clearing and grading, trenching, pipe stringing and bending, welding and coating, lowering-in and backfilling, hydrostatic testing, and cleanup.

- 1) Survey and Staking
- 2) Clearing
- 3) Front-End Grading
- 4) ROW Topsoil Stripping
- 5) Restaking Centerline of Trench
- 6) Trenching (wheel ditcher)
- 7) Trenching (rock)
- 8) Padding Trench Bottom
- 9) Stringing Pipe
- 10) Field Bending Pipe
- 11) Line-Up, Initial Weld
- 12) Fill & Cap, Final Weld
- 13) As-Built Footage
- 14) X-Ray Inspection, Weld Repair
- 15) Coating Field Welds
- 16) Inspection & Repair of Coating
- 17) Lowering Pipe into Trench
- 18) As-Built Survey
- 19) Pad, Backfill, Rough Grade
- 20) Hydrostatic Testing, Final Tie-In
- 21) Replace Topsoil, Final Clean-Up, Full Restoration

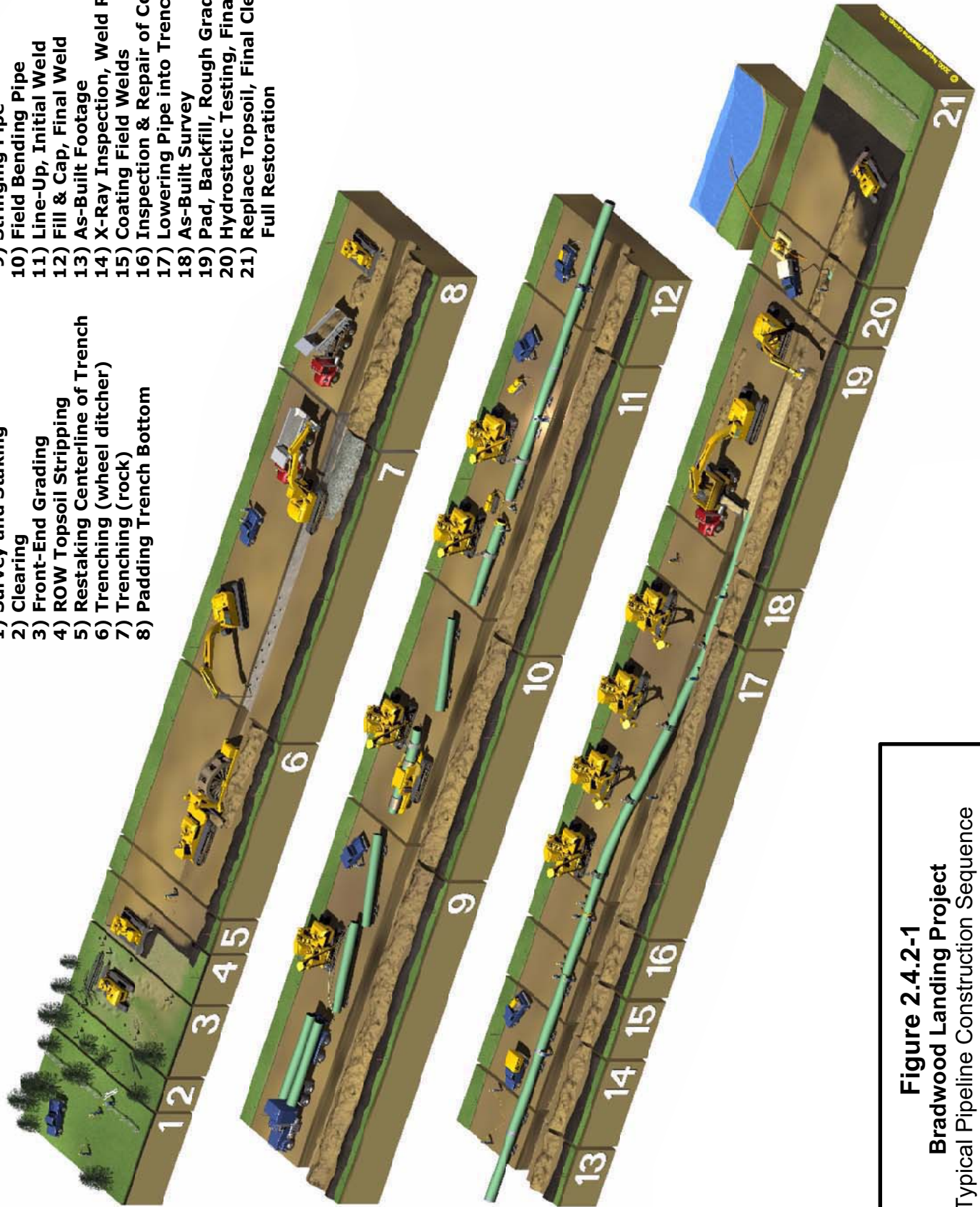


Figure 2.4.2-1
Bradwood Landing Project
 Typical Pipeline Construction Sequence

Survey and Staking

Before construction, NorthernStar's crews would survey and stake the centerline and exterior boundaries of the construction right-of-way. The exterior boundary stakes would mark the limit of approved disturbance areas and would be maintained throughout the construction period. Utility lines would be located and marked to prevent accidental damage during pipeline construction. NorthernStar would notify affected landowners, regulatory agencies, and other appropriate stakeholders before surveying and staking the proposed route. Survey and staking conditions of the NPDES Construction Stormwater Permit would be met.

Clearing and Grading

NorthernStar would clear the right-of-way of large obstacles such as trees, brush, and logs. Timber would be removed when necessary for construction purposes. Timber and other vegetative debris may be chipped for use as erosion-control mulch, or otherwise disposed of in accordance with applicable state and local regulations and landowner crossing agreements. Fences would be cut and braced along the right-of-way and temporary gates would be installed to control livestock and limit public access. The right-of-way would then be graded where necessary to create a reasonably level working surface to allow safe passage of construction equipment and materials. Where applicable (e.g., residential and agricultural lands), conserved topsoil would be stockpiled along one side of the right-of-way, allowing the other side to be used for access, material transport, and pipe assembly. NorthernStar would install temporary erosion control measures at this time.

Trenching

A rotary trenching machine, rock trencher, track-mounted backhoe, or similar equipment would be used to excavate a trench to a sufficient depth to provide a minimum 3-foot depth of cover. Depending on soil conditions, the top of the trench could be up to 25 feet wide and the bottom of the trench would typically be at least 12 inches wider than the diameter of the pipe (i.e., 42 inches wide for the 30-inch-diameter pipe and 48 inches wide for the 36-inch-diameter pipe). The sides of the trench would be sloped for stability and safety.

Spoil material excavated during trenching operations would be temporarily piled to one side of the right-of-way adjacent to the trench. In areas where topsoil stripping is required, the topsoil and subsoil would be stored in separate windrows or piles on the construction right-of-way and would not be allowed to mix.

Where the pipeline route is adjacent to an existing pipeline, the subsoil spoil would be placed on the same side of the trench as, but not directly over, the existing pipeline to keep working equipment off of the operating pipeline. In these collocated sections, the topsoil would be stockpiled on the working side of the right-of-way, outside the construction equipment lane.

Stringing and Bending

Either before or after trenching, 80-foot-long sections of externally coated pipe (also referred to as joints) would be shipped to the pipe storage and contractor yards and then transported to the right-of-way by truck and placed or "strung" along the excavated trench in a single, continuous line, easily accessible to the construction personnel on the working side of the trench, opposite the spoil side. At crossings of streams, railroads, and highways the amount of pipe required to span the crossing would be stockpiled in temporary staging areas on one or both sides of the crossing.

The pipe would be delivered to the construction right-of-way in straight joints. Some bending of the pipe would be required to allow the pipeline to follow natural grade changes and direction changes of the right-of-way. Selected joints would be bent in the field by track-mounted hydraulic bending machines, as necessary, before welding.

Welding and Coating

After stringing and bending are complete, pipe sections would be placed on temporary supports adjacent to the trench. The ends would be aligned and welded together using multiple passes for a full penetration weld. Only qualified welders would be permitted to perform the welding. Welders and welding procedures would be qualified according to the API Standard 1104 or the American Society of Mechanical Engineers Boiler and Pressure Vessel Code.

To ensure that the assembled pipe meets or exceeds the design strength requirements, NorthernStar would inspect all welds, both visually and radiographically (i.e., x-ray) or other nondestructive method if x-ray is impractical, and would make any necessary repairs. Following weld inspection, the previously uncoated ends of the pipe at the welds would be epoxy coated. The coating on the completed pipe section would be inspected and any damaged areas repaired.

Lowering-in and Backfilling

After welding and coating are completed, the pipe would be lowered into the trench by side-boom tractors. Before lowering the pipe, the trench would be inspected to ensure that it is free of rocks and other debris that could damage the pipe or the coating. In addition, the pipe and trench would be inspected to ensure that the configurations of the pipe and trench configurations are compatible.

Bladed equipment or a specially designed backfilling machine would be used to backfill the trench. No construction debris, including wooden supports, welding rods, containers, brush, trees, or refuse of any kind, would be permitted in the backfill. If rocks or other materials that could damage the pipe or coating are present in the backfill, a padding machine would be used to separate the rock from the backfill. In some instances, clean fill or additional protective coating such as rock shield would be placed around the pipe before backfilling.

Segregated topsoil, where applicable, would be replaced after backfilling the trench with subsoil. Following backfilling, a small crown of material would be left to account for any future soil settling that might occur.

Hydrostatic Testing

After backfilling, NorthernStar would hydrostatically test the pipeline in accordance with DOT regulations to ensure that the system is capable of operating at the design pressure. The testing process involves filling a segment of the pipeline with water and maintaining a prescribed pressure for a specified amount of time. If a leak or break in the line were to occur during testing, NorthernStar would repair and retest that section of pipe until DOT specifications are met.

A total of approximately 9.0 million gallons of water would be withdrawn from the Columbia River to hydrostatically test the pipeline. However, an additional 0.5 million gallons may be required to account for any water losses and make-up water. This water would be acquired from the Oregon side of the Columbia River at the location where the pipeline construction right-of-way meets the river. The water would be supplied via temporary piping connections from the source area or transported by tanker truck. No chemicals would be added to the test water. The water would be discharged through a straw

bale enclosure to the ground surface at an upland site near the river withdrawal location. If the construction sequence allows, the same water used for testing the Bradwood Landing pipeline may be used to test the Bradwood Landing LNG storage tanks to conserve water. Each segment of the pipeline to be installed by the HDD method would be initially hydrostatically pressure tested separately from the overall pipeline before and after installation in the borehole, then included in the overall pipeline pressure test once all the HDD segments are tied into the pipeline.

Meter assemblies would be built and tested separately from the pipeline. This usually occurs in contractor yards and involves relatively small volumes of water.

Cleanup

After a segment of pipe has been installed, backfilled, and successfully tested, the right-of-way, temporary extra workspaces, and other disturbed areas would be finish graded and the construction debris would be taken to an approved disposal area. NorthernStar would finish-grade the right-of-way to match the contour of adjacent undisturbed areas. In agricultural areas, compacted subsoil would be disked and the segregated topsoil would be replaced. Temporary and permanent erosion control measures, including diversion terraces and revegetation, would be installed at this time. Private and public property, such as fences, gates, driveways, and roads disturbed by the pipeline construction would be restored.

Revegetation

The restored construction right-of-way would be revegetated in accordance with NorthernStar's pipeline ESC Plan for Oregon and SWPPP for Washington, the FERC staff's Plan, other permit requirements, and site-specific landowner requests. Turf, ornamental shrubs, and other landscaping material would be restored in accordance with individual landowner agreements.

2.4.2.2 Special Pipeline Construction Techniques

Construction across wetlands; waterbodies; roads and railroads; foreign pipelines and utilities; agricultural, residential, commercial, and industrial areas; and rugged terrain may require special construction techniques. Special techniques would also be used if blasting is required. These techniques are described below. Additional detail on wetland and waterbody crossing construction techniques is provided in the *Bradwood Landing Pipeline Waterbody and Wetland Construction and Mitigation Procedures Plan*.⁴

Wetland Crossings

NorthernStar would construct its pipeline across wetlands in accordance with the FERC staff's Procedures and applicable permits. During crossing of unsaturated wetlands (i.e., wetlands without standing water or saturated soils), construction would be similar to the upland construction described above. If the crossing is less than 100 feet long, NorthernStar has requested the use of an 85-foot-wide construction right-of-way. In these areas, excavated material could be effectively moved to the adjacent upland spoil storage areas within the right-of-way. Where wetland crossings are longer than 100 feet, NorthernStar has requested use of a 100-foot-wide construction right-of-way. Section 4.4.1.3 describes these proposed modifications to the FERC Staff's Procedures in greater detail.

⁴ NorthernStar submitted the *Bradwood Landing Pipeline Waterbody and Wetland Construction and Mitigation Procedures Plan* to the FERC on December 21, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, by selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

Where necessary to prevent rutting or mixing of topsoil and subsoil, a temporary board road would be installed to allow passage of equipment with minimal disturbance of the surface and vegetation in wetlands. Trees would be cut to grade, but stumps would only be removed within 15 feet of the edge of the pipe trench, or where safety concerns dictate otherwise. Topsoil over the pipe trench would be segregated from subsoils. A riparian buffer would be left between the wetland and the upland construction areas except for the pipe trench itself and erosion control measures (e.g., silt fences, interceptor levees, and hay bale structures) would be installed and maintained to minimize sedimentation into the wetland. Trench plugs would be installed where necessary to prevent the unintentional draining of water from the wetland. After construction, forested wetlands would be replanted in-kind with trees, with the exception of the portion of the right-of-way within 5 feet of the pipeline (10 feet total), thereby minimizing the extent of disturbance. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Plan and Procedures. The corridor centered on the pipeline would be planted with a native grass seed mix and maintained in an herbaceous state to facilitate maintenance and inspection. Wetlands might also be crossed using the HDD construction method described below.

Waterbody Crossings

NorthernStar would cross small perennial and intermediate waterbodies in accordance with the FERC staff's Procedures and the proposed alternative measures described in section 4.4.1.3 as well as applicable permits. Intermittent streams that are dry at the time of crossing would be crossed using conventional upland construction techniques described above. The stream volume and velocity and available backfill materials would be considered in establishing the depth of cover over the pipeline in each stream in order to minimize the potential for scour and the ultimate exposure of the pipeline. Section 4.3.2.4 lists the proposed method for crossing all of the waterbodies along the pipeline route. Some waterbodies, including the Columbia River, would be crossed using the HDD method described below. Others would be crossed using open-cut or conventional bore methods. No bank hardening (e.g., riprap) is proposed to be used at any crossing.

NorthernStar would use two types of open-cut methods, the flume method and the dam and pump method. The flume method (see figure 2.4.2-2) is a standard dry waterbody crossing construction method that involves diverting the flow of water across the trenching area through one or more flume pipes placed in the waterbody. The first step in the flume crossing method would involve placing a sufficient number of adequately sized flume pipes in the waterbody to accommodate the highest anticipated flow during construction. Before the flume pipe is installed at the waterbody, it would be inspected to ensure it is free of dirt, grease, oil, or other pollutants. Excessive dirt would be removed. The pipe would be steam-cleaned, if necessary, to remove any oil or grease present before placement in the stream.

After placing the pipe in the waterbody, sand or pea gravel bags, water bladders, or metal wing deflectors would be placed in the waterbody upstream and downstream of the trench area. These devices would serve to dam the stream and divert the water flow through the flume pipes, thereby isolating the water flow from the construction area between the dams. Several measures would be taken to minimize short-term increases in turbidity during dam construction, including: 1) all in-stream work would be carried out on foot and no equipment would operate in the streambed; 2) sandbags would be filled with a non-leachable material such as clean, prewashed sand; 3) sandbags would be tied securely before they are installed; and 4) sheets of plastic would be interwoven between the layers of sandbags to ensure an effective seal. Leakage from the dams or subsurface flow from below the waterbody bed may cause water to accumulate in the isolated area. If necessary, the accumulated water would be periodically pumped out and discharged into energy dissipation/sediment filtration devices, such as a geotextile filter bag or straw bale structure, or into well-vegetated areas away from the water's edge.

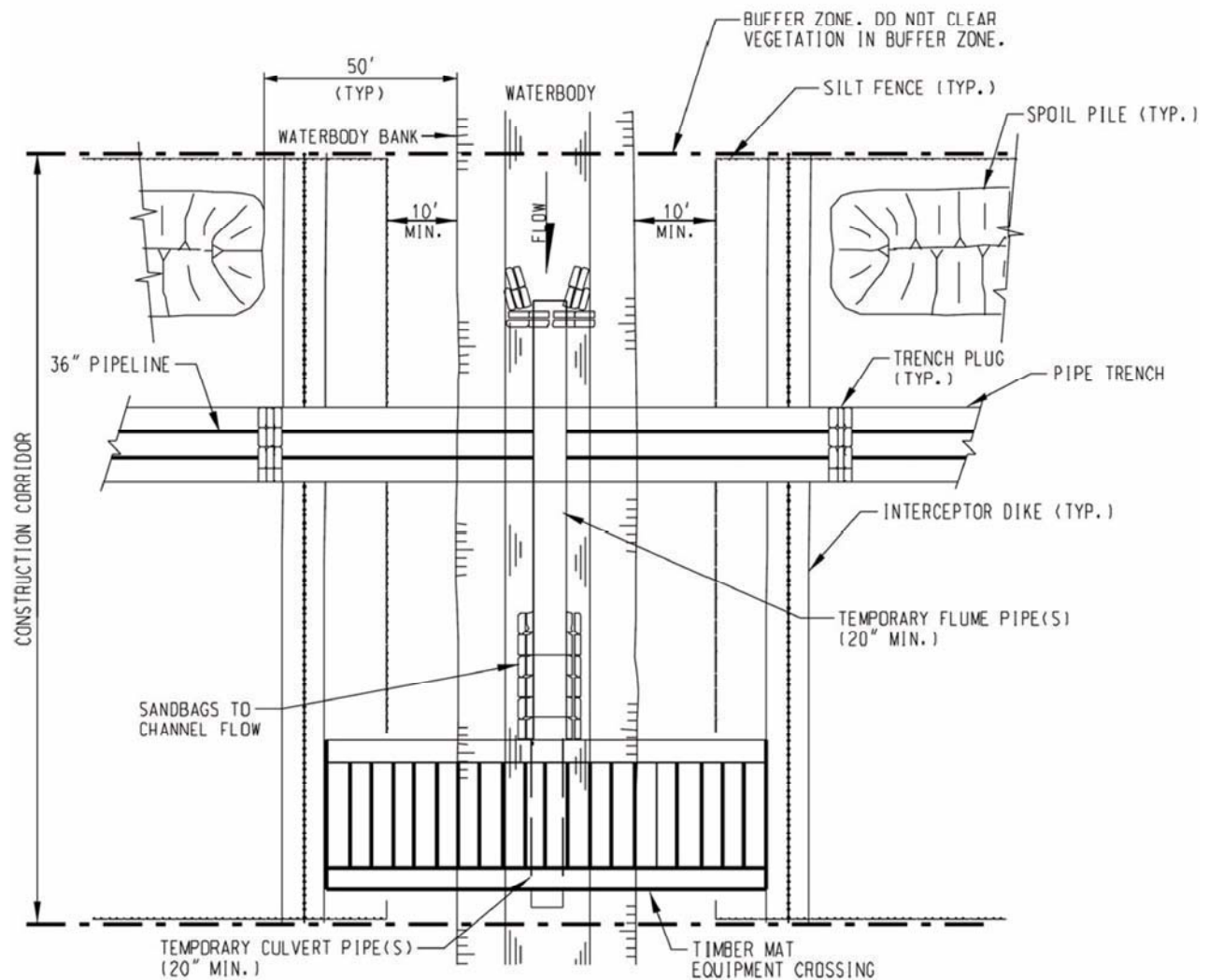


Figure 2.4.2-2
Bradwood Landing Project
 Flume Waterbody Crossing Method

Trackhoes located on both banks of the waterbody would excavate a trench under the flume pipe in the dewatered streambed. Spoil excavated from the waterbody trench would be placed or stored a minimum of 10 feet from the edge of the waterbody. Once the trench is excavated, the prefabricated segment of pipe would be installed beneath the flume pipes. The trench would then be backfilled with native spoil from the waterbody bed. Immediately following pipe installation and backfilling, and before removing the dams and flume pipes and returning flow to the waterbody channel, the streambanks would be reestablished to approximate preconstruction contours and stabilized. Erosion and sediment control measures would be installed across the construction right-of-way to reduce streambank and upland erosion and sediment transport into the waterbody. Sediment barriers, such as silt fence and/or straw bales or drivable berms would be maintained across the right-of-way at all waterbody approaches until permanent vegetation is established. After backfilling and major grading work are complete, any drivable berms would be removed and the ground surface returned to original contours. If a sediment control device is still needed at a location where a drivable berm was removed, a temporary sediment control device such as silt fencing would be installed. Equipment bridges would be removed when construction and restoration are completed.

The dam and pump method (see figure 2.4.2-3) is a standard dry waterbody crossing construction method that may be used as an alternative to the flume method for waterbodies less than 10 feet wide. This method is similar to the flume crossing method except that pumps and hoses would be used instead of flumes to move water across the construction work area. The technique involves damming of the waterbody with sandbags and/or steel plates upstream and downstream of the trench area. Pumps would be set up at the upstream dam with the discharge line routed through the construction area to discharge water immediately downstream of the downstream dam. An energy-dissipation device would be used to prevent scouring of the streambed at the discharge location. Water flow would be maintained through all but a short reach of the waterbody at the actual crossing. The pipeline would be installed and backfilled. After backfilling, the dams would be removed and the banks restored and stabilized. For both open-cut crossing techniques, the top 12 inches of substrate would be segregated for each crossing and returned. If additional material is needed, matching material would be utilized.

NorthernStar proposes to cross at least three waterbodies and up to seven waterbodies using a conventional bore, which is similar to the HDD method in that the pipeline is installed beneath a feature without surface disturbance to the feature during the crossing. However, the bore method differs in that the path of the pipeline across the feature is straight and is not variable or directional as in an HDD borehole where the path is curved or arched. The maximum length of a bore (hundreds of feet) is also much less than the maximum length of an HDD borehole (thousands of feet). Boring is frequently utilized at paved road and railroad crossings and is not a common crossing method for waterbodies primarily because of the difficulty in managing groundwater during the installation.

Boring requires excavation of pits on each side of the feature. Boring operations would require relatively large work areas, and well points or pumping for continuous dewatering operations, and may require continuous spoil/slurry processing throughout construction of the crossing. During a standard boring operation, spoil from the bore is carried into the pit as the crossing is being completed and then removed by trackhoes to provide room for the pipe to be welded and eventually pulled through the borehole. The operator for the boring machine, welders, and several laborers would work in the bore pit. Trench boxes or sheet piling may be used to support the pit walls and to help cut off groundwater inflows. Dewatering systems using deep wells or well points are frequently employed. The specific type of bore (e.g., jack and bore, slick bore, hammer bore) that would be utilized in a given area depends on the construction site characteristics, the type of soils present, and the contractor's familiarity with available methods.

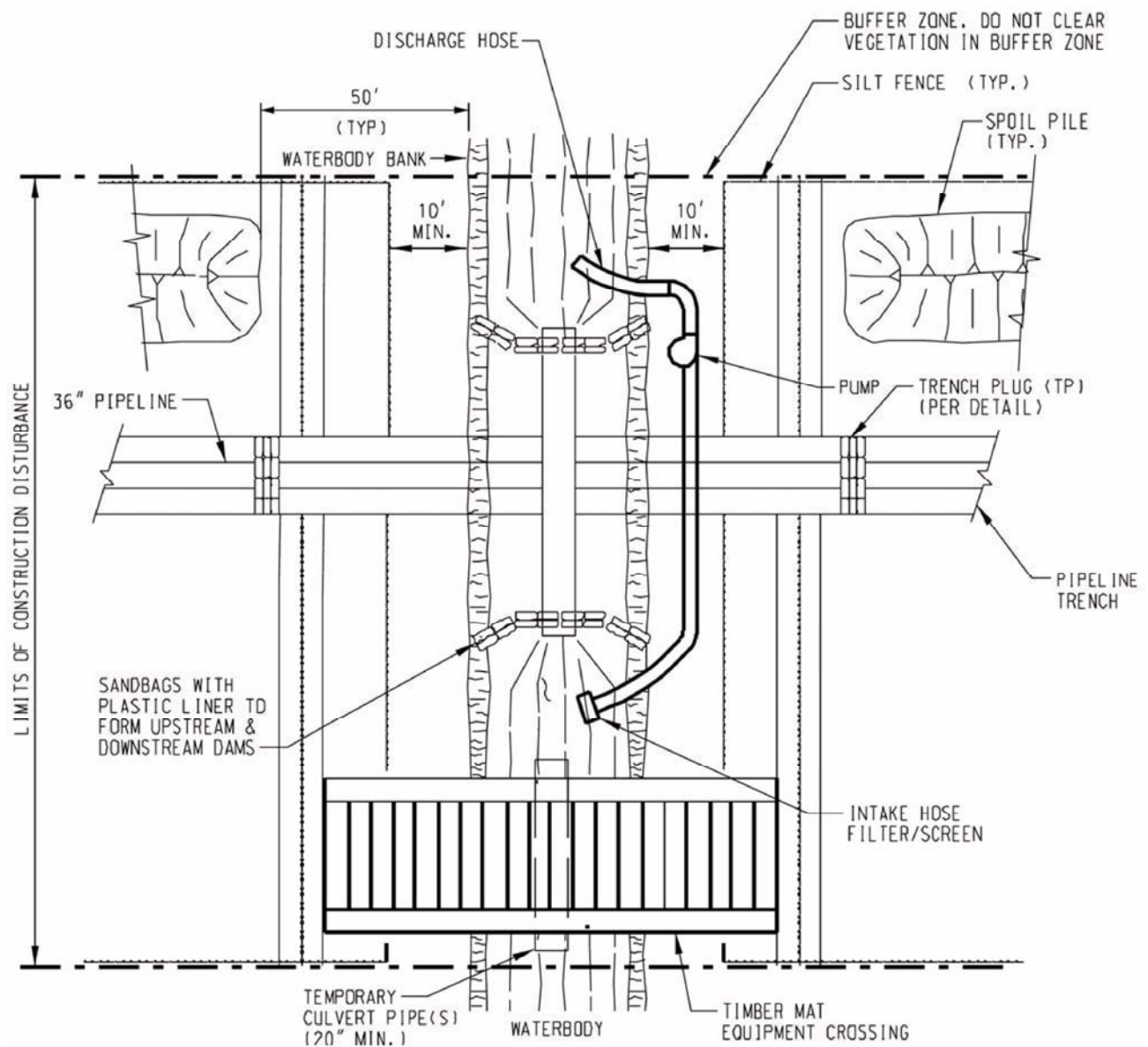


Figure 2.4.2-3
Bradwood Landing Project
 Dam and Pump Waterbody Crossing Method

Horizontal Directional Drilling

NorthernStar proposes to cross selected wetlands, waterbodies, selected upland habitats, and roads using the HDD construction method. This technique involves drilling a pilot hole under the waterbody, then enlarging that hole through successive reamings until the hole is large enough to accommodate the pipe. Throughout the process of drilling and enlarging the hole, a slurry made of naturally occurring non-toxic materials, such as bentonite clay and water, would be circulated through the drilling tools to lubricate the drill bit, remove drill cuttings, and hold the hole open. This slurry is referred to as drilling mud. NorthernStar has indicated it would use a drilling mud consisting of 95 percent water and 5 percent bentonite. Pipe sections long enough to span the entire crossing would be staged and welded along the construction work area on the opposite side of the waterbody and then pulled through the drilled hole. Figure 2.4.2-4 shows a conceptual HDD waterbody crossing.

Roads and Railroads

NorthernStar would install the pipeline under major paved highways and railroads where traffic cannot be interrupted using the HDD or bore method. Both of these methods would proceed as they would for a waterbody crossing discussed above.

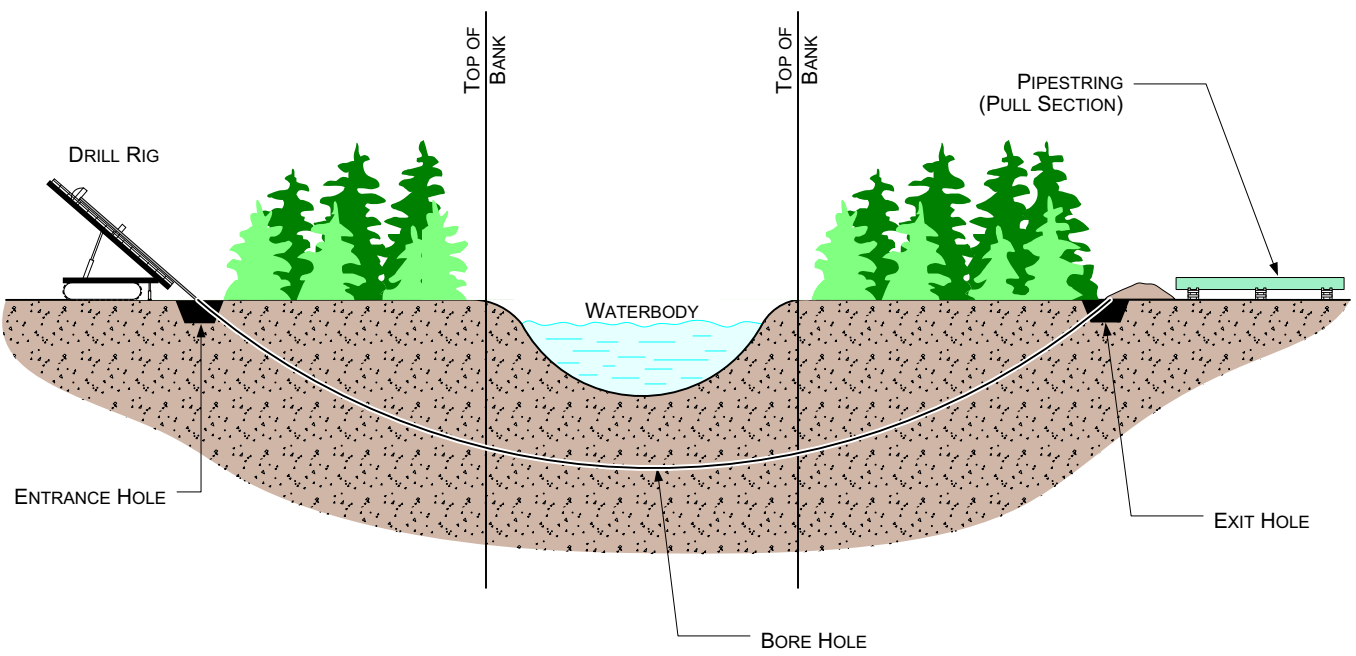
Smaller unpaved roads and driveways would be crossed by the traditional open-cut method. After construction, these roads and driveways would be restored. If an open-cut road crossing requires extensive construction time, NorthernStar would make provisions for temporary detours or other measures to allow safe traffic flow during construction. The pipeline would be buried to a depth of at least 5 feet below road surfaces or as required by applicable permits, and 10 feet below the toe of railroad embankments (or as otherwise required by the railroad company), and would be designed to withstand anticipated external loadings. Casings would be installed only where specifically required by permitting authorities.

Foreign Pipelines and Utilities

The proposed pipeline would cross several foreign pipelines. Additional foreign pipelines and other underground utilities are likely to be discovered during the preconstruction shallow hazards survey. Because of the relatively large size of the proposed pipeline and the soil cover and separation requirements, NorthernStar would cross under most foreign pipelines and utilities. Additional temporary workspace would be used at these crossings to accommodate the increased amount of spoil resulting from the need to excavate a deeper trench, and to prevent spoil and construction equipment from being placed over the existing pipelines. NorthernStar has indicated that it would ensure that the existing pipelines and utilities are not damaged during construction of its pipeline. Furthermore, NorthernStar would comply with state statutes (i.e., for Oregon: OAR 952-001-0010 through OAR 952-001-0090 – Oregon Utility Notification Center and for Washington: Chapter 19.122 RCW) which establish protocols and requirements for coordinating excavation work with operators of existing underground utilities.

Agricultural Areas

NorthernStar would conserve topsoil in actively cultivated and rotated cropland, improved pastureland, non-saturated wetlands, and rangeland. NorthernStar would segregate a maximum of 12 inches of topsoil in these areas, as well as in other areas at the specific request of the landowner or land management agency. The topsoil would be temporarily stockpiled separate from the subsoil within the construction right-of-way. Where topsoil is less than 12 inches deep, the actual depth of the topsoil would be removed and segregated. The trench would be excavated to a sufficient depth to allow for at least 3 feet of cover on top of the pipe.



For environmental review purposes only.

Figure 2.4.2-4
Bradwood Landing Project
Conceptual Horizontal Directional Drill Waterbody Crossing

The FERC staff's Plan requires that an applicant consult with landowners and local soil conservation organizations to locate existing drain tiles and irrigation systems in agricultural lands along the proposed pipeline route. The applicant needs to develop measures for constructing through drain tiled areas, maintaining irrigation systems during construction, and repairing drain tiles and irrigation systems after construction.

Residential Areas

NorthernStar's proposed construction work area (i.e., construction right-of-way and extra work areas) would be located within 50 feet of three residential structures, which are all located in Columbia County, Oregon. The potential impact the proposed sendout pipeline may have on residences is discussed in section 4.7.3.3. NorthernStar would prepare site-specific residential construction mitigation plans that detail the specific measures that would be used when construction occurs near residences. In general, where residences are within 50 feet of the edge of the construction work area, NorthernStar would fence the edge of the construction right-of-way, limit construction to daylight hours, backfill immediately after pipe installation, preserve landscaping where possible, and restore the construction area to the satisfaction of the landowner.

Commercial and Industrial Areas

Impacts on commercial and industrial areas would be limited to the construction and post-construction restoration periods when construction activities could inconvenience business owners, employees, and customers. NorthernStar would coordinate closely with business owners to maintain access, decrease construction duration, and generally minimize impacts on these areas.

Rugged Terrain

Portions of the proposed pipeline would cross rugged terrain, consisting of steep slopes and substantial changes in elevation. Additional grading may be required in areas where the pipeline route crosses steep slopes. Steep slopes often need to be graded down to a gentler slope to accommodate pipe bending limitations. In such areas, the slopes would be cut away, and, after the pipeline is installed, reconstructed to their original contours during restoration. In areas where the pipeline route crosses laterally along the side of a slope, cut and fill grading may be required to obtain a safe, flat work terrace. Steep slopes may also require the installation of special erosion control measures, including trench breakers, slope breakers, interception dikes, and erosion control mats to prevent the movement of disturbed soil off the right-of-way.

Blasting

It is likely that shallow bedrock is present in some areas along the proposed pipeline route. Currently, NorthernStar expects that any subsurface rock that is encountered along the pipeline route could be trenched using conventional equipment (e.g., trackhoes, rippers, or rock trenchers). As such, the use of blasting for pipe trench excavation is not expected to be necessary. If blasting does become necessary, mitigation measures described in the Blasting Management Plan (see section 2.4.1.1) would be implemented. Care would be taken to prevent damage to underground structures (e.g., cables, conduits, sewers, foundations, basements, and pipelines) and to springs, water wells, or other water sources. Blasting mats, soil cover, or other safety precautions would be used as necessary to prevent the scattering of loose rock. All blasting would be conducted during daylight hours and would not begin until occupants of nearby buildings, stores, residences, places of business, and farms have been notified and the area has been cleared of unauthorized persons. Only qualified and properly licensed personnel would be

allowed to handle explosives and conduct blasting activities. All blasting would be conducted in accordance with applicable federal, state, and local codes and ordinances.

2.4.2.3 Associated Aboveground Facilities

Interconnect/Meter Station Sites

During installation of the interconnect sites, construction activities and storage of construction materials and equipment would be confined to the pipeline construction right-of-way or approved temporary workspace. NorthernStar would dispose of debris and waste generated during the construction and all disturbed surface areas would be restored.

NorthernStar would excavate as necessary to accommodate the new reinforced concrete foundations for the new metering equipment, pigging facilities, and buildings. Forms would be set, rebar installed, and the concrete poured and cured in accordance with applicable industry standards. Backfill would be compacted in place, and excess soil would be used elsewhere or distributed around the site to improve grade.

Metering equipment would be delivered to the site by truck; unloaded using cranes, front-end loaders, or both, and positioned on the foundations, leveled, grouted where necessary, and secured with anchor bolts. After installation, all controls and safety equipment and systems, including ESD, relief valves, and gas and fire detection equipment, would be checked and tested, before being placed in service. Each of the interconnect sites would be fenced and graveled.

Pig Launchers and Receivers

A pig launcher would be installed at MP 0.0 at the LNG terminal. A pig launcher and receiver would be installed where the pipeline transitions from 36 inches in diameter to 30 inches in diameter at MP 18.8. A pig receiver would be installed at the Williams Northwest interconnect at MP 36.3. NorthernStar would install these facilities using the same standards and requirements established for construction of its proposed pipeline. The pigging facilities would be fenced and graveled after construction is completed.

Mainline Block Valves

MLVs would be installed at the pipeline origination at the pig launcher site within the LNG terminal, within the Williams Northwest interconnect site at the pipeline terminus, and within the pipeline right-of-way at several intermediate locations. The locations of the MLVs would be in accordance with the requirements in 49 CFR 192. NorthernStar would install these facilities using the same standards and requirements established for construction of its proposed interconnect sites and pipeline. The intermediate MLV sites would be fenced and graveled after construction is completed.

2.5 CONSTRUCTION SCHEDULE

No work would begin until the required permits and approvals are in place. NorthernStar indicates that it would require about 36 months to construct the proposed facilities. Construction and testing of the LNG tanks would require the most time. Construction of the pipeline and associated aboveground facilities would occur during the second year of constructing the LNG terminal facilities and require about 7 months to complete.

2.6 ENVIRONMENTAL COMPLIANCE INSPECTION AND MITIGATION MONITORING

In preparing construction drawings and specifications for the project, NorthernStar would incorporate mitigation measures identified in its application as well as requirements of federal, state, and local agencies. Contractors would also be provided copies of applicable environmental permits.

NorthernStar would conduct training for its construction personnel regarding proper field implementation of its ESC Plans, SWPPP, our Plan and Procedures, and other mitigation measures. Environmental training would be conducted before and during construction.

NorthernStar would be represented on each pipeline spread by a Chief Inspector, who would be responsible for quality assurance and compliance with mitigation measures, other applicable regulatory requirements, and company specifications. The Chief Inspector would be assisted by one or more craft inspectors and at least one full-time Environmental Inspector during construction of the pipeline. The Environmental Inspector would report directly to the Chief Inspector and would have stop-work authority. The Environmental Inspector's responsibilities would include:

- ensuring compliance with the requirements of the Plan, Procedures, the environmental conditions of the section 3 and Certificate authorization, the mitigation measures proposed by the applicant (as approved and/or modified by the FERC's authorization), other environmental permits and approvals, and environmental requirements in landowner easement agreements;
- identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;
- verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
- verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
- identifying erosion/sediment control and soil stabilization needs in all areas;
- ensuring that the location of dewatering structures and slope breakers would not direct water into known cultural resources sites or locations of sensitive species;
- verifying that trench dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge into a wetland or waterbody. If such deposition is occurring, the dewatering activity would be stopped and the design of the discharge would be changed to prevent reoccurrence;
- ensuring that subsoil and topsoil are tested in agricultural and residential areas to measure compaction and determine the need for corrective action;
- advising the Chief Construction Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting;
- ensuring restoration of contours and topsoil;

- verifying that the soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;
- determining the need for and ensuring that erosion controls are properly installed, as necessary, to prevent sediment flow into wetlands, waterbodies, sensitive areas, and onto roads;
- inspecting and ensuring the maintenance of temporary erosion control measures at least:
 - on a daily basis in areas of active construction or equipment operation;
 - on a weekly basis in areas with no construction or equipment operation; and
 - within 24 hours of each 0.5 inch of rainfall;
- ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification;
- keeping records of compliance with the environmental conditions of the FERC certificate, and the mitigation measures proposed by the project sponsor in the application submitted to the FERC, and other federal or state environmental permits during active construction and restoration; and
- identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase.

In addition, the FERC staff would conduct inspections to monitor the project for compliance with the Commission's environmental conditions and project mitigation measures proposed by NorthernStar or required by the regulatory agencies. To assist the FERC with its independent monitoring responsibilities during construction of this project, **we recommend that:**

- **NorthernStar should develop and fund a third-party environmental monitoring program to be implemented during construction of the Bradwood Landing Project. The program should allow for on-site, third-party compliance monitors representing the FERC to be present full-time during all pipeline construction phases, and periodically during LNG terminal construction, to ascertain that the project is being built as outlined in this EIS, and in accordance with the environmental conditions of the FERC Order. Prior to construction, NorthernStar should file a plan describing the third-party environmental monitoring program with the Secretary of the Commission (Secretary) for the review and written approval of the Director of OEP.**

Finally, other federal, state, and local agencies with jurisdiction or permitting authorities would conduct oversight inspections and monitoring to the extent deemed necessary by those agencies in order to meet their regulatory responsibilities.

2.7 OPERATION AND MAINTENANCE PROCEDURES

2.7.1 LNG Marine Traffic along the Waterway

Although LNG carriers and their operation are directly related to the use of the proposed import terminal, they are not subject to the section 3 authorization sought in this application. The LNG carriers arriving at the proposed LNG terminal must comply with all federal and international standards regarding

LNG shipping. A detailed discussion of design and safety features of LNG carriers is presented in sections 2.1.1.6 and 4.11.5.

LNG carriers would enter the Columbia River under the navigational control of a Columbia River Bar Pilot; the control would transfer to a Columbia River Pilot at Astoria. The pilots would decide whether the wave, visibility, tide, current, and wind conditions allow safe entry into the Columbia River and onward to the LNG terminal. The LNG carrier would transit the waterway with a two-tug escort, with three tugs used to maneuver the carrier within the turning basin and to dock at the terminal berth. The pilot would direct the securing of the lines and would turn navigational control back to the captain when the carrier is fastened.

The Coast Guard's WSR outlines conditions for LNG marine traffic in the waterway, including additional resources or assets that would be required prior to allowing LNG carriers to transit up the Columbia River to the Bradwood Landing LNG terminal. Safety and security measures relating to LNG marine traffic are described in more detail in section 4.11.5.

All LNG carriers would be required to carry Coast Guard-approved vessel response plans and comply with state spill prevention and contingency plans, including the applicable requirements in Chapter 317-40 of the WAC – Bunkering Operations.

The COE would be responsible for maintenance dredging of the navigation channel in the Columbia River. NorthernStar would be responsible for maintenance dredging of its turning basin and maneuvering area. NorthernStar estimates about 80,000 cubic yards of material would be removed from the maneuvering area every 2 to 4 years in order to maintain a depth of between 42 and 43 feet as part of maintenance dredging. NorthernStar expects the maintenance dredging would be carried out when the maneuvering area level reaches 42 feet CRD. Material from maintenance dredging would be deposited at the Wahkiakum County Sand Pit site located at the northern end of Puget Island (see section 3.1.9.2) or some other approved dredge disposal site. Each round of maintenance dredging would take about 2 weeks and would be accomplished using a hydraulic cutterhead suction dredge if placement is at the Sand Pit site. If a different dredge material disposal site is used, a clamshell/barge or hopper dredge would be necessary. NorthernStar has requested a permit for maintenance dredging from the COE that would cover the first 5 years of the LNG terminal operation.

2.7.2 LNG Terminal Facilities

NorthernStar would operate and maintain its facilities in compliance with 49 CFR 193.2503 and 193.2605 and sections 11.3.1 and 11.5.2 of NFPA 59A, 33 CFR 127, and other applicable federal and state regulations. Before commencing operation of the LNG terminal, NorthernStar would prepare and submit for approval operation and maintenance manuals that address specific procedures for the safe operation and maintenance of the LNG storage and processing facilities. NorthernStar would also prepare an operations manual that addresses specific procedures for the safe operation of the ship unloading facilities in accordance with 33 CFR 127.305. Operating procedures would address normal operations as well as safe startup, shutdown, and emergency conditions.

All operations and maintenance personnel at the LNG terminal would be trained to properly and safely perform their assignments. The terminal operators would be trained in LNG safety, cryogenic operations, and the proper operation of respective terminal control equipment. The operators would be required to meet all the training requirements of the DOT, Coast Guard, and other applicable regulatory entities. Operating personnel would be on duty at the terminal 24 hours per day, 7 days per week. Two operators per shift would work in the control room. In addition, one or two operators would be available to perform manual operating tasks at the processing and storage areas.

NorthernStar would maintain a full-time, maintenance staff to perform routine maintenance and minor overhauls at the LNG terminal. Major overhauls and major maintenance activities would be handled by trained and qualified contract personnel. All maintenance activities, including scheduled preventative and predictive maintenance and unscheduled maintenance, would be managed through a computerized maintenance management system (CMMS). Scheduled preventative and predictive maintenance would be inputted into the CMMS before commissioning of each piece of equipment. Unscheduled maintenance would be entered into the CMMS by the qualified personnel identifying the need. NorthernStar would train all facility operations and maintenance personnel on the use of the CMMS.

2.7.3 Pipeline and Associated Aboveground Facilities

The pipeline and associated aboveground facilities would be operated and maintained in accordance with 49 CFR 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*, as required by the DOT. Section 4.11.9 presents a discussion of the DOT's safety regulations and requirements for natural gas pipelines and describes how these requirements would be met by the pipeline operator.

The pipeline would be inspected regularly by aerial patrols or on-the-ground personnel to observe general right-of-way conditions and to identify any indications of soil erosion that may expose the pipe, stressed vegetation that may indicate a leak in the line, damage to erosion-control structures, unauthorized encroachment onto the right-of-way, and other conditions that could present a safety hazard or require preventive maintenance or repairs. All inspections would be in accordance with DOT requirements. Appropriate responses to conditions observed during the periodic inspections would be taken as necessary.

The aboveground facilities would be inspected at intervals that meet DOT requirements. Pipeline personnel would perform routine checks of the facilities, including calibration of equipment and instrumentation, inspection of critical components, and scheduled and routine maintenance of equipment. Safety equipment, such as pressure-relief devices, fire detection and suppression systems, and gas detection systems, would be tested for proper operation. Corrective actions would be taken for any identified problem.

2.8 SAFETY CONTROLS

2.8.1 LNG Terminal Facilities

The LNG terminal facilities would be sited, designed, constructed, operated, and maintained in compliance with federal safety standards. The major federal siting and design requirements for LNG facilities are summarized in table 2.8.1-1.

2.8.1.1 Spill Containment

The LNG impoundment systems for the terminal facilities would be designed and constructed to comply with DOT regulations (49 CFR 193.2149 through 193.2185). These regulations require that each LNG container and each LNG transfer system be provided with a means of secondary containment that has been sized to hold the quantity of LNG that could occur as a result of the design spill that is appropriate for the area and LNG equipment. The design spills are defined in NFPA 59A.

TABLE 2.8.1-1 Federal Siting and Design Requirements for LNG Facilities	
Requirement	Description
Thermal Radiation Protection (49 CFR 193.2057 and section 2.2.3.2 of NFPA 59A)	This requirement is designed to ensure that certain public land uses and structures outside the LNG facility boundaries are protected in the event of an LNG fire.
Flammable Vapor-Gas Dispersion Protection (49 CFR 193.2059 and sections 2.2.3.3 and 2.2.3.4 of NFPA 59A)	This requirement is designed to prevent a flammable vapor cloud associated with an LNG spill from reaching a property line that can be built upon.
Seismic Design (49 CFR 193.2101, and NFPA 59A)	This requirement outlines the necessary site specific seismic hazard study and specifies that critical safety-related components of the facility must be designed to survive earthquake ground motions estimated to have a 1 to 2 percent probability of occurring within a 50-year period.
Wind Forces (49 CFR 193.2067)	This requirement specifies that all facilities be designed to withstand wind forces of not less than 150 mph without the loss of structural integrity.
Impounded Liquid (section 2.2.3.8 of NFPA 59A)	This requirement specifies that liquids in spill impoundment basins cannot be closer than 50 feet from a property line that can be built upon or a navigable waterway.
Container Spacing (section 2.2.4.1 of NFPA 59A)	This requirement specifies that LNG containers with capacities greater than 70,000 gallons must be located a minimum distance of 0.7 times the container diameter from the property line or buildings.
Vaporizer Spacing (section 2.2.5.2 of NFPA 59A)	This requirement specifies that integral heated vaporizers must be located at least 100 feet from a property line that can be built upon and at least 50 feet from other select structures and equipment.
Process Equipment Spacing (section 2.2.6.1 of NFPA 59A)	This requirement specifies that process equipment containing LNG or flammable gases must be located at least 50 feet from sources of ignition, a property line that can be built upon, control rooms, offices, shops, and other occupied structures.
Marine Transfer Spacing (33 CFR 127.105)	This requirement specifies that each LNG unloading flange must be located at least 985 feet from any bridge crossing a navigable waterway.

The LNG storage tanks would use a full-containment design, consisting of an inner steel tank surrounded by a secondary outer concrete tank. The outer tank would be sized to contain 110 percent of the full design volume of the tank in the event that there is a complete failure of the inner tank. NorthernStar proposes to install an additional protective measure of a 5-foot-high, tertiary earthen berm around the LNG facility. The structure's volumetric capacity would contain a single LNG tank's maximum liquid capacity in the event of any hypothetical catastrophic event.

All LNG transfer lines would be provided with spill collection and containment troughs that would drain to either the wharf area containment basin or the tank area containment basin, each of which is equipped with a sump. Each sump would be sized to contain a 10-minute spill from one of the unloading lines at the maximum design transfer rate.

2.8.1.2 Hazard Detection System

A fire protection and gas detection system would be designed and installed at the LNG terminal in compliance with NFPA 59A, 33 CFR 127, and 49 CFR 193, as well as practices recommended by the ANSI and API. The design would take into consideration an evaluation based on sound fire protection engineering principles, analysis of local conditions, hazards within the facility, and exposure to or from other property.

2.8.1.3 Hazard Control System

Both passive and active measures for fire and hazard prevention or control would be incorporated into the design and construction of the LNG terminal. Passive measures would prevent or minimize a fire or hazard and would include spill impoundment systems, ignition source control, and fireproofing. Active control measures would be implemented in the event of a fire or the release of LNG and would include the following fire-fighting systems and equipment:

- a looped, underground fire suppression piping system that would use water from the Columbia River;
- 2 main firewater pumps located on the wharf;
- 16 fire hydrants;
- 14 fire hose reels within the administration/warehouse building and control building;
- 16 portable extinguishers for liquid, gas, or electrical fires; and
- 9 dry chemical extinguishers, 1 positioned on the wharf and 8 positioned on the LNG storage tanks.

2.8.1.4 Fail-Safe Shutdown

The proposed LNG terminal would have an ESD system that would isolate and shut off sources of combustible gas and automatically shut down process equipment. Three levels of shutdown would be configured for the LNG terminal facility. Level 1 would be used for a major incident and carry out a total plant shutdown. Level 2 ESD would only shut down the wharf unloading area, and Level 3 ESD would be used for shutting down individual pieces of equipment.

2.8.1.5 Security System

NorthernStar would develop a security plan for the LNG terminal that would be in accordance with 33 CFR 105 and 49 CFR 193. This plan would describe security inspections and patrols, liaisons with local law enforcement officials, design and construction of protective enclosures, lighting, monitoring, alternative power sources, and warning signs.

Security would be maintained for the entire site by personnel stationed 24 hours per day, 7 days per week. A security fence would be constructed around the LNG facilities at the terminal site, with controlled access to the entrance gate and at the wharf. A guardhouse post would be located at the entrance gate. The security fence would be chain-link material approximately 8 feet high with barbed wire at the top. The fence would be monitored by security cameras and motion detectors and would be patrolled throughout the day and night. Security lighting around the facility would be provided as required to comply with 49 CFR 193, Subpart J Security.

2.8.2 Pipeline and Associated Aboveground Facilities

The pipeline and aboveground facilities associated with the Bradwood Landing Project would be designed, constructed, operated, and maintained in accordance with the DOT's *Transportation of Natural and Other Gas By Pipeline: Minimum Federal Safety Standards* in 49 CFR 192. These safety standards are discussed in section 4.11.9.1.

2.8.2.1 Corrosion Protection and Detection System

The pipeline would be protected from corrosion by a fusion-bonded epoxy coating. A cathodic protection system would also be installed to prevent or minimize corrosion. The system reverses the natural current flow from the pipelines to the ground, which could result in corrosion at imperfections in the pipeline coating. The cathodic protection system would be monitored and inspected periodically in accordance with DOT requirements to ensure proper and adequate corrosion protection. The interior of the pipe would be periodically monitored for corrosion using internal in-line pigging technology.

2.8.2.2 Emergency Response Procedures

Pipeline system emergencies can include gas leaks, fire or explosion, and/or damage to the pipeline and aboveground facilities. In accordance with DOT regulations, NorthernStar would develop a pipeline emergency response plan to address procedures to be followed in the event of an emergency along the pipeline. This plan would include training of employees on emergency procedures; establishing liaisons with appropriate fire, police, and other community officials; and informing the public on how to identify and report an emergency condition along the pipeline route. This would be a separate plan from the ERP for the LNG terminal and waterway.

2.9 FUTURE PLANS AND ABANDONMENT

NorthernStar has not proposed any plans for expansion of the proposed LNG terminal or pipeline. However, if there is a future demand for additional natural gas in the market area, provisions have been made in the layout of the site to allow for a possible future expansion by adding a third LNG storage tank and associated equipment. This possible future expansion would increase the natural gas sendout capacity of the LNG terminal to 1.5 Bcfd. The proposed pipeline has already been sized for the maximum future capacity of 1.5 Bcfd; therefore, no other expansion of the pipeline facilities is planned at this time. Before any expansion of the proposed facilities, NorthernStar would be required to seek the appropriate authorization from the FERC. The FERC would conduct a separate environmental analysis under the NEPA before authorizing a proposed expansion of NorthernStar's facilities.

NorthernStar has no future plans to abandon or remove the proposed LNG terminal and pipeline facilities. Based on economic projections, the facilities are expected to have an operating life of 30 to 40 years. If market conditions persist, the facilities could be maintained to operate for 50 years or more. Any future abandonment would be subject to the appropriate environmental and non-environmental review based on federal, state, and local regulations in effect at that time.

NorthernStar has submitted a decommissioning plan to Clatsop County and the State of Oregon. The decommissioning plan specifies that NorthernStar would submit a proposed final retirement plan 2 years before closure of the LNG facility. The retirement plan would provide for completion of retirement within 2 years of the end of operations and describes how the site would be restored to a useful, nonhazardous condition. The decommissioning plan also provides for financial assurance for completion of retirement.

3.0 ALTERNATIVES

In considering NorthernStar's applications, the FERC will review both the environmental and non-environmental record in deciding whether it is in the public convenience and necessity to issue any authorization for the project. The EIS addresses alternatives to the proposed actions before the FERC, the COE, and the Coast Guard. The FERC must consider whether or not to approve the facilities proposed by NorthernStar.

The COE will review permit applications submitted by NorthernStar in October 2006 under section 10 of the RHA and section 404 of the CWA. The Coast Guard will consider issuing an LOR under its regulations at 33 CFR 127.009 regarding the suitability of the waterway for LNG marine traffic.

3.1 FERC ALTERNATIVES

In accordance with the NEPA and Commission policy, we have evaluated a number of alternatives to the Bradwood Landing Project to determine if any are reasonable and environmentally preferable to NorthernStar's proposed action. Alternatives considered by the FERC, described in more detail below, include no action or postponed action, system alternatives, LNG terminal site alternatives, LNG terminal layout alternatives, vaporization technologies, power line route alternatives, pipeline route alternatives, and dredging and dredged material placement alternatives.

Alternatives were evaluated against the objectives of the Bradwood Landing Project, as described in section 1.1. The primary objective of the project is to deliver competitively priced natural gas to meet the growing demands of gas consumers in the Pacific Northwest. To achieve this objective, NorthernStar would: 1) construct and operate an LNG import terminal with docking/unloading facilities capable of berthing one LNG carrier, an LNG storage capacity of 320,000 m³, and LNG vaporization facilities with a peak sendout capacity of 1.3 Bcfd; and 2) construct and operate a pipeline with a maximum capacity of 1.5 Bcfd. The sendout pipeline would serve the target market by delivering natural gas to the Georgia-Pacific paper mill at Wauna, Oregon and the PGE Beaver Power Plant at Port Westward, Oregon, interconnecting with Northwest Natural's existing bidirectional intrastate pipeline facilities capable of transporting gas to their Mist underground storage facility, and interconnecting with the Williams Northwest interstate pipeline system.

Specifically, at an average sendout rate of 1 Bcfd, the Bradwood landing Project is expected to deliver about 50 percent of its natural gas to Oregon consumers, 30 percent would go to Washington consumers, and less than 20 percent would go to Idaho, northern California, and Nevada combined. At an average sendout of 400 MMcfd, 73 percent of natural gas would go to end users in Oregon, 26 percent would go to Washington customers, and less than 1 percent would go to other states combined. To be considered as a reasonable alternative to the Bradwood Landing Project, a project should provide comparable volumes of natural gas to Oregon and Washington.

The FERC's evaluation criteria for selecting potentially reasonable and environmentally preferable alternatives include whether they:

- are technically feasible, reasonable, and practical;
- offer significant environmental advantage over the proposed project; and
- meet the objectives of the project, as described above.

With respect to the first criterion, it is important to recognize that not all conceivable alternatives are technically feasible and practical. Some alternatives may be impracticable because they are unavailable and/or incapable of being implemented after taking into consideration costs, existing

technologies, and logistics in light of the overall project purpose. In conducting a reasonable analysis, it is also important to consider the environmental advantages and disadvantages of the proposed action and to focus the analysis on those alternatives that may reduce impacts and/or offer a significant environmental advantage.

The Commission has three possible courses of action in processing NorthernStar's proposal. The Commission may: 1) deny the proposal, 2) postpone action pending further study, or 3) authorize the proposal with or without conditions. In arriving at a course of action, the Commission considers a range of alternatives in light of the project's objectives, evaluation criteria, and environmental comparisons. Each alternative is considered until it is clear that the alternative is not reasonable or would result in greater environmental impacts that could not be readily mitigated. Those alternatives that appear to be the most reasonable with less than or similar levels of environmental impact are reviewed in the greatest detail.

3.1.1 No Action or Postponed Action

If the Commission denies NorthernStar's proposal or postpones action on the proposal, the short- and long-term environmental impacts identified in this EIS would not occur. If the Commission selects the no action or postponed action alternative, the objectives of the proposed project would not be met and NorthernStar would not be able to import LNG to provide natural gas to markets in the Pacific Northwest. It is purely speculative to predict the resulting effects and actions that could be taken by other suppliers or users of natural gas in the region as well as any associated direct and indirect environmental impacts.

The States of Washington and Oregon do not produce much natural gas, and must import natural gas produced from the WCSB, the Rocky Mountains, and the San Juan Basin via the existing GTN and Williams Northwest interstate pipeline systems (see section 1.1). Various studies have indicated that under certain circumstances, existing gas supplies and infrastructure could fall short of meeting regional peak demand by 2012 (NWGA, 2007; ICF, 2007). Without the new source of natural gas to be provided through the LNG import terminal proposed by NorthernStar, customers in the Pacific Northwest would have fewer and potentially more expensive options for obtaining natural gas supplies in the near future.

In the State of Washington, the price of natural gas increased by as much as 300 percent over the last several years due to a number of factors, such as lack of investment in new infrastructure; growth in regional demand, including an increase in the use of natural gas for power generation; deregulation of state controls on electric generation; and limitations on natural gas supplies, especially the reduction of imports from Canada (WUTC, 2006). In Oregon, wholesale natural gas prices rose 168 percent between 1999 and 2004 (ODE, 2005a). Higher natural gas prices could adversely influence the regional economy by reducing realized household incomes and business profits (Greenspan, 2003). Oregonians spend about \$10 billion on energy, and in 2000, 1.2 percent of personal income in Oregon was spent on natural gas. Due to higher natural gas prices, wholesale electric costs rose sharply in Oregon between 2003 and 2005 (ODE, 2005a; 2008a). The U.S. Department of Commerce (2005) estimated that higher gas prices reduced growth of the Gross Domestic Product by about 0.2 percent between 2000 and 2001, and between 2000 and 2004 about 489,000 civilian jobs were lost to the national economy, including 79,000 in manufacturing industries, because of increases in the price of natural gas. The U.S. Department of Commerce (2006) also indicated that higher natural gas prices in the future would push up consumer prices and reduce real disposable income. A study sponsored by the Interstate Natural Gas Association of America (INGAA) Foundation in 2005 (INGAA, 2005) found that a delay of 3 years for installing new natural gas infrastructure, including LNG import terminals, in the Pacific Northwest would cost the Oregon economy an estimated \$11.1 billion and the Washington State economy about \$9.7 billion.

Higher natural gas prices (or the threat of higher gas prices) could also lead to alternative proposals to develop natural gas delivery infrastructure, increased efficiency and conservation or reduced use of natural gas, and/or the use of other sources of energy. Alternative fuel sources, such as coal or oil, could provide an equivalent amount of energy as the proposed Bradwood Landing Project, but may have greater environmental impacts; specifically with regard to air pollution and the release of greenhouse gases (GHG) (see section 3.1.1.3 and table 3.1.1-1). Currently, 30 percent of the natural gas imported into the Pacific Northwest is used for power generation (ICF, 2007). The EIA Annual Energy Outlook for 2008, Early Release Version (EIA, 2007d) projected an increase in total coal consumption in the United States between 2006 and 2030 as coal is used more in the future for electric generation, in part due to constraints on supplies of natural gas and higher natural gas prices. Higher natural gas prices were also cited as a reason for the projected increased demand for total renewable fuels. However, as discussed below in section 3.1.1.3, renewable energy sources, such as solar, wind, and geothermal resources, would not be able to produce an amount of energy equal to the proposed Bradwood Landing Project.

3.1.1.1 Alternative Natural Gas Infrastructure Proposals

The adoption of the no action alternative could result in the expansion of other existing interstate natural gas pipeline systems or LNG facilities to meet the increasing demand for natural gas in the Pacific Northwest. This might include constructing or expanding regional pipelines as well as LNG import and storage systems. In section 3.1.2 we examine system alternatives. Any expansion of existing systems or construction of new facilities would result in specific environmental impacts that could be less than, similar to, or greater than those associated with the Bradwood Landing Project.

3.1.1.2 Increased Efficiency and Conservation of Natural Gas

Denying or postponing a decision on NorthernStar's application could limit access to new supplies of natural gas in the future, which could in turn contribute to higher natural gas prices. Higher prices could potentially result in customers conserving or reducing the use of natural gas. There is no doubt that both conservation and increased efficiency have an important role to play in the future energy needs of the Pacific Northwest. Between 1990 and 2002, utilities in the Pacific Northwest invested \$2.4 billion in conservation, resulting in savings of 2,600 average MW per year (ODE, 2005a). In its Fifth Power Plan (Northwest Power and Conservation Council, 2005), the Northwest Power and Conservation Council (which covers Oregon, Washington, Idaho, and Montana) recommended conservation targets of 700 average MW between 2005 and 2009 and 2,500 average MW during the 20-year planning period.

The State of Oregon offers both Business and Residential Energy Tax Credits and an Energy Loan Program designed to help businesses and residential consumers invest in energy efficiency through such actions as the purchase of more efficient appliances, heating and air conditioning systems, and building renovations. These programs have seen dramatic results in the last 5 years. According to the 2005-2007 Oregon Biennial Energy Plan (ODE, 2005a), in 2000 the combined residential and business energy tax credit programs stimulated savings of 58.9 kilowatt-hours (kWh). By 2003, savings had reached 860.3 million kWh. In 2005, the Business Energy Tax Credit resulted in savings of 2.2 billion kWh in electricity and 107.9 million therms in natural gas, while the Residential Energy Tax Credit saved 104.1 million kWh in electricity and 2.8 million therms in natural gas total in Oregon (ODE, 2008a).

It is important to recognize that projections for energy demand in the region incorporate the savings achieved and anticipated from planned energy conservation measures. While it is possible that continued high natural gas and electricity prices may result in some increase in the rate of conservation, the incremental increase will not have a material effect on the regional demand for new sources of natural gas supply. Additional regional natural gas supplies are needed to compensate for declining United States production and Canadian imports as well as the increasing regional demand from economic growth.

Furthermore, energy conservation is not, in itself, an energy source and cannot ultimately replace the natural gas needed by end users such as industrial and residential customers (see section 1.1). Therefore, increased conservation does not provide an alternative to the proposed project, but rather a complementary component of the overall energy demand and supply mix.

3.1.1.3 Other Sources of Energy

It is also conceivable that adoption of the no action alternative could promote the development of other (non-LNG/non-natural gas) sources of energy. In order to assess the alternative fuels and energy sources that would potentially be available to replace the needed natural gas supplies to be provided by the proposed project, it is necessary to understand how natural gas is used by consumers in Oregon. In 2003, 18 percent of the energy used in Oregon came from natural gas. About 10 percent of the electricity generated for Oregon was fueled by natural gas in 2005 (ODE, 2008a). According to the 2003 Oregon Energy Plan (ODE, 2003), excluding natural gas used for electrical generation, the industrial sector is the primary consumer of natural gas, using more than both the residential and commercial sectors combined. Natural gas accounts for approximately 30 percent of total industrial sector energy use. The primary use of natural gas in the industrial sector is for process heating. During the 1990s, industries shifted to natural gas from wood, heating oil, and electricity. Therefore, in the absence of increasing supplies of competitively-priced natural gas, the industrial sector would likely need to return to these alternative sources to meet demands for energy supplies in the future. However, this may not be possible for all users, as the shift to natural gas in many cases may have required changes in equipment. In these cases, the economic implications of reverting to alternate energy sources may be too great and the users may have no choice but to curtail production.

Commercial and residential use of natural gas is primarily for space and water heating. Again, the shift to natural gas in both the commercial and residential sectors during the 1990s to meet space and water heating demands has meant a shift away from the use of wood, heating oil, and electricity (ODE, 2003). Therefore, in the absence of increasing supplies of competitively-priced natural gas, the commercial and residential sectors would likely return to these alternative sources to meet demands for energy in the future.

For all sectors, the recent shift to the use of natural gas in place of wood, oil, and electricity has led to significant environmental benefits for Oregon and the Pacific Northwest. It is widely recognized that natural gas is the fuel of choice with respect to air emissions. The Oregon Energy Plan notes that energy use and production have significant impacts on the environment, in particular on air and water resources. With respect to air emissions, the same document notes that natural gas as a fuel for generating electricity produces significantly less CO₂ and nitrogen oxides (NO_x) than existing coal-fired power plants, and virtually no volatile hydrocarbons, sulfur oxides (SO_x) or particulate matter. Coal-fired power plants produced 41 percent of Oregon's 2005 fuel mix for generating electricity. In a May 2008 report to the Governor of Oregon, the ODE stated: "as climate change legislation is enacted, it is likely that financial conditions will encourage the switch from coal to natural gas since natural gas has much lower life-cycle GHG emissions. It is unlikely that Oregon will be able to replace all of the coal-fired power it uses with renewables in the short-term, so natural gas consumption is likely to rise" (ODE, 2008b). When used directly for space and process heating by consumers, natural gas is also cleaner in air emissions than wood or heating oil. As an alternate to hydropower, which accounted for delivery of approximately 42 percent of Oregon's power generation supply in 2005 (ODE, 2008a), natural gas avoids the impacts on endangered salmonids and their habitats in the Pacific Northwest associated with hydropower dams.

As noted above, in the absence of additional supplies of natural gas to meet increasing consumer demand, users would be forced to seek alternate fuels and energy sources. To the extent that users

returned to the use of traditional fuels (wood, oil, coal) this shift would result in increased environmental impacts compared to the use of the natural gas that would be provided by the proposed project. With respect to the potential increased demand for electricity as an alternate energy source, the environmental implications are somewhat more difficult to define as discussed below.

As indicated in the Oregon Energy Plan, the state's electric generation fuel mix varies with weather, specifically water and snow conditions, which dictate the availability of hydropower. For example, in 2003, natural gas generation accounted for approximately 7 percent of total generation, whereas in 2001, it was approximately 15 percent (ODE, 2008a). This demonstrates the response of the generation system to variations in availability of supply sources as well as demand. As a result of the recent development of new gas-fired generation in the region in response to the electricity crisis of 2000-2001, sufficient generation capacity is available to meet increases in demand in the region in the foreseeable future. However, the bulk of this new generation is gas-fired and, as a result, highly vulnerable to the volatile price fluctuations of recent years. Between 2000 and 2005, electricity rates in Oregon rose 28 percent, in part because of higher natural gas prices. Thus, to the extent that consumers revert to electricity in the absence of increased availability of competitively-priced natural gas, it is likely that a significant portion of that electricity will come from existing coal-fired generation sources during non-peak periods, resulting in greater environmental impacts than the proposed project.

Renewable Energy

Renewable energy resources represent an alternative to the use of natural gas depending on the types of resources and their uses. For example, hydro and wind power resources represent alternatives for electricity generation, whereas biomass, solar, and geothermal resources can be used to generate heat as well as electricity. However, there are also environmental impacts associated with some types of renewable resources. For example, hydropower dams may affect fish, and wind turbines may affect birds and bats.

The Pacific Northwest has been at the forefront nationally in terms of the use of renewable energy resources, in large part due to the historic prevalence of hydropower resources in the region. Approximately 11 percent of total energy use in Oregon in 2003 was supplied by renewable resources (ODE, 2008a). In 2007, the Oregon legislature created a state Renewable Portfolio Standard. This requires all electric utilities that serve Oregon to include power generated from renewable sources in their energy mix by 2025, with a sliding scale of percentages over time.

Hydropower and Wave Energy

Hydropower, or generating electricity from water stored behind dams and then run through turbines, plays a significant role in the current energy mix of the Pacific Northwest, accounting for 64 percent of the region's energy capacity in 2006 (Northwest Power and Conservation Council, 2006). In 2007, hydropower generated 66,700 thousand MW hours in Washington State (EIA, 2007e). In Oregon, in 2005, hydropower produced 42 percent of the electricity in the state (ODE, 2008a).

However, the ODE recognizes that climate change may alter the runoff regime feeding water to the hydroelectric dams along the upper Columbia River, resulting in less summer power in the future. Legal issues concerning the operation of the dams with regards to fisheries could also diminish hydropower generation (ODE, 2008b).

New large hydropower projects are unlikely to play a role in renewable energy growth in the future. The ODE anticipates that the future of hydropower in Oregon would be dependent on developing small-scale micro-hydro or seasonal hydro projects, such as piped irrigation systems, or using run-of-the-

river technology which does not need water stored behind dams. Several new hydro projects, ranging from 1 MW to 12 MW, are currently in the planning stages in Oregon (ODE, 2008a).

According to the Northwest Power and Conservation Council (2007), most feasible hydroelectric facilities have already been developed. It is unlikely that new dams would be constructed in the future because of high development costs, environmental impacts, and the complex and lengthy licensing process. In fact, efforts are underway to remove some existing dams to restore habitat. Further, environmental scrutiny during the relicensing process for existing dams has, in some instances, resulted in increased release of water for fisheries, which has reduced their electric generation capacity. It has been estimated that hydropower generation is going to decline from supplying about 10 percent of the nation's electricity in 2005 to about 6 percent in 2020 (DOE, 2005). Thus, the development of additional hydropower resources is not considered to be a reasonable or environmentally preferable alternative to the proposed project.

A new potential source of electric power for the future is hydrokinetic energy, or electricity generated from ocean currents, swells, waves, or tidal action. These facilities could only be developed offshore. Currently, the United Kingdom has an ocean energy program supported by the government. The FERC recently initiated a licensing process for hydrokinetic test projects in the United States. The goal of the FERC pilot process is to allow developers to test new technologies, to determine the best location for hydrokinetic facilities, and to determine the environmental effects associated with the siting and operation of such facilities. It has been estimated that if hydrokinetic technologies could be successfully developed, it could potentially double the amount of hydrogenerated electricity available in the United States (FERC, 2007). The ODE (2008a) estimated that ocean wave energy could provide over 500 MW in electricity from Oregon projects developed over the next 10 years.

Although numerous preliminary permits have been issued on the east coast, only two wave power projects have been licensed under the FERC pilot program. Both are proposals from Finavera Renewables Ocean Energy, Ltd. (Finavera). One proposal calls for the installation of four 250 kW wave energy conversion buoys in Makah Bay off the coast of Washington State. The other Finavera project would be located off the coast of Humboldt County, California (Irish Independent, 2008). Additional wave power projects are in the early development stage for facilities near Grays Harbor, Washington and Reedsport and Coos Bay, Oregon (International Water Power and Dam Construction, 2008; Coos Bay World, 2008; KCBY, 2008). A report by the Electric Power Research Institute identified seven sites along the Oregon Coast as being potentially suitable for wave energy projects. In July 2006, Ocean Power Technologies proposed a 50 MW wave-power project in Oregon. The ODE counted eight applications for wave energy projects to the FERC proposed by developers or Oregon coastal counties (ODE, 2008a). In March 2008, the FERC signed a memorandum of understanding with the State of Oregon to coordinate procedures and schedules for the review of wave energy projects in state waters off the coast of Oregon (Electric Light & Power Utility, 2008; Dam Engineering, 2008).

There are no existing hydrokinetic facilities currently operating in the United States. The development of such resources in the future is speculative, because of challenges related to the use of new technologies, financial barriers, and an unclear regulatory process. Nor do we know about the potential environmental impacts resulting from the construction and operation of a hydrokinetic facility, although it appears that such a facility would likely have some effects on aquatic resources. Therefore, we do not consider hydrokinetic facilities to be a reasonable, feasible, or foreseeable alternative to the proposed Bradwood Landing Project in the near future.

Geothermal

Geothermal resources are naturally occurring sources of heat, such as hot springs, geysers, or volcanoes that could be tapped to generate energy. Geothermal resources include high-temperature (above 100 °C) sources for electric generation, intermediate temperature (50 to 100 °C) sources for industrial, agricultural, and municipal uses, and low temperature sources for residential heat pump uses. In 2005, wind and geothermal resources combined supplied 1 percent of the electric generation in Oregon, averaging 53 MW (ODE, 2008a, 2008c). Geothermal resources in Oregon are used to supply heat for buildings, swimming pools, and industrial uses. As of 2005, there were about 2,200 ground-source heat pumps providing space and water heating to homes in Oregon. The City of Klamath Falls uses geothermal energy for a district heating system. There have been explorations on the flanks of Newberry Volcano to evaluate its potential future use for high-temperature geothermal electricity production (ODE, 2008a). The Warm Springs Tribes are considering a geothermal project at Mount Jefferson. The 13-MW Raft River Project in southern Idaho is the only commercial geothermal power plant operating in the Pacific Northwest (Northwest Power and Conservation Council, 2007).

The main barriers to the further development of geothermal resources are the identification of potential naturally occurring sources, and above-market costs. Given the physical limits of geothermal sites that have a potential for future exploitation, the lack of interest from investors in developing new potential resources, and the minimal energy that geothermal resources produce, we do not see this type of renewable resource as a feasible or predictable alternative to the proposed Bradwood Landing Project.

Biomass and Biogas

Biomass resources can produce electricity and heat or steam from wood, wood waste, plant and animal waste, or other organic matter. As of 2007, biomass generation represented about 2 percent (900 MW) of the total electric power capacity of the Pacific Northwest (Northwest Power and Conservation Council, 2007). In 2004, biomass produced 79 trillion Btu of energy in Oregon, or about 6 percent of that state's total energy supply (ODE, 2008a).

More than 90 percent of Oregon's biomass energy comes from forest or wood waste and paper mill pulping liquor. About 40 percent of Oregon's biomass energy comes from wood waste burned at 49 industrial sites. Ten of these sites produced 866,000 MW-hours of electricity. About 46 percent of the total biomass energy in Oregon is produced from combustion of pulping liquids at six mills. Two mills produced about 310,000 MW-hours of electricity in 2004 (ODE, 2008a). A new 10-MW wood waste cogeneration plant recently went on line at the end of 2007 in Lyons, Oregon (Northwest Power and Conservation Council, 2008).

There are three landfills in Oregon that tap waste methane gas to generate 37,000 MW-hours of electricity for industrial use, with a fourth under construction in southern Oregon. In addition, 29 wastewater treatment plants in Oregon use methane to generate 26,000 MW-hours of electricity to provide heat for sewage treatment. Two facilities produced about 500 MW-hours of electricity from cow manure (ODE, 2008a).

Barriers to the further development of biomass resources include uncertainty in biomass outputs, the high costs associated with the transporting of forest products to an energy conversion facility, and lack of private capital investment in the development of additional biomass facilities. In Oregon, virtually every paper mill has already installed equipment to allow the utilization of biomass waste, leaving little potential to develop new resources. Because of the relatively high costs of development, only about 15 MW in new biomass generation were brought on line between 2004 and 2007 in the Pacific Northwest (Northwest Power and Conservation Council, 2007). Because of the difficulties of developing biomass

resources, and the small amount of additional energy they could produce, biomass does not represent a feasible, reasonable, and foreseeable alternative to the proposed Bradwood Landing Project.

Solar

There are three primary ways to harvest solar energy: 1) direct sunlight into buildings can be used for light and heat; 2) roof-mounted collectors can use sunlight to heat water; and 3) sunlight can be converted into electricity using photovoltaics or solar panels. There are about 300 solar electric systems in the State of Oregon, and residents have installed more than 17,600 solar water heating systems in the last 25 years (ODE, 2008a).

There is the potential to develop solar energy in sunny areas, such as eastern and southern Oregon. For example, a project in Bend, Oregon is installing 900 solar modules, with assistance of a loan from the ODE. In 2006, the Jackson County Fairgrounds dedicated a solar pavilion which generated about 24 kW, or enough electricity for three homes (ODE, 2008a).

However, solar power has never made a significant contribution to the energy mix in the Pacific Northwest because of cloudy weather conditions at major metropolitan population centers along the coast. There is not enough sunlight to generate much solar energy during the cloudy winter months when there is peak demand in Portland and Seattle. National Weather Service data collected at the Seattle-Tacoma International Airport, which has a similar climate to much of western Oregon, showed the average annual possible sunshine for the area is about 47 percent. Data presented by the Renewable Energy Power Project indicated that the daily average is 2.9 kWh per square meter (m²) for Seattle. At this rate, thousands of acres of solar collectors would be needed. Solar power does not appear capable of producing enough energy in this region to be considered a reasonable or feasible alternative to the proposed Bradwood Landing Project.

Wind

In the Pacific Northwest, wind power accounts for about 3 percent of the regional capacity, or 1,730 MW total (Northwest Power and Conservation Council, 2007). Oregon has wind projects in operation with a total capacity of 450 MW (ODE, 2008a). In Washington and Oregon, combined, about 885 MW of additional capacity would be made available from new wind farms that recently went into service in 2007 or are presently under construction (Northwest Power and Conservation Council, 2008).

Due to the variable nature of wind, on average, wind turbines only generate about one third of their maximum output capacity. Another barrier to the further development of wind farms in eastern Oregon is lack of transmission capacity. Clustering effects at wind farms result in spikes and troughs in production that have no relation to demand, and contribute to transmission congestion. However, a stakeholder group evaluating this situation in 2006 believes that about 6,000 MW of electricity from eastern Oregon wind projects could find its way into the region's grid by 2024 (ODE, 2008a). In addition, the cost of developing new wind projects has gone up since 2004 because of rising prices for equipment (Northwest Power and Conservation Council, 2007). Environmental consequences from wind farms include visual effects and impacts on birds and bat populations.

Lastly, there are limitations to wind power in comparison to energy production from the proposed project. The entire inventory of existing and proposed wind projects in Oregon would only equal about 4.3 percent of the energy sendout capacity of the Bradwood Landing Project. Taking the largest wind turbine made by General Electric, and assuming that the wind blows constantly so that full output is achieved, it would take 34,000 wind turbines to produce an equivalent amount of electricity that could be

generated using the total capacity of the natural gas from the Bradwood Landing Project. Therefore, wind power does not represent a reasonable, feasible, and foreseeable alternative to the proposed project.

Nuclear Energy

Nuclear power has the potential to generate enough energy to substitute for the proposed Bradwood Landing Project. However, due to economic, environmental, and regulatory factors, the future of nuclear power as an energy alternative is in doubt. There are currently 103 nuclear reactors operating at 65 sites in 31 states, generating about 19 percent of the nation's electricity. There is only one nuclear power plant currently operating in the Pacific Northwest; the Columbia Generating Station, located north of Richland, Washington, with an electrical output of 1,107 MW. Imported power generated from nuclear sources represented about 3 percent of the electricity mix in Oregon in 2005 (ODE, 2008a).

The only nuclear power facility in Oregon, the Trojan plant on the Columbia River in Columbia County, operated between 1976 and 1992. It was closed in 1993, years before its scheduled operational life-span, in part because of environmental and safety issues. The Hanford nuclear weapons plant in southeast Washington halted production in 1988, but is the site of radioactive contamination that will take years and billions of dollars to remediate (ODE, 2008a).

Until recently, no new nuclear power plants have been planned since the mid-1980s due to concerns raised after the Three Mile Island incident in Pennsylvania in 1979. As a result of incentives offered in the EPAct, the Nuclear Regulatory Commission expects that it may receive up to 21 new applications for nuclear power plants between 2007 and 2009. Two of these proposed plants would be located in Idaho; one at Bruneau and one near Boise. The Northwest Power and Conservation Council believes that the earliest a new nuclear power plant could come on line in the Pacific Northwest would be 2015.

We do not consider nuclear power to be a feasible foreseeable alternative to the proposed project. Barriers to the nuclear industry include problems related to the disposition of spent fuel, long regulatory review time, and costs. The Watts Bar nuclear power plant in Tennessee that began operation in 1996 took 23 years to complete, at a cost of \$6.9 billion. The proposed nuclear power plant at Bruneau, Idaho is estimated to cost \$4.5 billion to build (Idaho Statesman, 2008). The ODE (2008a) has stated that "nuclear plants are not likely to be approved in Oregon in the near term." An Oregon law requires voter approval to allow a new nuclear power plant to be built in the state, and only if a permanent repository can be found for the disposal of plant waste.

Other Fossil Fuels

As indicated above, compared to other fossil fuels such as coal or oil, natural gas is a relatively clean and efficient fuel that can reduce the emission of regulated pollutants (e.g., NO_x, sulfur dioxide (SO₂), and particulate matter) or unregulated greenhouse gases (e.g., CO₂). Given there are emissions associated with producing, processing, transmitting, and distributing natural gas and other fossil fuels, it is difficult to accurately quantify the impact of an LNG import project on air quality. However, credible estimates of air emissions can be developed based on reasonable assumptions regarding burning natural gas delivered by the project compared to burning fossil fuels that would likely be utilized if the gas from the project was not available. Table 3.1.1-1 lists the emissions that would result from the Bradwood Landing Project assuming it provides about 1.3 Bcfd of natural gas to the Pacific Northwest market and the corresponding emissions that would result if an equivalent amount of energy were generated using coal or fuel oil in lieu of natural gas. It is clear from the table that the use of either fuel oil or coal would increase emissions significantly. Additionally, to comply with current air emission regulations, emission control technologies could be required that could limit the economic viability of any new oil- or coal-fired facility.

TABLE 3.1.1-1					
Comparison of Air Emissions from Burning Fossil Fuels ^a					
Fossil Fuel	SO ₂ (tpy)	NO _x (tpy)	PM ₁₀ (tpy)	CO ₂ (tpy)	C (tpy)
Natural Gas	143	21,522	1,723	23,833,333	6,500,000
Fuel Oil	112,636	43,047	2,441	34,558,333	9,425,000
Coal	301,321	150,661	6,673	45,283,333	12,350,000
^a	The emissions generated by coal, fuel oil, and natural gas were estimated using the most recent Best Available Control Technology (BACT) analyses identified on the EPA Reasonably Available Control Technology/BACT/Lowest Achievable Emission Rate Clearinghouse for boilers with heat input ratings between 100 and 250 million Btu per hour. The emissions from each fuel source are estimated based on a fuel use of 1.3 Bcfd, 365 days per year, 1,000 Btu/cubic foot.				
PM ₁₀	particulate matter less than 10 microns in diameter				
C	carbon				
tpy	tons per year				

In addition to the increased emissions associated with the burning of coal or fuel oil, each of these fuels would also have to be imported into the project area and stored, similar to the proposed LNG. The distribution of these fuels to market would require more truck, barge, and train trips than the distribution of an equivalent amount of energy derived from natural gas, which would increase emissions and traffic congestion.

The ODE conducted an independent review of life-cycle GHG emissions resulting from LNG projects, making assumptions from the point of origin to its use for electric generation in Oregon. The ODE concluded that carbon emissions from vaporized LNG when combusted in a conventional electric power plant would fall somewhere between domestically produced natural gas transported by interstate pipeline and coal. However, the ODE study added on emissions produced by long distance shipping of the LNG from foreign counties, including the fuel used by LNG carriers in transport, and in the liquefaction and regasification processes. According to the ODE review, when combusted in a conventional electric power plant, life-cycle GHG emissions from LNG were forecast to be 6 to 12 percent greater than domestically produced natural gas transported by interstate pipelines, but 39 to 48 percent less than coal (ODE, 2008b).

3.1.2 System Alternatives

System alternatives are options that would make use of other existing LNG or natural gas facilities to meet the stated objectives of the proposed project. A system alternative would make it unnecessary to construct all or part of the proposed project even if some modifications or additions to the existing facilities are necessary. These modifications or additions would result in environmental impacts that could be less than, similar to, or greater than those associated with construction of the proposed project. Ultimately, the purpose of identifying and evaluating system alternatives is to determine whether potential environmental impacts associated with construction and operation of the Bradwood Landing Project could be avoided or reduced by using another system.

3.1.2.1 Existing Pipeline Systems

The Pacific Northwest receives Canadian natural gas produced in British Columbia and Alberta and domestic gas from sources in the Rocky Mountain region and San Juan Basin. Two existing interstate natural gas pipelines, the Williams Northwest pipeline system and TransCanada's GTN pipeline system, currently serve the Pacific Northwest (see figure 3.1.2-1). These interstate pipelines connect to various LDCs in the Pacific Northwest, including Northwest Natural, Avista Corporation, and Cascade Natural Gas.

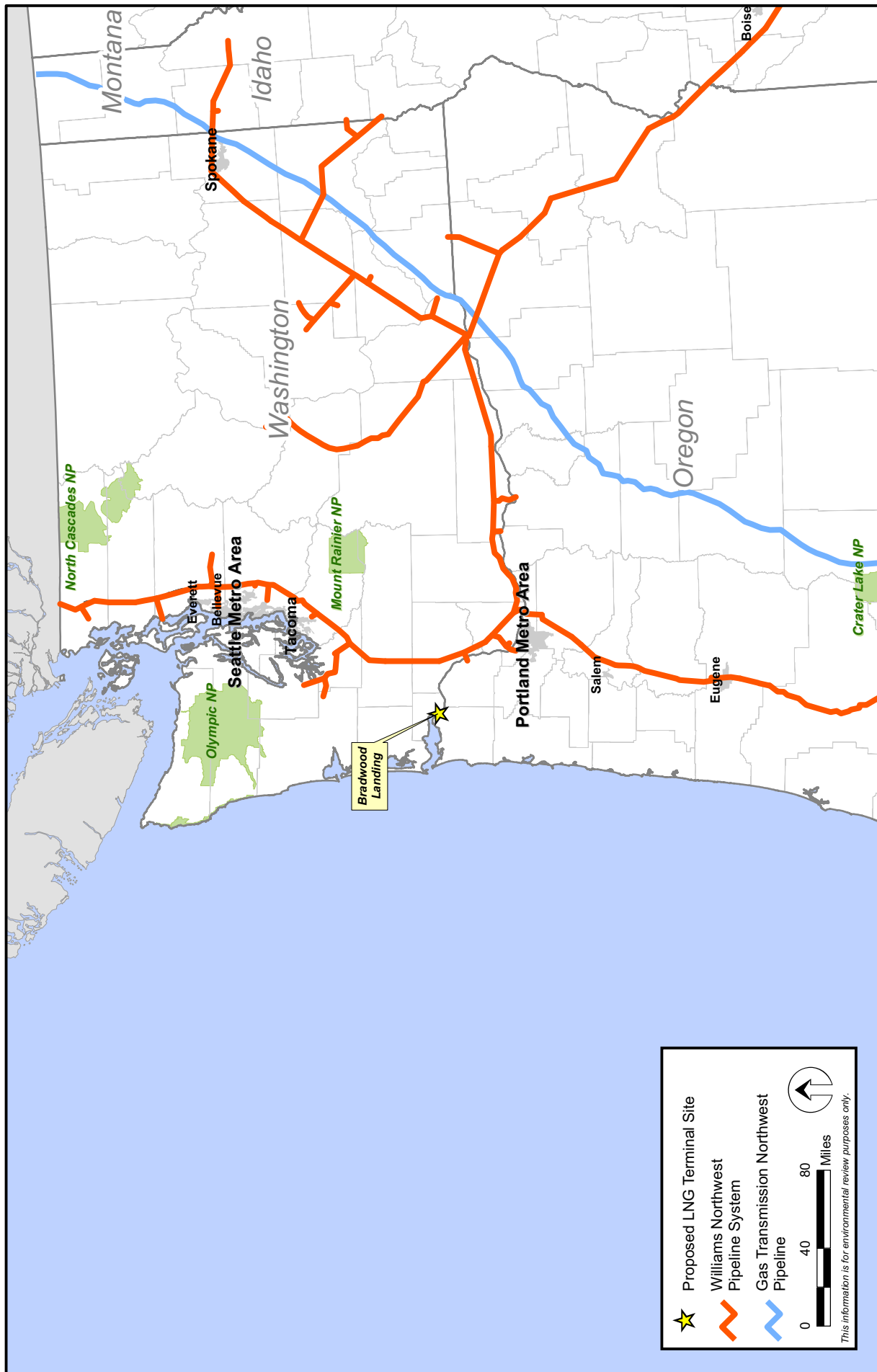


Figure 3.1.2-1
Bradwood Landing Project
 Existing Interstate Pipelines in Pacific Northwest

Williams Northwest pipeline is a 3,900-mile-long bi-directional transmission system crossing the States of Washington, Oregon, Idaho, Wyoming, Utah, and Colorado. This system provides access to British Columbia, Alberta, Rocky Mountain, and San Juan Basin natural gas supplies (Williams, 2007). The Williams Northwest system can receive up to about 1.3 Bcfd from its interconnection with Westcoast Energy at Sumas, Washington. Its mainline pipeline coming from the north to Vancouver, Washington has a capacity of 630 MMcfd. Coming west into Oregon from Caldwell, Idaho the system has a capacity of about 480 MMcfd. Between its interconnection with GTN near Stanfield, Oregon and Vancouver, Washington the system has a capacity of 550 MMcfd (ICF, 2007).

The GTN pipeline system includes 612 miles of pipeline beginning at the Idaho/British Columbia border, traversing through northern Idaho, southeastern Washington and central Oregon, and terminating at the Oregon/California border. The GTN system interconnects with TransCanada's British Columbia system at Kingsgate, British Columbia; with the Williams Northwest system at Spokane and Palouse, Washington and Stanfield, Oregon; and with the Pacific Gas and Electric (PG&E) and Tuscarora systems near Malin at the Oregon/California border. The GTN system can transport more than 2.9 Bcfd, with about 1.0 Bcfd targeted for markets in the Pacific Northwest (GTN, 2008). Natural gas for the GTN pipeline originates primarily from supplies in the WCSB, although it can also receive Rocky Mountain gas from its interconnections with Williams Northwest.

As an alternative to developing a new LNG import terminal in the Pacific Northwest, we considered the possibilities of expanding or modifying the existing interstate natural gas pipeline systems operated by Williams Northwest or GTN. GTN, in partnership with Northwest Natural, is proposing an expansion, known as the Palomar Pipeline Project, extending from its existing mainline near Madris, Oregon, to an interconnection with Williams Northwest near Molalla, Oregon, then on to an interconnection with Northwest Natural's existing system to the Mist storage field, and a potential interconnection with the Bradwood Landing pipeline in Clatsop County, Oregon. Williams (the parent of Williams Northwest), in partnership with TransCanada (GTN's parent company) recently announced plans to develop the so-called Sunstone Project, that would consist of a new pipeline parallel to its existing mainline system between Opal, Wyoming and Stanfield, Oregon. Williams would then develop the Blue Bridge Pipeline Project, to connect to Seattle, Washington, in partnership with Puget Sound Energy, Inc. (PSE). These proposed expansions are discussed below under Newly Proposed Pipelines as System Alternatives in section 3.1.2.2.

The environmental impacts associated with the expansion or modification of an existing pipeline system to be able to deliver volumes of natural gas to the Pacific Northwest equivalent to the Bradwood Landing Project would depend on the project size, length, and design. Such a project would result in impacts on water resources, upland vegetation, wetlands, wildlife habitats, land use, and air quality that may be less than, equal to, or greater than the proposed Bradwood Landing Project.

One of the obstacles associated with the expansion of existing interstate pipeline systems as alternatives to the Bradwood Landing Project, would be the procurement of new sources of natural gas that those systems could transport, in addition to the volumes they currently carry, as opposed to the importation of LNG. Net natural gas imports from Canada are projected to decrease from 3.3 Tcf in 2005 to 1.2 Tcf in 2030 (EIA, 2007a).

The Rocky Mountain region is expected to increase its production of natural gas over the next 20 years, primarily from unconventional sources such as tight sands, shale, and coalbed methane. The portion of natural gas contributed by the Rocky Mountain region to the total of the lower 48 states' onshore natural gas production is expected to increase from 27 percent (in 2003) to 38 percent in 2025 (EIA, 2005a). Part of this predicted gain in share of total onshore production is because some other domestic regions are expected to experience declining production rates.

However, much of the additional new production in the Rocky Mountain region is targeted for markets in the Midwest and eastern United States. For example, the western phase of REX, authorized in FERC Docket No. CP06-354-000, consists of about 718 miles of 42-inch-diameter pipeline from Colorado to Missouri that went into service in early 2008. In April 2008, the FERC issued a final EIS for the eastern phase of REX, in Docket No. CP07-208-000, analyzing the potential environmental impacts of extending the pipeline an additional 639 miles from Missouri to Ohio. Alliance Pipeline, Inc., in partnership with Questar Overthrust Pipeline, recently announced plans to develop the proposed Rockies Alliance Pipeline Project, which would extend an 800-mile-long 42-inch-diameter pipeline from Wamsutter, Wyoming to Emerson, Minnesota (Natural Gas Intelligence, 2008c). In response, TransCanada announced plans for a 500-mile-long, 42-inch-diameter pipeline from Wamsutter, Wyoming to interconnect to the existing Northern Border system (Natural Gas Intelligence, 2008d).

There are also plans for new pipelines to bring Rocky Mountain gas to southern Oregon, northern Nevada, and northern California. Both the Bronco and Ruby projects propose to construct pipelines between the hub at Opal, Wyoming to interconnections with the existing GTN, Tuscarora, and PG&E systems just east of Malin, Oregon. The Ruby and Bronco projects are discussed under Newly Proposed Pipelines as System Alternatives in section 3.1.2.2.

3.1.2.2 Newly Proposed Pipelines as System Alternatives

We considered four newly proposed jurisdictional interstate pipeline projects as system alternatives to the Bradwood Landing Project. These projects are in different stages of development and review, as discussed below. The Palomar Pipeline Project, which is currently being reviewed under the FERC's Pre-filing process, proposes to transport Canadian and Rocky Mountain gas to the Portland metropolitan area. The Ruby Project and Bronco Pipeline Projects would both transport Rocky Mountain gas to the Oregon/California border. While the Ruby Project is currently being reviewed by the FERC under our Pre-filing process, the Bronco project has not yet come before the FERC. The potential Sunstone and Blue Bridge projects would increase the amount of Rocky Mountain natural gas that could be transported on the Williams Northwest system from Wyoming to Oregon and Washington. However, Williams has not yet come to the FERC with either the Sunstone or Blue Bridge project.

Palomar

On August 30, 2007, the FERC accepted a request from Palomar Gas Transmission, LLC (Palomar), to initiate the Pre-filing environmental review process for its proposed new pipeline project in Oregon, in Docket No. PF07-13-000. We issued an NOI to produce an EIS for the Palomar Project on October 29, 2007. The FERC intends to do an independent environmental review of the Palomar Project. However, we will further address the Palomar Project under the cumulative impacts section of this EIS, because it is a foreseeable future project that may be developed during the same time frame as the Bradwood Landing Project in the general geographic vicinity.

Palomar is a partnership between TransCanada's GTN and Northwest Natural. The main purpose of the Palomar pipeline is to bring Canadian and Rocky Mountain gas to the Portland, Oregon metropolitan area and the Willamette Valley, and compete with the Williams Northwest system, which currently is the only interstate pipeline having direct interconnections with Northwest Natural, the LDC for northwestern Oregon and southwestern Washington. In addition, a segment of the Palomar pipeline would interconnect with the proposed Bradwood Landing LNG terminal near Wauna, Oregon, and provide a second sendout pipeline that could bring new supplies of natural gas from imported LNG to the Portland metropolitan area and to the GTN mainline. The proposed Palomar pipeline would not be a replacement for the proposed Bradwood Landing sendout pipeline; but can be viewed as a newly proposed system alternative.

The Palomar Project has no clear environmental advantages over the Bradwood Landing Project. The Palomar Project would include about 215 miles of 36-inch-diameter pipeline, with a bi-directional flow capable of handling up to 1.4 Bcfd of natural gas. The pipeline would begin at an interconnection with GTN northwest of Madras, and extend over portions of Wasco, Clackamas, Marion, Yamhill, Washington, Columbia, and Clatsop Counties, Oregon. Palomar envisions the construction of the pipeline in two segments. The first segment would be about 109 miles long from the point of origin with GTN to an interconnection with Williams Northwest near Molalla, Oregon. A short lateral would provide an interconnection with Northwest Natural, also near Molalla. The second segment would be about 103 miles long between Molalla and Wauna, Oregon. If the Bradwood Landing Project is not authorized, or not built, Palomar would terminate its pipeline somewhere west of Molalla, at an as yet undetermined point of interconnection with Northwest Natural. Northwest Natural could then construct an expansion of its nonjurisdictional local distribution system to indirectly connect Palomar to its Mist storage field in Columbia County, Oregon.

The Palomar pipeline would be collocated adjacent to existing power lines or road rights-of-way for about 26 percent of its route. For a total of about 49 miles, the pipeline would cross federal lands, including parcels administered by the Prineville and Salem Districts of the U.S. Department of the Interior, Bureau of Land Management (BLM), and the Mount Hood National Forest. The route would cross two federally designated Wild and Scenic Rivers: the Deschutes and the Clackamas. Other special management areas crossed include the Tillamook and Clatsop State Forests, and the White River State Game Management Area.

We consider the Palomar Project to be a separate undertaking from the Bradwood Landing Project. Neither project is inter-dependent on the other. If Palomar is not authorized or built, the Bradwood Landing Project could still go forward, and visa versa. The two projects can be considered as competitors to supply natural gas from different sources to the same market. While NorthernStar proposes to import LNG from foreign countries to provide a new source of natural gas for the Pacific Northwest, Palomar proposes to transport Canadian and Rocky Mountain produced natural gas for the Portland metropolitan area and Willamette Valley.

Ruby

The FERC accepted the Ruby Project for Pre-filing review on January 31, 2008 in Docket No. PF08-9-000. On March 28, 2008, we issued a Notice of Pre-filing Environmental Review for the Ruby Project, and scheduled public scoping meetings at multiple locations in Wyoming, Utah, Nevada, and Oregon to take place in April 2008. We intend to produce an independent, stand-alone environmental document for the Ruby Project to comply with the NEPA. The U.S. Department of Agriculture, Forest Service (USFS), and BLM are participating as cooperating agencies in the production of the environmental document for the Ruby Project, as about 60 percent of the proposed route for pipeline would cross federally administered lands.

The Ruby Project was originally planned to be a joint venture between El Paso, Bear Stearns, and PG&E. Bear Stearns has recently undergone financial problems, and in early May 2008, PG&E announced it was pulling out of an agreement to acquire a 25.5 percent equity interest in the project, citing rising steel prices contributing to higher-than-expected pipeline costs. However, PG&E will remain as the anchor shipper for the Ruby pipeline, contracted for 375,000 Dt/d for 15 years (Energy Daily, 2008; Inside FERC, 2008c).

The purpose of the project is to bring Rocky Mountain natural gas to customers on the West Coast and Nevada. The project would consist of about 655 miles of 42-inch-diameter pipeline, extending from Opal, Wyoming to Malin, Oregon, with a capacity to transport about 1.2 Bcfd of natural gas. In

addition, there would be two compressor stations (one in Lincoln County, Wyoming and another in Elko County, Nevada), 10 interconnections at five measurement stations, and 40 mainline block valves.

The Ruby Project would have no clear environmental advantages over the Bradwood Landing Project. The Ruby pipeline would be about 18 times longer than the proposed Bradwood Landing sendout pipeline. The Ruby Project would affect about 12,000 acres total during construction, and 3,765 acres would become part of the permanent operational easement for the pipeline. This compares to about 700 acres affected by construction of the Bradwood Landing Project, with 350 acres becoming part of the permanent operational right-of-way. A total of about 63,262 horsepower would be required at new compression stations for the proposed Ruby Project, while no new compression would be necessary for the Bradwood Landing Project.

After PG&E pulled out as a project sponsor, James Yardley, chairman of El Paso's Pipeline Group, told industry analysts that his firm has "not yet committed to go forward with Ruby." Yardley further indicated that El Paso would only move ahead with the Ruby, "if we see a return on the project" (Energy Daily, 2008). Although El Paso completed an open season in April 2008, Bruce Connelly, vice president of investor and media relations, indicated the company would be going back to committed and potential shippers with new cost estimates (Inside FERC, 2008c).

Bronco

The Bronco Pipeline Project is being proposed by Spectra. While Spectra has not identified a specific route for the pipeline, it would extend almost 700 miles from Opal, Wyoming to Malin, Oregon. The purpose of the Bronco Pipeline Project would be to transport Rocky Mountain gas to the Pacific Northwest and California markets. The pipeline would have a capacity of about 1 Bcfd. In January 2008, Spectra initiated an open season to gauge market interest. The scope and timing of the project would depend on the results of the open season (Natural Gas Intelligence, 2008b). Spectra indicated that it may go forward with its project even if LNG import terminals are eventually authorized and built in Oregon, because the Bronco pipeline would offer customers in the growing markets of northern Nevada and northern California competitive choices of domestically produced gas versus imported LNG (Natural Gas Intelligence, 2007). While the BLM indicated that a Right-of-Way Grant application was submitted for the Bronco pipeline to cross federal lands, at this time Spectra has not yet requested that the FERC begin the initiation of the Pre-filing environmental review process for its project.

The Bronco Pipeline Project would have no clear environmental advantages over the Bradwood Landing Project. The Bronco pipeline would be almost 700 miles long, while the Bradwood Landing sendout pipeline would be about 36 miles long. Spectra has not yet announced the results of its open season for the Bronco Pipeline Project, which ended in February 2008. A Spectra representative indicated that the project "may not work out as we originally saw it." Other industry analysts speculate that the Bronco project may be canceled because of competition from the Ruby Project and Williams' Sunstone Project, which would serve the same purpose and need (Inside FERC, 2008a).

Sunstone and Blue Bridge Projects

In January 2008, Williams, in partnership with TransCanada, sent out a letter to prospective customers to determine interest in expanding its existing Williams Northwest pipeline system between Wyoming and Oregon (Williams, 2008). The potential expansion would consist of a new pipeline, to be known as the Sunstone Project, designed to transport about 1.2 Bcfd of natural gas. The Sunstone Project would consist of a new 618-mile-long, 42-inch-diameter pipeline parallel to the existing Williams Northwest mainline from Opal, Wyoming to an interconnection with the GTN system near Stanfield, Oregon. The purpose of the Sunstone Project would be to transport natural gas produced in the Rocky

Mountain region and the WCSB to markets in the Pacific Northwest, northern Nevada, and northern California (Natural Gas Intelligence, 2008e).

In March 2008, Williams and PSE announced their joint plans to develop the so-called Blue Bridge Project. This would consist up to about 170 miles of 30- and 36-inch-diameter pipeline extending from the terminus of the Sunstone Project at Williams Northwest's existing interconnection with GTN at Stanfield, Oregon to Seattle, Washington. The Blue Bridge Project would also require the addition of compression at Williams Northwest's existing Plymouth, Washougal, and Chehalis compressor stations in Washington. The Blue Bridge Project would make available up to 500,000 decatherms per day (Dthd) of natural gas from Rocky Mountain and WCSB producers (Steis, 2008). PSE, an LDC serving customers in western Washington, indicated it would be the anchor shipper on the pipeline, and may become an equity investor in the project.

We consider the Sunstone and Blue Bridge projects to be in the speculation stage. Williams and its partners are still weighting customer interest in these projects. The open season for the Blue Bridge Project is expected to continue through May 2008. Williams and its partners have not yet come to the FERC to discuss their plans, or seek the initiation of the FERC Pre-filing environmental review process for either the Sunstone or Blue Bridge projects.

Conclusions about Newly Proposed Pipelines as System Alternatives

We do not yet have detailed data about the potential environmental impacts of the proposed Palomar, Ruby, Bronco, or Sunstone/Blue Bridge pipeline projects. Palomar and Ruby are being reviewed by the FERC under our Pre-filing process. Palomar filed its initial draft environmental Resource Report 1 (Project Description) on September 28, 2007, but indicated it would not be providing the remainder of its first drafts of environmental resource reports until May 2008, or later. Ruby filed its initial draft environmental Resource Report 1 on April 1, 2008. In the case of the Bronco and Sunstone/Blue Bridge projects, no proposals have been made before the FERC yet, and we consider these projects to be speculative in nature at this time.

As indicated in table 3.1.2-1, all of these pipelines would be substantially longer than the sendout pipeline proposed by NorthernStar. The Palomar pipeline would be about 215 miles long, the Ruby pipeline would be about 655 miles long, the Sunstone pipeline would be about 618 miles long, and the Blue Bridge pipeline would be about 170 miles long. It stands to reason that a longer pipeline may have more environmental impacts. As of the date of the writing of this EIS, we have no detailed information about the kind of resources that may be affected by construction of the Palomar, Ruby, Bronco, or Sunstone/Blue Bridge pipelines, including their potential effects on waterbodies, wetlands, soils, vegetation, wildlife, and cultural resources. Therefore, these proposed pipelines would not be environmentally preferable system alternatives to the Bradwood Landing Project.

TABLE 3.1.2-1				
Comparison of Proposed Project to Pipeline Projects as System Alternatives				
Pipeline/Project	Gas Source	Target Market	Estimated Completion Date	Impacted Mileage
Bradwood Landing	LNG	Primarily OR & WA	2011	36.3
Ruby	U.S. Rockies	Primarily CA & NV	2011	655
Bronco	U.S. Rockies	CA, NV and OR	2012	700
Sunstone/Blue Bridge	U.S. Rockies	WA, OR, NV and CA	2011	618/170
Palomar	Canada & U.S. Rockies	Portland Area	2012	215

It is questionable if either the Ruby or Bronco projects could meet the objectives of the proposed Bradwood Landing Project. The main purpose of the Ruby and Bronco pipelines is to transport Rocky Mountain gas to markets in northern Nevada and northern California, through interconnections with the existing PG&E and Tuscarora systems at the Oregon/California border. It is possible that gas could be backhauled through the existing GTN system at its interconnection with either the Ruby or Bronco pipeline near Malin, Oregon to serve markets in the Pacific Northwest. However, that would be against the current flow of gas in the GTN system, and it would be a longer distance to transport the gas to southern Washington than the sendout pipeline proposed by NorthernStar that would interconnect with the existing Williams Northwest system near Kelso, Washington. The main objective of the Bradwood Landing Project is to import LNG as a new source of natural gas for the Pacific Northwest.

Like the Ruby and Bronco pipelines, the Sunstone Project would bring additional volumes of Rocky Mountain gas to Oregon. The target markets for the Sunstone Project include the Pacific Northwest, northern Nevada, and northern California. Williams indicated that this project is intended to provide an option to utilize currently unsubscribed capacity on GTN's existing mainline between Stanfield and Malin, Oregon. The Sunstone Project was pitched by Williams to prospective customers as an alternative to compete with the proposed Ruby pipeline (Williams, 2008).

Both the Palomar Project and NorthernStar proposal could serve similar markets, but with different sources of natural gas. Palomar would transport most of its gas from Canada; obtained from GTN. A number of studies have predicted that Canadian exports into the western United States are not likely to increase in the future, and may even decline as production in the WCSB levels off over time and additional customers in Canada are served. Palomar could supplement its supplies using Rocky Mountain gas obtained through its interconnections with Williams Northwest. Whereas, the LNG to be imported by NorthernStar would probably come from places outside of North America (mainly the Pacific Basin, but Alaska is another possible source). Therefore, these projects may not be mutually exclusive, as they would diversify the supply of natural gas from different sources to the Pacific Northwest.

There would also be environmental challenges associated with the Palomar pipeline. The proposed route of the Palomar pipeline would go over the Coast and Cascade mountain ranges and through old growth forest habitat for federally listed threatened and endangered species, including the marbled murrelet and the northern spotted owl. In addition, it would cross agricultural land and vineyards in the Willamette Valley. The proposed route for the Bradwood Landing sendout pipeline would be shorter, follow an existing right-of-way for a greater percent, traverse less steep terrain, clear less forest, impact less agricultural land, and cross fewer waterbodies and wetlands than the proposed Palomar pipeline.

All of these other proposed pipeline projects may be on different time frames for beginning service than the Bradwood Landing Project. None have filed applications with the FERC yet, and it is unclear if they could be reviewed, approved, and constructed on a schedule similar to the Bradwood Landing Project. The FERC initiated the Pre-filing review of the Palomar Project at the end of August 2007, and started the Pre-filing review of the Ruby Project at the end of January 2008. The Bronco and Sunstone/Blue Bridge projects have not yet come to the FERC seeking the initiation of Pre-filing environmental reviews. NorthernStar, on the other hand, filed its applications for the Bradwood Landing Project in September 2006, and the FERC issued a draft EIS in August 2007. If the Commission authorizes the Bradwood Landing Project by the end of 2008, the LNG import terminal could be in operation by the end of 2011.

It is possible that market conditions could make some of the currently planned new pipelines from the Rockies to Oregon not viable. Spectra indicated that it is reconsidering whether it can go forward with the Bronco pipeline, based on the results of its open season. El Paso lost PG&E as a partner

due to the high price of steel pipe, is revisiting the costs of the Ruby pipeline with committed and prospective shippers, and would further develop the project only if it makes sense from an economic standpoint. Williams has not yet concluded open seasons for its proposed Sunstone and Blue Bridge projects.

3.1.2.3 Existing LNG Facilities

Existing LNG Import Terminals in the United States

There are four existing onshore LNG import terminals in operation in the United States (in Massachusetts, Maryland, Georgia, and Louisiana) and one offshore facility (in the Gulf of Mexico). In addition, there are three newly authorized onshore LNG import terminals currently under construction along the Gulf Coast (in Louisiana and Texas). None of the existing or under-construction LNG import terminals would be a reasonable or feasible system alternative to the proposed project because of their distance from the proposed market area.

Numerous new LNG import terminals are proposed throughout the United States. The FERC has recently authorized eight onshore LNG import facilities along the Gulf Coast (three projects in Corpus Christi, Texas; one in Port Arthur, Texas; one in Sabine Pass, Texas; one in Cameron, Louisiana; and two in Pascagoula, Mississippi), and two in the Northeast (Massachusetts and New Jersey); although final design construction has not yet begun at any of these approved facilities. We did not study any of the authorized but not yet built LNG import terminals located along the East or Gulf Coasts as potential system alternatives to the Bradwood Landing Project, since we do not consider them to be reasonable or feasible alternatives because of their distance from the proposed market area.

Existing LNG Storage Facilities in the Pacific Northwest

Five LNG storage facilities currently exist in the Pacific Northwest (see figure 3.1.2-2). These are peak shaving plants that liquefy natural gas, store it as LNG, and then vaporize the LNG back into natural gas for use during periods of peak demand. These facilities do not add new supplies of natural gas to the region, but rather act as storage facilities, using existing supplies, to even out the discrepancies created by varying seasonal demands.

In Oregon, Northwest Natural owns and operates two peak shaving LNG storage plants. One is located in Portland, and has a 28,000 m³ tank with a storage capacity of 600 million standard cubic feet (MMscf). The other is located in Newport and has a 48,000 m³ tank and a storage capacity of 1.0 billion standard cubic feet. In Washington, Williams Northwest owns and operates a peak shaving LNG storage plant in Plymouth with a liquefaction capacity of 19.7 Mscf, a storage capacity of 60,000 m³, and a vaporization capacity of 300 Mscf. In Gig Harbor, Washington, PSE operates a small LNG peak shaving plant with a capacity of 31 thousand decatherms (MDth), and a maximum withdrawal rate of 3 MDthd. In Nampa, Idaho, Intermountain Gas operates an LNG peak shaving plant with a capacity of 588 MDth and a maximum withdrawal of 60 MDthd (NWGA, 2007).

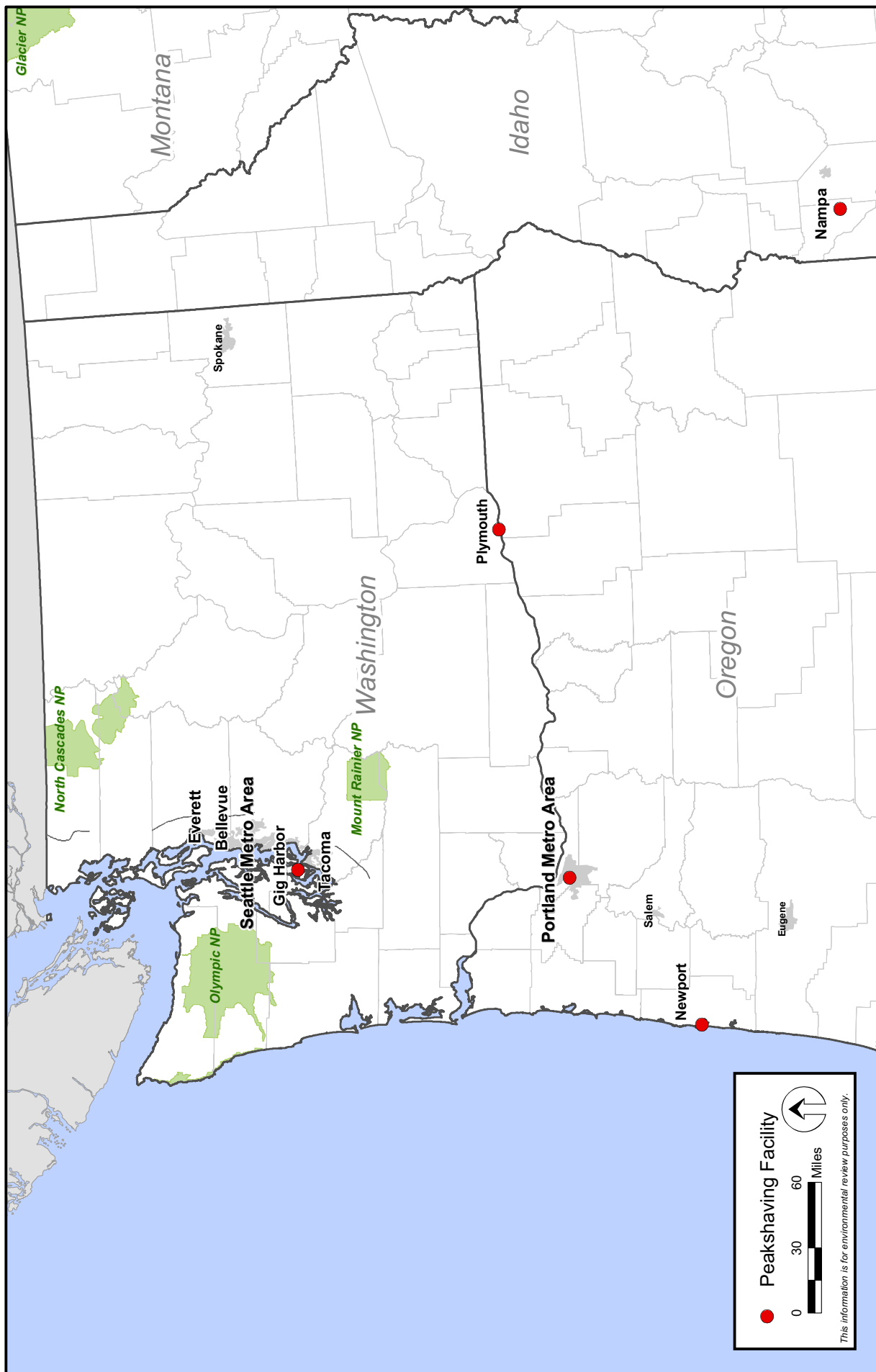


Figure 3.1.2-2
Bradwood Landing Project
 Existing Peakshaving Facility Locations

We considered the possibility of converting one of the existing peakshaving LNG storage plants into an LNG import terminal as a system alternative to the proposed project. However, such an alternative would likely not be economically viable due to the small size and limited capacity of the existing storage facilities. At these locations there is not enough additional vacant land around the existing facilities to allow them to be expanded and converted into import terminals. Only the two LNG storage facilities in Oregon are located on a waterway that would be potentially reachable by an LNG carrier. While Plymouth is located on the Columbia River, it is upriver of several dams, and so it would not be accessible to LNG carriers. Although Gig Harbor is located on Puget Sound, the PSE peakshaving facility is located about 1 mile from the harbor and would not be accessible to LNG carriers. While it may be feasible to construct a pipeline to transmit LNG from the harbor to the PSE peakshaving facility, such a pipeline would have additional associated environmental impacts. The Portland facility is located on the Willamette River and would potentially be accessible to LNG carriers. However, the waterway for LNG marine transit would be over 100 miles long and the navigation channel is obstructed by a bridge at Ross Island that only has clearances of 120 feet high and 100 feet wide. Newport is on the Oregon coast; however, the port of Newport is relatively small, with channel depths ranging from 20 to 30 feet. The port at Newport could not accommodate LNG carriers without extensive dredging. We estimate at least 16 million cubic yards of material would need to be dredged to accommodate LNG carriers at this location. Therefore, we conclude that converting existing peakshaving LNG storage plants in the region into LNG import terminals is not a reasonable or feasible system alternative to the proposed project.

3.1.3 Proposed West Coast Alternative LNG Import Terminals

We assessed proposals for offshore and onshore LNG import terminals to be located on the Pacific Coast of North America, including facilities proposed on the West Coast of Mexico, Canada, and the United States (see figure 3.1.3-1).

3.1.3.1 Proposed LNG Import Terminals on the West Coast of Mexico

The proposed LNG import terminals on the West Coast of Mexico include two offshore facilities (Terminal GNL Mar Adentro de Baja California and Moss-Maritime LNG Project) and two onshore facilities (Terminal GNL de Sonora and Energia Costa Azul LNG terminal). The Terminal GNL Mar Adentro de Baja California, proposed by Chevron Corporation (Chevron), would have been a gravity-based structure (GBS) (see section 3.1.4.1) located near the Coronado Islands off the coast of Tijuana with a projected average sendout capacity of 700 MMcfd. In March 2007, Chevron announced it was dropping its plans to develop its proposed Baja, Mexico LNG import terminal (East Bay Business Times, 2007). The Moss-Maritime LNG Project, proposed by a partnership between Moss-Maritime and Terminales y Almacenes Maritimos de Mexico, would be a floating storage and regasification unit (FSRU) (see section 3.1.4.1). The terminal would be located about 5 miles from Rosarito Beach off the coast of Baja, Mexico and have an average sendout capacity of 297 MMcfd. This facility was granted a permit from the Mexican government, but its current status is unknown (Lindquist, 2007).

The Terminal GNL de Sonora would be an LNG import terminal located near Puerto Libertad, Sonora, on the eastern shore of the Gulf of California (Sea of Cortez), with a sendout capacity of 1.3 Bcfd, proposed by El Paso Corporation (El Paso) and DKRW Energy LLC. The partners have received three environmental permits from the Mexican Federal Ministry of the Environment and Natural Resources. Gas supply for this facility still needs to be secured, and in May 2006 El Paso announced it was halting plans for a 59-mile-long sendout pipeline that would link the proposed terminal to markets in Tucson (CEC, 2007b).

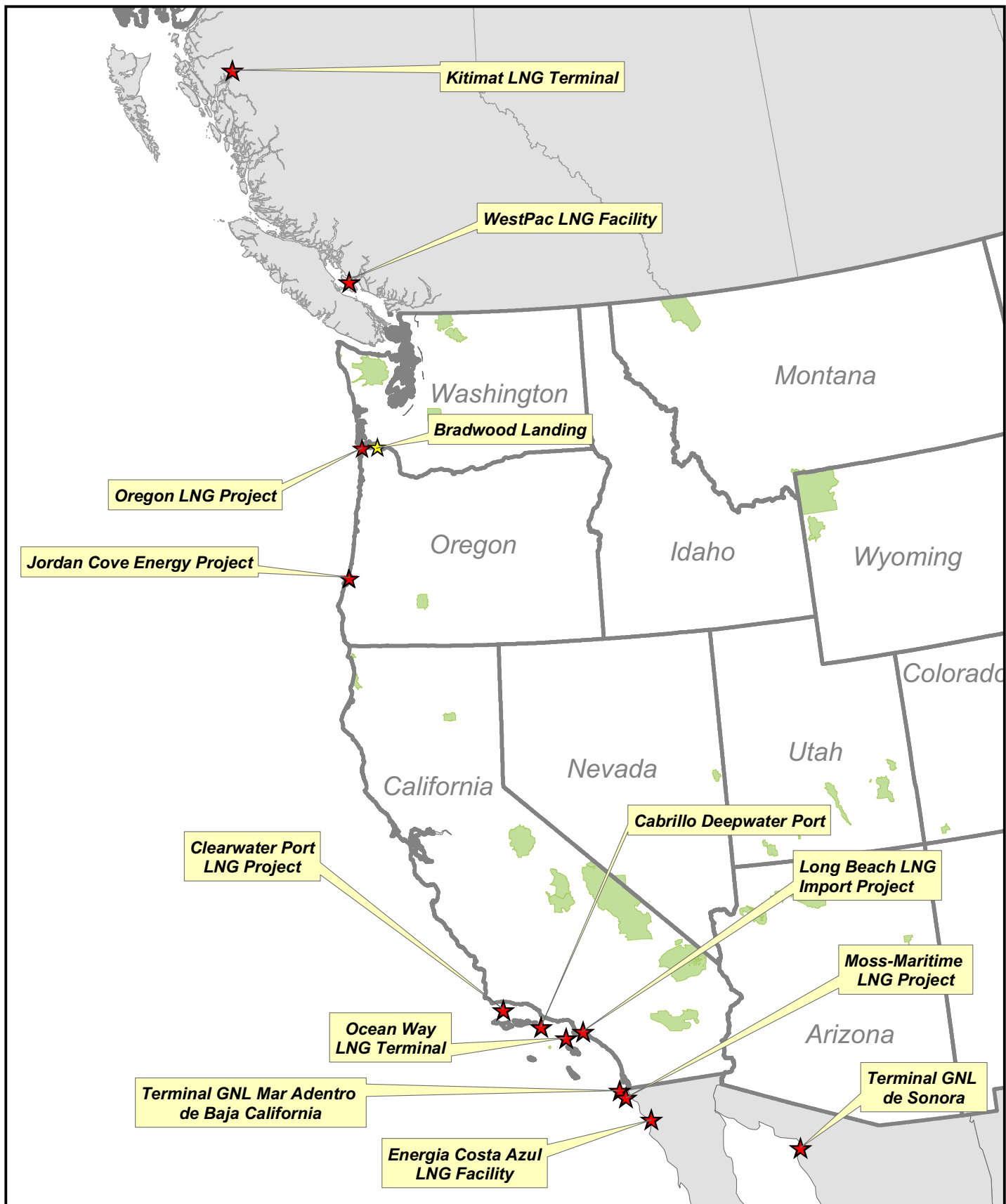


Figure 3.1.3-1
Bradwood Landing Project
 Proposed LNG Terminals on West Coast

The Energia Costa Azul LNG terminal (Costa Azul), proposed by Semptra Energy LNG Corporation, is located near Ensenada, on the Pacific Coast of Baja, Mexico. The terminal is sited within a 400-acre parcel, with two full containment LNG storage tanks with a total capacity of 320,000 m³, open rack vaporizers (ORV), and a 42-mile-long, 36-inch-diameter pipeline with an average sendout capacity of 1.0 Bcfd. All permits have been secured for this facility and it is currently under construction. It is expected to be in operation late in the second quarter of 2008. In March 2008, Costa Azul awarded a \$100 million contract to Fluor Corporation to build a nitrogen injection system and power generation facilities within its LNG terminal tract (CEC, 2008b).

The target markets for the LNG import terminals on the West Coast of Mexico would be northern Mexico, southern California, and other states in the southwestern United States (Arizona and Texas). The CEC (2007c) estimated that up to 50 percent of the capacity of the Costa Azul LNG terminal would be contracted for use in Mexico, with the remainder available for southern California markets. Natural gas from Costa Azul would be conveyed into southern California via the existing intrastate pipeline systems of Southern California Gas (SoCal) and San Diego Gas and Electric Companies, both subsidiaries of Semptra, the owner of Costa Azul. The proposed LNG import terminals in northern Mexico would be far from the market area proposed for the Bradwood Landing Project and could not meet the objective of providing natural gas to the Pacific Northwest without substantially increasing the capacity of the terminals and constructing over 1,000 miles of new pipeline with compressor stations. Therefore, we do not consider the Mexican LNG terminals to be reasonable or feasible alternatives to the proposed project and did not evaluate them further.

3.1.3.2 Proposed LNG Import Terminals on the West Coast of Canada

One proposed onshore LNG import facility (WestPac) in British Columbia, Canada, has not yet begun the environmental review process for its revised project, while another LNG import terminal (Kitimat) has received regulatory approval and is planning to begin construction in the near future.

WestPac LNG Terminal, British Columbia

WestPac LNG Corporation proposes to construct and operate an LNG import terminal near Kiddie Point on Texada Island, about 75 miles northwest of Vancouver in Georgia Strait, British Columbia, Canada. Originally, WestPac started the environmental review process with the Prince Rupert Port Authority in 2006 for an LNG terminal site on Ridley Island (CEC, 2008a). The proposed location of the LNG terminal was moved to Texada Island in July 2007. The terminal would include a marine wharf capable of handling up to about 36 LNG carriers per year, with capacities up to 165,000 m³. Onshore there would be two full-containment LNG storage tanks, re-gasification facilities, and an electric generation plant. While WestPac indicated it would have access to the Vancouver Island gas pipeline, it did not reveal any details about its sendout pipeline. Instead, WestPac indicated that it would provide a detailed project description with the application it intends to file with the British Columbia and Canadian Environmental Assessment Offices early in 2009 (WestPac LNG, 2008). In January 2008, the sponsors put the project on hold pending review of initiatives that may be taken by the provincial government of British Columbia related to emission or climate change regulations (Gas Daily, 2008).

The WestPac LNG facility may be considered as a potential alternative to the proposed Bradwood Landing Project, if the project were to include pipeline connections to the existing grid, enabling the transportation of natural gas to markets in the western United States. However, at the present time it is unclear what the target markets may be for this project, and how gas would be transported from the LNG terminal to end users. In addition, environmental review of the proposal would not resume until 2009, and there is uncertainty over whether or not the appropriate Canadian government authorities would

approve the project. Therefore, we do not consider the WestPac LNG terminal to be a feasible alternative to replace the Bradwood Landing Project.

Kitimat LNG Terminal, British Columbia

The Kitimat LNG terminal, proposed by a subsidiary of Galveston LNG, Inc. would be located at Bish Cove, about 8 miles south-southwest of the Port of Kitimat, British Columbia. The facility would receive four or five LNG shipments per month. The LNG terminal design includes marine offloading, two 160,000 m³ LNG storage tanks, natural gas liquids recovery, and regasification facilities, with a nominal sendout capacity of 1 Bcfd of natural gas. The terminal would deliver gas via a 9-mile-long pipeline into the Pacific Trails Pipeline, to be operated by a partnership between Galveston LNG, Inc. and Pacific Northern Gas Ltd. This would be a new 292-mile-long pipeline extending from Kitimat to Summit Lake, British Columbia, where it would interconnect with the existing Spectra Energy Transmission (Spectra) (formerly Duke Energy) pipeline system (Kitimat LNG, 2008). An environmental assessment was completed for the Kitimat LNG terminal, and the project was approved by the Canadian Environmental Ministry in August 2006. Pacific Trails Pipeline filed a formal environmental application with the British Columbia Environmental Assessment Office in August 2007 (CEC, 2008a). The Kitimat developers expect to have their LNG terminal in operation by the end of 2010.

The Kitimat LNG terminal appears to be a potential alternative for providing the Pacific Northwest with additional volumes of natural gas through new sources of imported LNG. However, one of the main goals of the Kitimat LNG Project is to provide natural gas to the tar sands oil production area of Alberta, Canada; one of the fastest growing natural gas markets in North America. Further, interconnections from the Spectra and TransCanada pipeline systems would allow natural gas from Kitimat to be transported to Midwest and eastern United States markets through the existing Northern Border, Alliance, and Iroquois pipeline systems. Thus, only a portion of the natural gas from Kitimat would probably be available for delivery to markets along the West Coast of the United States. The volume of gas from Kitimat would be smaller and would need to be transported a longer distance to reach the market center of Portland, Oregon, than gas from Bradwood Landing. Therefore, the Kitimat LNG terminal could not satisfy all of the objectives of the Bradwood Landing Project.

3.1.3.3 Proposed LNG Import Terminals on the California Coast

There are five offshore (Cabrillo, Clearwater, Ocean Way, Pacific Gateway, and Esperanza) and one onshore (Long Beach) LNG import terminals proposed for the Pacific Coast in California.

Long Beach LNG Import Terminal Project

The Long Beach LNG Import Terminal Project was proposed by Sound Energy Solutions (SES), a joint venture between Mitsubishi Corporation and ConocoPhillips, in FERC Docket Nos. CP04-58-000 et al., to be located within the Port of Long Beach, California. Features of the terminal include a berth capable of handling an LNG carrier up to about 200,000 m³ capacity in size, two LNG storage tanks with a combined capacity of 320,000 m³, four shell and tube vaporizers (STV), and a typical sendout capacity of 700 MMcfd of natural gas. A 2.3-mile-long 36-inch-diameter pipeline would be constructed to transport natural gas from the LNG terminal to existing SoCal facilities. In addition, a 4.6-mile-long 10-inch-diameter pipeline would be constructed to transport vaporized ethane from the LNG terminal to an existing ConocoPhillips plant. In October 2005, the FERC and Port of Long Beach produced a joint draft EIS for this project.

In January 2007, the Long Beach Board of Harbor Commissioners, who would be responsible for leasing the property for the LNG terminal, decided to end its environmental review (Polakovic, 2007). In

March 2008, the FERC issued a letter to SES stating that staff would no longer work on its application for an LNG import terminal at Long Beach, because the company could not document that it had access to or control over its proposed terminal site. SES appealed the City of Long Beach's decision through the local judicial system. However, in March 2008 a Superior Court judge ruled against SES, finding that Long Beach had acted in an appropriate manner in halting its environment review process (CEC, 2008b).

California Offshore LNG Import Terminal Proposals

All of the proposed LNG terminals off the California shore would be reviewed by the Coast Guard and U.S. Department of Transportation, Maritime Administration (MARAD) under the authority of the Deepwater Port Act.

Cabrillo Deepwater Port LNG Facility

The Cabrillo Deepwater Port LNG Facility, proposed by BHP Billiton, would be located in the Santa Barbara Channel about 14 miles from Point Mugu. The import facility would consist of an FSRU permanently moored to the ocean floor, with three independent Moss spherical storage tanks mounted within the hull together with eight vaporizers. An underwater 30-inch-diameter pipeline would extend about 21 miles, coming ashore in the vicinity of Ormond Beach in Ventura County, California, and interconnecting with the existing SoCal system. The facility would have the ability to send out an average of about 800 MMcfd of natural gas.

The Coast Guard and California State Lands Commission (CLC) issued a final EIS for this project in March 2007. In April 2007, the CLC and the California Coastal Commission voted against authorizing the Cabrillo Deepwater Port LNG import facility. California Governor Arnold Schwarzenegger rejected BHP Billiton's proposal in May 2007. According to the DOT Docket Management System, on June 5, 2007, the MARAD issued a Record of Decision denying the application for the Cabrillo Deepwater Port.

Clearwater Port LNG Project

The Clearwater Port LNG Project was proposed by NorthernStar Natural Gas, Inc., the same developers promoting the Bradwood Landing Project. The Clearwater Port project would use existing offshore Platform Grace, located in the Santa Barbara Channel about 13 miles from Oxnard. A new floating dock would need to be installed adjacent to the existing platform to moor LNG carriers during transfer. No storage facilities are proposed. The platform would be reconfigured to accommodate vaporizers. The natural gas would be delivered from the platform to the shore via a new 32-inch-diameter, 13-mile-long subsea pipeline. An additional 12-mile-long underground pipeline would convey the gas onshore from Oxnard to an interconnection with the existing SoCal system near Camarillo. The average sendout capacity of the facility would be about 1.2 Bcfd.

NorthernStar filed its application for the proposed Clearwater Port with the MARAD on January 28, 2004. On August 23, 2007, the application was deemed complete, and on September 18, 2007 the MARAD issued a notice of intent to produce a draft EIS for the project. On October 23, 2007, the Coast Guard issued a "stop the clock" letter to the applicant with a list of 396 questions (DOT, 2007; CEC, 2008a). This project would need the approval of the Governor of California before it could go forward.

Ocean Way LNG Terminal

The Ocean Way LNG Terminal, to be located in the Pacific Ocean about 22 miles south of Los Angeles, California, is proposed by Woodside Energy, Inc. (Woodside). The project would include a

mooring facility and an underwater pipeline that would come onshore near Los Angeles International Airport and interconnect with the existing SoCal intrastate local distribution system. The LNG would be regasified while still on board the ship, and the facility would have a first phase nominal sendout capacity of about 400 MMcfd.

Woodside filed its application with the MARAD on August 18, 2006. In September 2007 the application was deemed complete, and a notice of intent was issued indicating that a draft EIS would be prepared by the appropriate federal agencies and the City of Los Angeles. The clock was stopped on this project on November 23, 2007, when the Coast Guard issued a letter to Woodside with a list of 61 questions (CEC, 2008a). The Coast Guard suspended its environmental review of Woodside's proposal pending the completion of a global lifecycle assessment of GHG impacts of the proposed ship-to-ship transfer and regasification processes (Natural Gas Intelligence, 2008f).

Pacific Gateway LNG Facility

The Pacific Gateway LNG Facility is proposed by Excelerate Energy LLC (Excelerate) to be located off the shore of northern California. Excelerate, which currently operates an offshore LNG import terminal in the Gulf of Mexico, would use specially designed LNG tankers for the transportation of LNG and vaporization into natural gas. The northern California proposal would deliver up to 1.0 Bcfd of natural gas. This project is currently in the conceptual design phase, with Excelerate conducting "fatal flaw" analyses of offshore terminal locations and pipeline routes (Excelerate, 2007). An application under the Deepwater Port Act has not yet been submitted for this project.

Esperanza LNG Terminal

In March 2007, Esperanza Energy LLC (Esperanza), a subsidiary of Tidelands Oil and Gas Corporation, announced plans for an offshore LNG import terminal to be located in the Pacific Ocean about 15 miles from Long Beach, California. This facility would use the proprietary HiLoad system developed by TORP Technology to vaporize LNG as it is offloaded from ships. The natural gas would be transported to shore by an undersea pipeline, with a sendout capacity of about 1.2 Bcfd. The project is intended to serve existing onshore gas-fired electric generation plants in the Long Beach-Huntington Beach area. One unique feature of this proposal would be the use of warm water discharged from an onshore host to regasify the LNG. Esperanza is considering the construction of a directionally drilled tunnel, 100 feet underground, that could provide a conduit for water, communication, and electric lines, together with its sendout pipeline linking its offshore import terminal with SoCal's existing local distribution system. Esperanza has not yet filed its application under the Deepwater Port Act. Apparently, Esperanza also has to address the issue of GHG emissions, and has not yet lined up financing for the project (Esperanza, 2007; Natural Gas Intelligence, 2007, 2008f).

California LNG Import Terminal Conclusions

None of the proposed LNG import terminals in California are viewed as reasonable or feasible alternatives to the Bradwood Landing Project because the target markets for these projects are in southern California. None of these proposals have been authorized at this time. In fact, some (Pacific Gateway and Esperanza) are in the speculation stage, with no applications yet submitted. In addition, the target markets for these projects are in southern California. The California LNG import terminal proposals, therefore, could not meet the objectives of the Bradwood Landing Project to supply the States of Oregon and Washington with new sources of natural gas.

3.1.3.4 Proposed LNG Import Terminals in Oregon

There are three other potential LNG import terminal alternative locations along the Columbia River, in addition to the Bradwood Landing Project, and one in Coos Bay. These are compared in table 3.1.3-1 and described below.

TABLE 3.1.3-1					
Comparison of Proposed LNG Import Terminals in Oregon					
Variable	Jordan Cove Energy LNG	Oregon LNG	Tansy Point	Port Westward	Bradwood Landing
Acreage affected by construction at LNG terminal	159	208	50	Not Available	148
Dredging required for turning basin or berth	5.6 million cubic yards	1.3 million cubic yards	minimal	Est. 0.6 million cubic yards	0.7 million cubic yards
Residential structures within 0.5 mile of terminal	0	0	> 85	0	0
Annual roundtrip LNG carrier traffic	80 carriers	100 carriers	Not Available	Not Available	125 carriers
Acres of wetland affected by terminal	11.3	21	9	2.6	14.8
Sendout pipeline length	230 miles	130 miles	58 miles	33 miles ^a	36 miles
Residences within 50 feet of pipeline construction right-of-way	15	At least 14	Not Available	Not Available	3
Compressor Stations	1	1	1	0	0
Acreage affected by construction along pipeline	4,920	1,461	793	430	553
Miles of public lands crossed	80	9	5	0.2	3
Number of federally listed threatened and endangered species affected by project	11	34	Not Available	Not Available	37
Number of waterbodies crossed by pipeline	379	192	90	55	94
Acres of wetland affected by pipeline construction	406	126	139	51	97.9
Acres of forest crossed by pipeline	1,906	57	Not Available	Not Available	179.7
Acres of agricultural land crossed by pipeline	587.3	45	Not Available	Not Available	98.6
Number of identified archeological sites along pipeline route ^b	88	9	Not Available	Not Available	4
^a Includes lateral to Wauna Mill and Northwest Natural interconnects.					
^b All affected parcels have not yet been surveyed.					

Jordan Cove Energy LNG Project

On September 4, 2007, Jordan Cove Energy Project, L.P. (Jordan Cove) filed an application with the FERC in Docket No. CP07-444-000 for a proposed LNG import terminal in Coos Bay, Oregon. At the same time, Pacific Connector Gas Pipeline, L.P. (PCGP) filed its application, in Docket No. CP07-441-000 for a sendout pipeline associated with the LNG import terminal. The FERC intends to produce an EIS for the Jordan Cove LNG terminal and PCGP sendout pipeline combined. The COE, Coast Guard, EPA, BLM, USFS, and Douglas County are cooperating agencies in the production of the EIS.

The Jordan Cove LNG import terminal would be located at about Mile 7.5 along the Coos Bay navigation channel, on the eastern shore of the North Spit in Coos County, Oregon. Proposed facilities would include a single berth capable of handling about 80 LNG carriers per year, 2 full containment LNG storage tanks, each with a net volume of 160,000 m³, and 6 SCVs with a sendout capacity of 1 Bcfd. The terminal would also include a natural gas liquids extraction facility and a 37 MW natural gas fired power plant.

PCGP's sendout pipeline would consist of a 230-mile-long 36-inch-diameter pipeline, extending from the Jordan Cove LNG import terminal across Coos, Douglas, Jackson, and Klamath Counties, terminating at interconnections with PG&E and Tuscarora near Malin, Oregon. Aboveground facilities associated with the pipeline include a 20,620 hp compressor station near Butte Falls and four meter stations (see figure 3.1.3-2).

The PCGP sendout pipeline would be more than six times longer than NorthernStar's pipeline. PCGP's pipeline route would have to go over difficult terrain of the Coastal Range and the Cascade Range, and cross lands administered by four BLM districts (Coos Bay, Roseburg, Medford, and Lakeview) and portions of the Fremont-Winema, Rogue River-Siskiyou, and Umpqua National Forests administered by the FS. On federal lands, the pipeline would cross about 25 miles of habitat categorized as Late Successional Reserves, 45 miles of Matrix, and almost 2 miles of Riparian Reserves. The route would go through old growth forest habitat occupied by federally listed threatened and endangered species. Biological surveys in 2007 resulted in 114 detections at 14 activity centers for northern spotted owls, 4 stands found to be occupied by nesting marbled murrelets, and 23 confirmed active nests for the red tree vole. In addition, one site of large-flowered wooley meadowform, and three sites of Kincaid's lupine were identified (Siskiyou BioSurvey, 2007). The proposed pipeline would also cross 379 waterbodies and potentially impact about 406 acres total of wetlands. Preliminary cultural resources surveys identified 88 archaeological sites along segments of the pipeline route (HRA, 2007).

Jordan Cove and PCGP indicate that their project would supply natural gas to the Pacific Northwest, northern Nevada, and northern California. In some respects, that is similar to the objectives of NorthernStar's project. There are no clear environmental advantages of the Jordan Cove LNG Project over the Bradwood Landing Project; therefore, it is not a preferable alternative.

Oregon LNG Project

On June 10, 2007, the FERC agreed to the request from LNG Development Company LLC and the Oregon Pipeline Company (hereafter referred to together as Oregon LNG) to initiate the Pre-filing environmental review of their proposed Oregon LNG Project, in Docket No. PF07-10-000. This project would consist of an LNG import terminal in Warrenton, Clatsop County, Oregon, and an associated 121-mile-long sendout pipeline crossing Clatsop, Tillamook, Washington, Yamhill, Marion, and Clackamas Counties, Oregon. The development of an LNG import terminal at Warrenton was originally proposed by Calpine Corporation (Calpine). However, after Calpine declared bankruptcy, rights to the project were transferred to Oregon LNG, a subsidiary of the Leucadia National Corporation. The FERC intends to produce a separate, stand alone, independent EIS for the Oregon LNG Project.

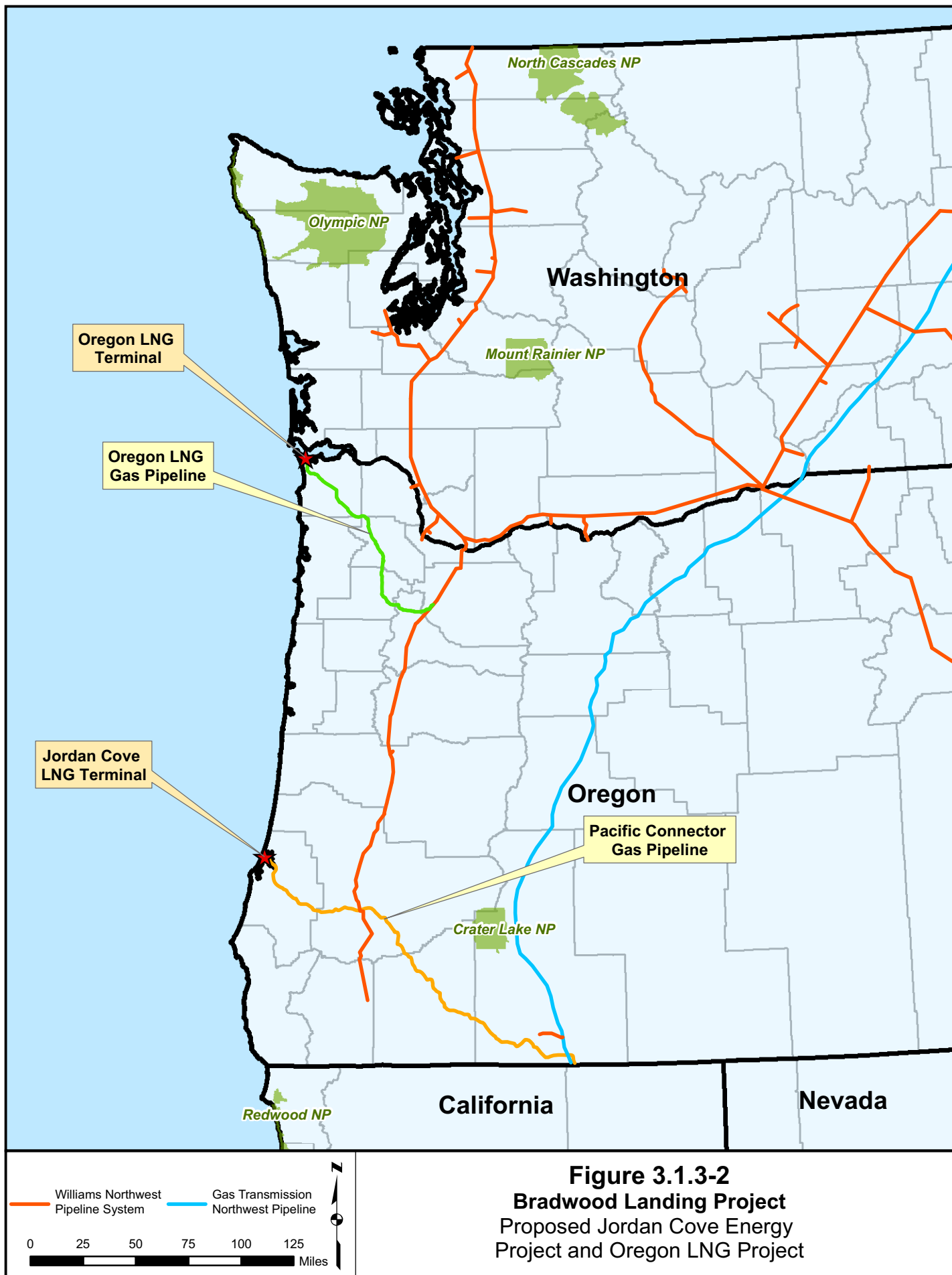


Figure 3.1.3-2
Bradwood Landing Project
 Proposed Jordan Cove Energy
 Project and Oregon LNG Project

The Oregon LNG terminal would be constructed within a 96-acre tract on the East Skipanon Peninsula, within the City of Warrenton, near the confluence of the Skipanon and Columbia Rivers, at about CRM 11 (see figure 3.1.3-3). The terminal site is owned by the State of Oregon, and leased to the Port of Astoria. Oregon LNG holds a 65-year sublease with the Port of Astoria. The Skipanon Peninsula was created by placement of sandy sediments dredged from adjacent waterways beginning in the 1920s. The site does not include any prime farmland. The surrounding land use is industrial and recreational. An 18-hole golf course was once planned for this area (Port of Astoria 2006a). The City of Warrenton recently rezoned the tract for water-dependent industrial use in order to allow for an LNG terminal at this location (Ramsayer 2005). The onshore portions of the parcel are zoned Water Dependent Industrial Shorelands 1-2, while the marine facilities are zoned Aquatic Development A-1.

The proposed Oregon LNG import terminal would have a single berth designed to handle about 100 LNG carriers per year, sized from about 70,000 m³ to 260,000 m³ in capacity. The berth would be located offshore in Young's Bay, adjacent to the Columbia River navigation channel, on submerged lands owned in fee by the ODSL, with current depths between 20 and 30 feet below mean lower low water (MLLW). Oregon LNG expects that construction of its berth and turning basin would require dredging of about 1,275,000 cubic yards of material within an 83-acre area to reach depths of about 45 to 50 feet required for the safe docking of LNG carriers. Oregon LNG indicated that its preferred alternatives for disposal of dredge materials would be in-water placement, including a combination of flow lane/scour hole placement and shallow open water placement. However, it has not specified the exact locations for dredge disposal.

Oregon LNG believes that its dock would qualify for the "wharf exception" under OSR 780.040(1), which would not require a lease from ODSL. The unloading platform at the berth would include three unloading arms and one vapor return arm. Construction of the dock and turning basin would affect about 138 acres.

Onshore facilities would include three 160,000 m³ full containment LNG storage tanks, vaporizers, and a sendout system with a peak capacity of 1.5 Bcfd of natural gas. Oregon LNG currently plans on using a combination of direct ambient air vaporizers and natural gas-fired heaters to regasify the LNG. Construction of the land based portion of the LNG import terminal would affect a total of about 70 acres.

Oregon LNG would install a new 36-inch-diameter 121-mile-long natural gas sendout pipeline to connect the LNG import terminal with the existing Williams Northwest system near Molalla, Oregon. About 30 percent of this pipeline route would follow existing rights-of-way, for roads, railroads, and power lines. Construction of the sendout pipeline would affect about 1,461 acres. In addition, Oregon LNG would install a 9.4-mile-long 24-inch-diameter lateral, in Washington County, Oregon, that would connect to existing Northwest Natural LDC system facilities. The lateral's maximum capacity would be 0.8 Bcfd. Aboveground facilities associated with the sendout pipeline would include a single electric-drive gas compressor station, located at about MP 51, where the Northwest Natural lateral would split off from the mainline. Oregon LNG indicated that it would be willing to transport its gas on the proposed Palomar pipeline, instead of building its own sendout pipeline, if the parties could reach a mutual agreement.

The closest residences are about 0.5 mile from the southern boundary of the Oregon LNG terminal. The facility would be visible from the hillside of the western portion of the City of Astoria and from the City of Warrenton. Oregon LNG indicated that there may be 14 structures located in close proximity to its proposed sendout pipeline.

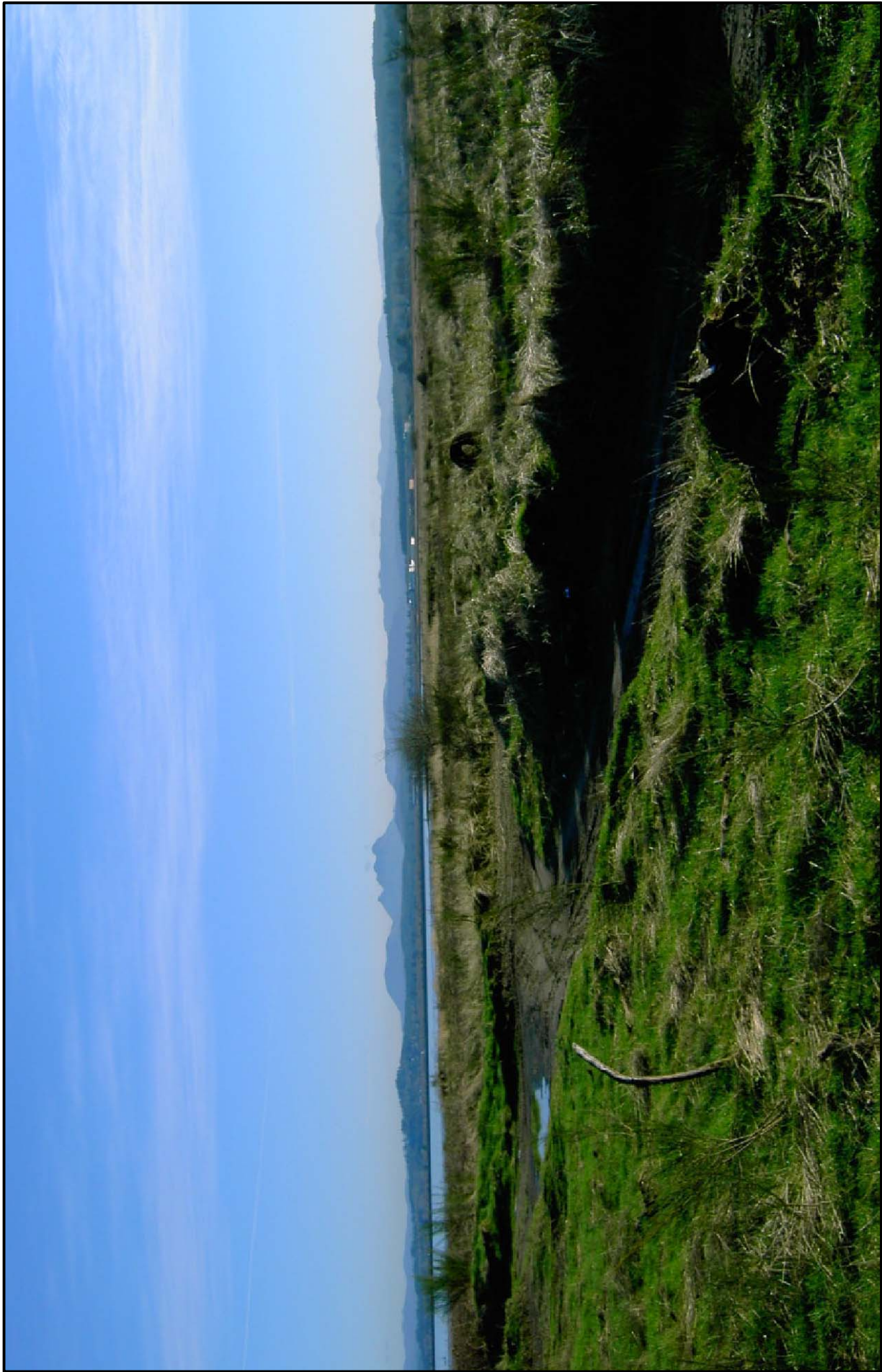


Figure 3.1.3-3
Bradwood Landing Project
Photograph of Oregon LNG Looking Southeast

Oregon LNG has not yet filed all of its draft environmental resource reports, so we do not have complete information about the potential environmental impacts of the project on specific resources. Oregon LNG estimates that construction of its import terminal would affect about 21 acres of wetlands in total, including about 2.2 acres of mudflats, 18 acres of high marsh, and 1 acre of low marsh. About 11.5 miles of wetlands would be crossed by the proposed pipeline.

Calpine conducted a preliminary habitat category determination of the LNG terminal site in accordance with standards set by the ODFW (Ellis Ecological Services and CH2M Hill, 2005). Most of the parcel was proposed as Category 4 or 5 habitat, because it is degraded and does not provide important habitat for fish and wildlife. The shallow subtidal and mudflats, where the trestle and unloading pipeline from the berth would be located, were proposed as Category 2 habitat because these areas are important for salmonids. No Category 1 habitat was identified within the property. The area that would require dredging for the LNG carrier turning basin and berth was identified as deep subtidal habitat, proposed as Category 4.

Within the vicinity of the proposed LNG terminal, ship route, and pipeline facilities there are 34 federally listed threatened and endangered species. No federally listed threatened or endangered species were found during surveys of the upland portion of the proposed Oregon LNG terminal. The waterway for LNG marine traffic and the terminal berth would be located within the Lower Columbia River estuary. The estuary provides habitat for federally listed threatened and endangered fish species, including eight units of Pacific salmon and five segments of steelhead trout. In total, there are 15 federally listed threatened and endangered fish species in the project area. The waterway for LNG marine traffic is also a potential habitat for four species of federally listed threatened and endangered turtles, eight marine mammals, one invertebrate, and two plants. Four federally listed threatened and endangered bird species (brown pelican, northern spotted owl, marbled murrelet, and short-tailed albatross) were identified in the project area.

The proposed pipeline would cross about 699 acres of non-wetland forest, including portions of the Clatsop and Tillamook State Forests. About 549 acres of non-wetland agricultural land would be crossed by the pipeline, including some vineyards in the Willamette Valley.

The proposed pipeline would result in 192 waterbody crossings, which include 61 currently known perennial flow waterbodies, 39 currently known ephemeral flow waterbodies, and 27 currently known intermittent waterbodies. Oregon LNG indicated that it proposes to use HDDs at 20 waterbodies, including Adams Slough, Lewis and Clark River, Nehalem River, Tualatin River, Yamhill River, Willamette River, and Pudding River.

No archaeological sites were identified at the proposed Oregon LNG terminal, mainly because the terrestrial portion of this facility would be located on fill. Nine archaeological sites were found along surveyed portions of the pipeline route; of which eight require additional investigations to assess their NRHP eligibility.

In summary, the main environmental advantage of the Oregon LNG import terminal site would be its location downstream of the Astoria-Megler Bridge and the shorter distance up the Columbia River for LNG marine traffic. The main disadvantage, in comparison to the Bradwood Landing Project, would be environmental impacts associated with the additional length of the Oregon LNG sendout pipeline. In conclusion, the Oregon LNG terminal alternative does not appear to be environmentally superior to the Bradwood Landing Project.

Other Potential LNG Terminal Locations along the Columbia River

Tansy Point

Tansy Point is a low-lying headland located between the mouth of the Skipanon Waterway and Trestle Bay, 10 miles upriver from the mouth of the Columbia River, in Clatsop County, Oregon (see figures 3.1.3-4 and 3.1.3-5). The potential LNG terminal site is owned by the City of Warrenton and is leased to Warrenton Fiber Company. The company currently operates the 50-acre site as a log yard and wood processing facility. It is within the City of Warrenton's Water Dependent Industrial zoning district. Warrenton Fiber has been given a 5-year period to negotiate with the City for lease amendments, which would be required in order to construct an LNG facility on the site. While Warrenton Fiber is exploring the possibility of developing this site as an LNG terminal, no LNG development company or other financial backer has come forward, and no LNG import terminal proposal has been submitted to the FERC.

LNG carriers would have a relatively short transit up the navigation channel in the Columbia River to Tansy Point, and would not have to go under the Astoria-Megler Bridge. The site is currently equipped with a ship dock, and the river adjacent to the site is 43 feet deep. Therefore, no or minimal dredging would be required; however, the ship dock area would need to be rebuilt to meet the specific requirements for berthing and unloading LNG carriers.

The lower Columbia River is designated critical habitat for salmon. However, the designated salmon critical habitat near the mouth of the river is spread out over a larger area and fish in this part of the river generally spend less time in the habitat (NMFS, 2006a). This area is also EFH for groundfish and pelagic species, as well as salmon.

Based on National Wetlands Inventory (NWI) data, there are approximately 14 acres of wetlands present on the 50-acre Tansy Point site. These wetlands are confined to the southern half of the parcel. Assuming the LNG terminal would have a footprint of 45 acres and the terminal could be situated to minimize wetland impacts (i.e., the entire unused 5 acres would be wetland acres) development of the site for an LNG terminal would permanently impact about 9 acres of wetlands. No prime farmland is present at the site.

Some years ago, Tansy Point was the site of a terminal for a steamship that traveled between Warrenton and San Francisco. The topographic map for this area indicates ruins are present in the river adjacent to Tansy Point, and the Columbia River Maritime Museum in Astoria displays a record of the steam tug Firefly having sunk off Tansy Point in 1854. Therefore, cultural resources, including submerged remains of ship wrecks in the river, may be present at this location.

The berth for the Tansy Point site would be closer to the navigation channel compared to the other alternative sites along the Columbia River. This proximity could pose a higher risk of allisions between LNG carriers unloading their cargo and other ship traffic in the channel.

Of the potential alternative LNG terminal locations considered along the Columbia River, Tansy Point has the largest number of nearby residences and the area immediately southwest of the site is zoned for intermediate density residential use. Based on examination of aerial photographs, we estimate over 85 residential structures are present within 0.5 mile of the site. The proposed LNG terminal would also have visual impacts on residents of Warrenton.

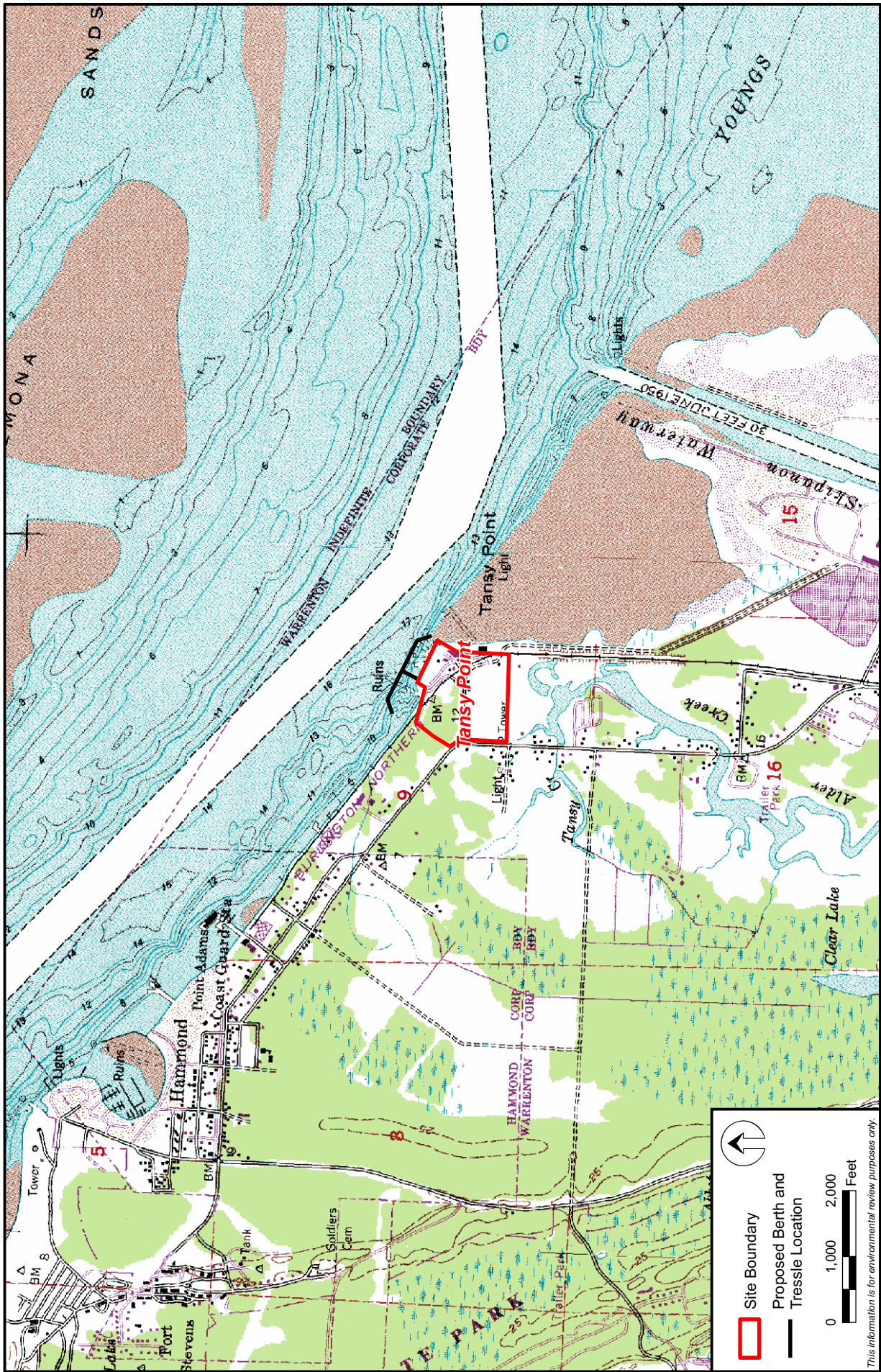


Figure 3.1.3-4
Bradwood Landing Project
 Tansy Point



Figure 3.1.3-5
Bradwood Landing Project
Photograph of Tansy Point Looking West

Because there is no application before us, the FERC staff had to speculate about the length and location of a sendout pipeline for the Tansy Point LNG import terminal alternative. We assumed that the sendout pipeline would have to interconnect with the Williams Northwest pipeline, which is the closest existing interstate transportation system. In selecting the pipeline route, we made an effort to avoid populated areas without increasing the length of the pipeline by an unreasonable amount. The conceptual pipeline route would follow an existing power line corridor where possible. While it is standard practice to collocate pipelines with existing rights-of-way, we have not field verified that this route would be constructible for a natural gas pipeline. The sendout pipeline route we propose would be about 58 miles long. Its location is illustrated on figure 3.1.3-6.

In summary, the main environmental advantages of Tansy Point would be the short LNG marine transit distance, little or no dredging necessary for a turning basin in the Columbia River, and limited impacts on wetlands. Because the site is already being used for industrial purposes, development as an LNG terminal would have fewer impacts on wildlife habitats than if the land were previously undeveloped. Disadvantages include little separation of the berth from the navigation channel, population density around the site, and greater length for a sendout pipeline. In conclusion, the Tansy Point alternative LNG import terminal site is not clearly environmentally superior to the proposed Bradwood Landing Project.

Port Westward

The Port Westward alternative LNG terminal site is located on the south side of the Columbia River, opposite Oak Point, about 12 miles down river from Longview, Washington, in Columbia County, Oregon (see figures 3.1.3-7 and 3.1.3-8). The site is part of an economic zone managed by the Port of St. Helens. Port Westward LNG has an agreement with the Port of St. Helens to develop an LNG import facility within this zone. However, Port Westward LNG's request to the FERC to initiate our Pre-filing Review Process was not accepted because it could not demonstrate that it fully owned or controlled the entire parcel proposed for the LNG import terminal.

The proposed Port Westward LNG import terminal alternative site consists of two parcels totaling about 270 acres. The Thompson family owns a 145-acre wooded parcel fronting the Columbia River. The Port of St. Helens negotiated a 99-year lease agreement with the Thompson family to sublease this land (The Daily News, 2006a). Based on discussions between the FERC staff and representatives of Port Westward LNG, it appears that the terms of the lease agreement between the Thompson family and the Port of St. Helens are not ideal for the construction and operation of an LNG marine berth on that property.

The second parcel at the Port Westward site consists of agricultural land used for grazing cattle and a tree farm for pulp production, controlled by the Port of St. Helens. A farmstead is located on the property; however, the Port of St. Helens has an agreement with the residents for abandonment of the farm in the event the parcel is developed for industrial purposes. Surrounding land use is agricultural and industrial. We identified several residential structures east of the southeast corner of the site. However, depending on the exact placement and configuration of the 45-acre LNG terminal footprint within the site, these structures would likely be more than 0.5 mile away. No prime farmland is present at the Port Westward site.

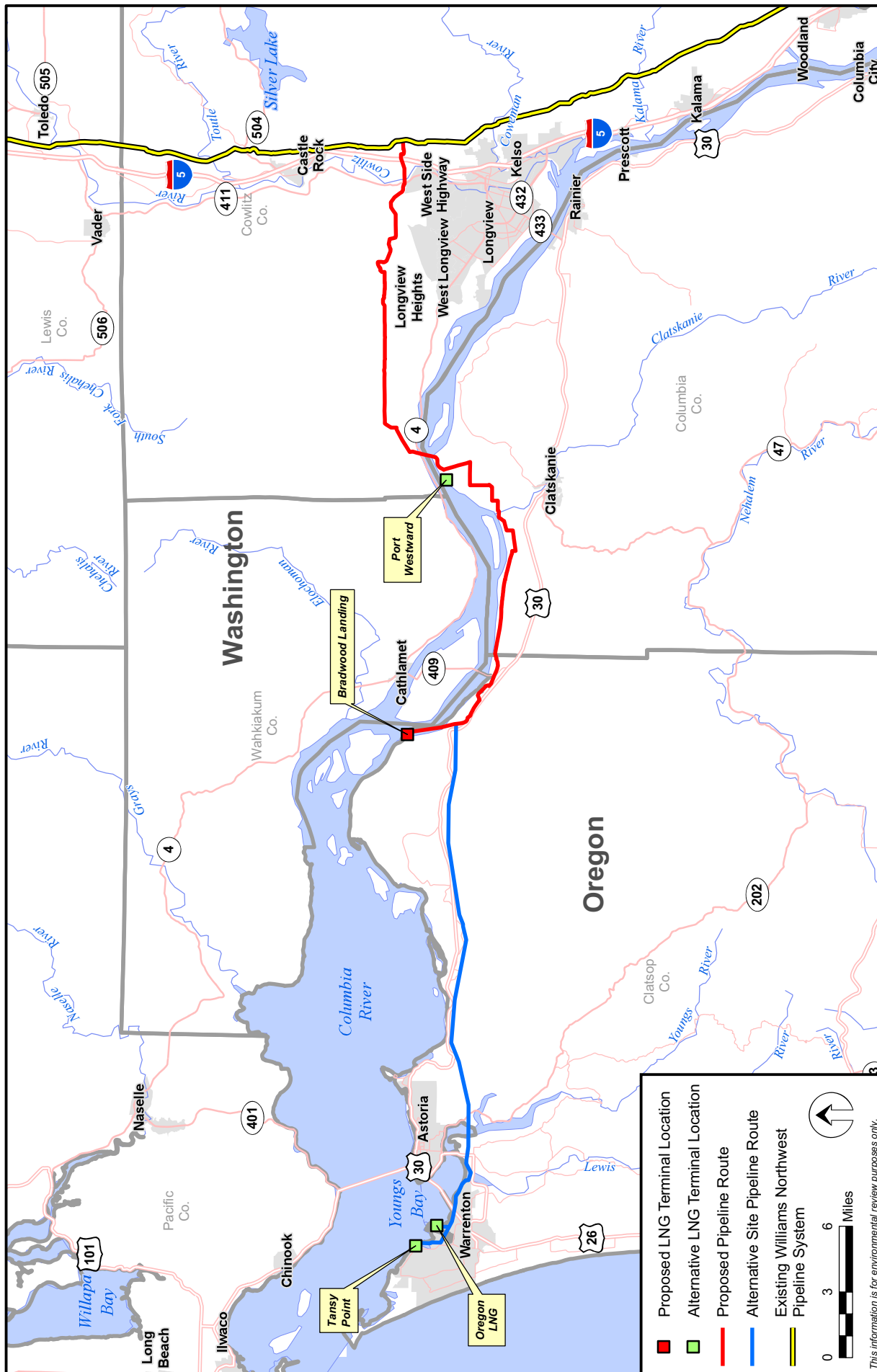
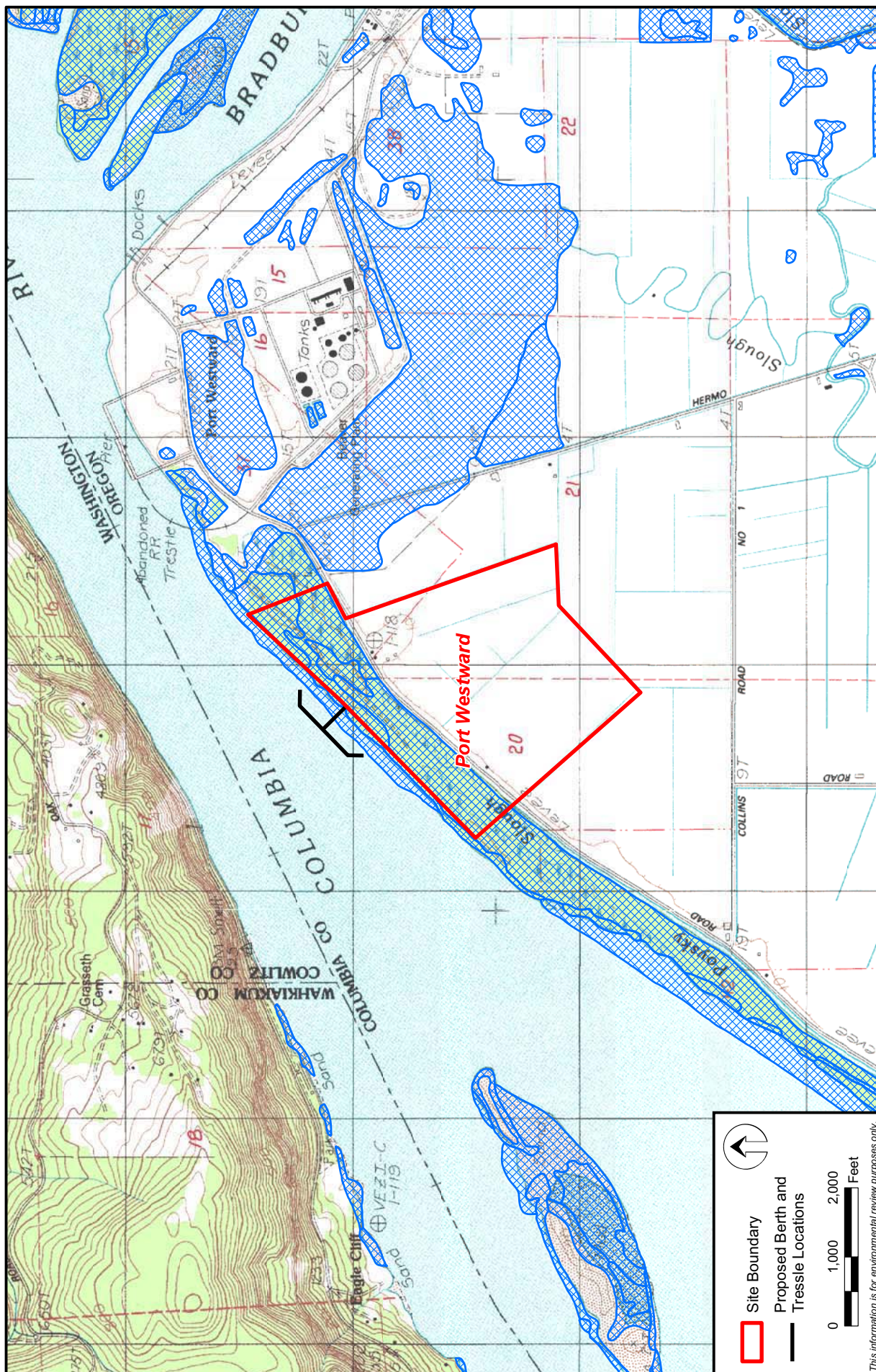


Figure 3.1.3-6
Bradwood Landing Project
 Tansy Point Alternative Sendout Pipeline Route



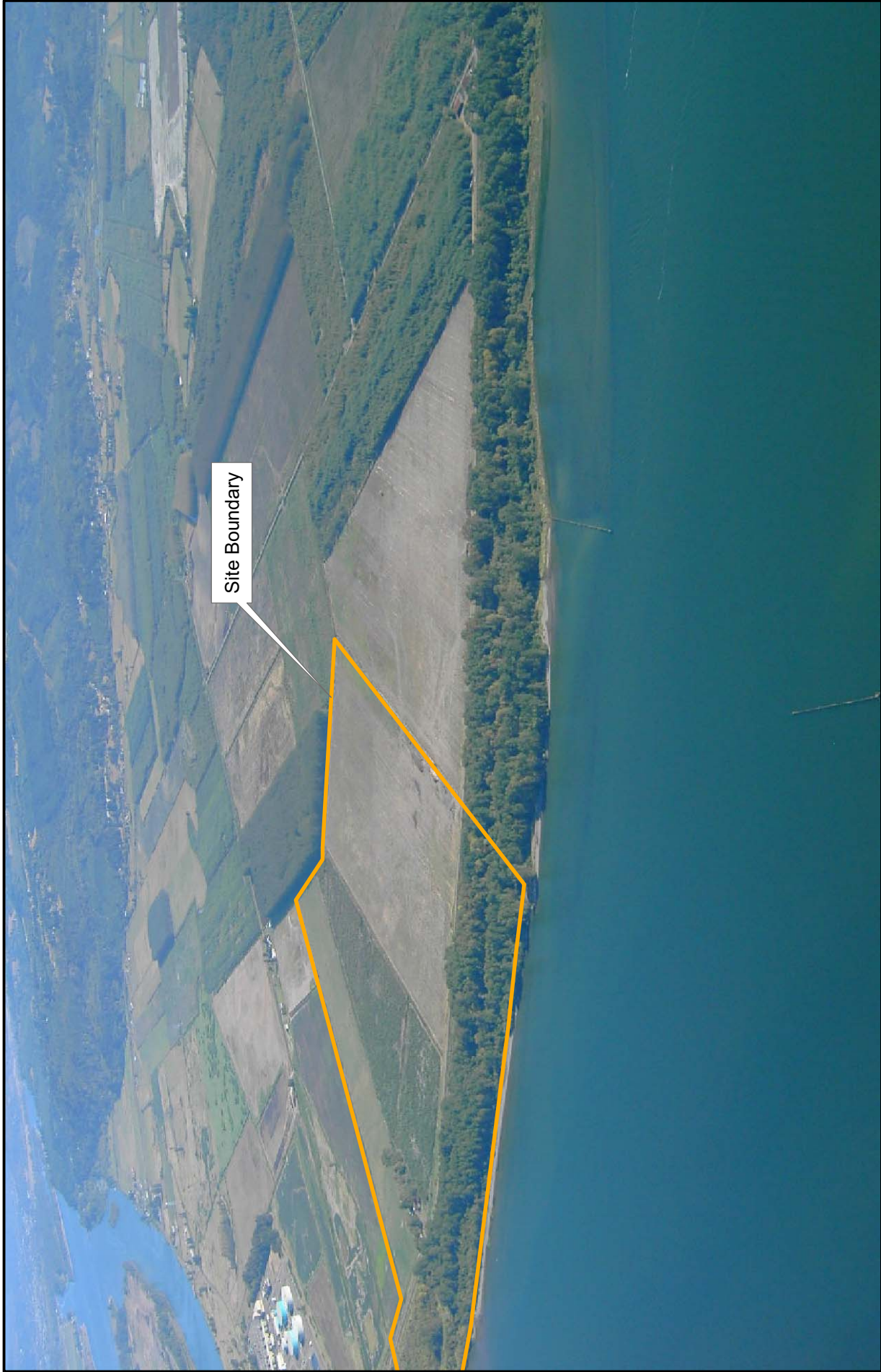


Figure 3.1.3-8
Bradwood Landing Project
Photograph of Port Westward Looking Southeast

The existing Beaver Power Plant, a natural gas and fuel oil fired facility operated by PGE, is located east of the proposed Port Westward LNG terminal site. PGE is currently constructing another power plant (fired by natural gas and coal) within the Port of St. Helens economic zone. Additional industrial facilities are planned for this area, including another new power plant and an ethanol production plant. An LNG terminal at the Port Westward site would have minor visual impacts, based on the relatively low population density of the surrounding area and the fact that the view has already been compromised by existing industrial infrastructure.

Power plants frequently use river water for cooling and discharge the warmed water back into the river, often with adverse impacts on aquatic resources. For example, there is a warm water discharge associated with operation of the Beaver Power Plant and the existing NPDES permit for this facility includes a schedule requiring PGE to conduct an evaluation and to implement controls to reduce effluent temperature. Further, water quality at this segment of the Columbia River is limited because of warm temperatures (ODEQ, 2004). “Waste heat” from one of the existing or planned power plants within the Port of St. Helens industrial zone could be a potential source of heat in a closed loop system to vaporize LNG for the proposed project. The use of waste heat could eliminate or reduce the need to burn natural gas in the LNG vaporization process. This would reduce air emissions and provide both environmental and economic benefits to the operation of the LNG terminal. It follows that the LNG terminal could also provide a source of “waste cold” that could be used to condense the steam used to produce electricity at one of the power plants. It is conceivable that an LNG terminal at this location could provide a source of cold water (or other liquid mixture) as part of a closed loop system between a power plant and the LNG vaporizers. The sharing of these processes could potentially provide environmental and economic benefits to both the LNG terminal and to the industrial facilities because it could eliminate or reduce air emissions associated with LNG vaporization at the LNG terminal and it could eliminate or reduce warm water discharges associated with the operation of the industrial facilities. A system similar to this is planned for Ingleside Energy Center LNG Project in Corpus Christi, Texas (see FERC Docket No. CP05-13-000). While environmental and economic advantages of such a system can be envisioned, conducting the technical design and commercial negotiations necessary to fully analyze the specific benefits and feasibility of a waste heat/cold system is outside the scope of this EIS.

NWI data indicates wetlands are present over the entire riverfront parcel, but no wetlands are present on the rest of the site. We assume the LNG terminal would be located back from the river with an extended pipe and trestle system to minimize impacts on wetlands and the slough. Assuming a 150-foot corridor for the pipe and trestle, 2.6 acres of wetlands would be permanently impacted, including 0.9 acre of forested/scrub-shrub wetlands, if the site was developed as an LNG import terminal. Without field wetland delineations, the extent of wetland impacts at this location is speculative, and the NWI data may underestimate potential wetland impacts at the Port Westward LNG terminal alternative site.

Using navigation charts with bathymetric data for the area, we estimate approximately 538,000 cubic yards of sediment would need to be dredged from the Columbia River bottom to create room for the ship berth and turning basin at Port Westward. Although this estimate is less than the volume that would be dredged at Bradwood Landing, a more detailed project-specific berth design and dredging plan would be required for Port Westward to allow for an accurate comparison of dredging between the two sites.

The Columbia River navigation channel up which the LNG marine traffic would have to transit some 54 miles is designated critical habitat and EFH for salmon. In addition to safety and security issues related to LNG marine traffic, the transit distance may increase the potential for impacts on aquatic and other resources. The wakes of LNG carriers may result in the stranding of juvenile fish at specific locations and contribute to river bank erosion (see sections 4.6.2.1 and 4.1.3.3, respectively). Port Westward is the only Columbia River LNG terminal alternative site located outside of the Oregon Coastal Zone.

The Port Westward site is located along the proposed Bradwood Landing pipeline route at about MP 18.0. The sendout pipeline would therefore follow the proposed route from the Port Westward site to the terminus north of Kelso, Washington for a total length of 18.3 miles. However, to achieve the project objective of interconnects at the Wauna Mill and Northwest Natural pipeline delivery points, a lateral pipeline to those locations would be necessary. This lateral would follow the same route as the proposed pipeline route for a total length of 14.3 miles. As such, the effective pipeline length for the Port Westward alternative would be 32.6. The lateral would be 24 inches in diameter to the Northwest Natural pipeline interconnect and then 4 inches in diameter to the Wauna Mill interconnect. For comparing impacts on wetlands we assume the construction right-of-way through wetland areas would be 75 feet for the 24-inch pipeline and 50 feet for the 4-inch pipeline. This compares to a construction right-of-way of 100 feet through wetlands for the proposed sendout pipeline and the sendout pipeline for the Tansy Point site alternative.

Because no NWI mapped wetlands are present along the proposed Bradwood Landing pipeline route between MPs 0.0 and 3.7, the same lineal feet of wetlands would be crossed by the Port Westward alternative pipeline as for the proposed sendout pipeline. However, because of the narrower construction right-of-way necessary for the smaller diameter pipeline, about 40 percent less wetlands would be impacted during construction. These impacts would be primarily temporary impacts as opposed to the impacts on the wetlands at the terminal site, which would be permanent. Six fewer waterbodies would be crossed by the Port Westward site alternative pipeline.

In summary, the Port Westward LNG terminal alternative would have some environmental advantages over the Bradwood Landing proposal. Port Westward would be located outside of the Oregon Coastal Zone, and upriver from the lower Columbia River estuary, which is considered critical habitat for some life stages of listed salmonids. It appears that somewhat less dredging would be necessary and fewer acres of wetlands would be impacted by construction of an LNG import terminal at Port Westward. The sendout pipeline from Port Westward would be slightly shorter than any of the other Columbia River LNG import terminal alternative sites. In addition, an LNG terminal at Port Westward could potentially take advantage of waste heat/waste cold exchanges with power plants within the Port of St. Helens economic zone.

However, there are also some disadvantages associated with the Port Westward location. First, the LNG marine traffic transit would be longer than for any of the other alternative sites along the lower Columbia River and 15 miles longer than for the proposed site. Second, it is unclear if the terms of the agreement between the Port of St. Helens and the Thompson family would allow for the economical construction and operation of an LNG marine berth on that property. Because of the longer LNG vessel transit and uncertainties over the lease agreement for the marine berth parcel, the Port Westward LNG terminal alternative is not significantly environmentally superior to the Bradwood Landing site.

3.1.4 LNG Terminal Alternatives Offshore of Oregon

Commentors have requested the study of offshore LNG terminal alternatives, in order to avoid many of the environmental issues and safety concerns associated with siting an LNG facility onshore. Offshore LNG import terminals located in federal waters fall under the jurisdiction of the MARAD and the Coast Guard (pursuant to the Deepwater Port Act of 1974, as amended by the Maritime Transportation Security Act of 2002).

This section presents a discussion of the available offshore LNG terminal technologies and strategies that were considered, presents an analysis of conditions on the Oregon coast and a comparison of conditions elsewhere, and provides the results of the quantitative analysis that was completed to

evaluate potential offshore alternatives, including a detailed evaluation of a hypothetical offshore alternative.

3.1.4.1 Offshore LNG Terminal Technologies and Strategies

Companies that have proposed to construct and operate offshore LNG import terminals have advanced various technologies and strategies for platform construction, LNG carrier mooring, LNG transfer and storage, vaporization, and sendout (LNG Express, 2003). These technologies/strategies include:

- offshore docking/onshore storage;
- fixed offshore terminals (GBS or platforms);
- transport/regasification vessels; or
- FSRUs.

The technologies evaluated for comparison with the proposed project are based on an analysis of weather conditions off the Oregon coast and basic system requirements for safely and efficiently offloading LNG. A discussion of conditions in Oregon, system requirements, and the technologies considered is included below.

Weather and Sea State

The weather in the Pacific Northwest is typical of a coastline along the eastern edge of a major ocean basin (ABSG, 2006). Weather patterns are controlled by the marine environment and modified by the boundary between land and sea. Winds along the coast are predominantly out of the south through westerly directions with associated ocean swell originating far offshore that frequently creates a high sea and quite long wave period.

An examination of data collected by National Data Buoy Center Buoy 6029 was completed to understand the feasibility of an offshore LNG receiving installation in Oregon. The data buoy is a 3-meter discus buoy that is owned and maintained by the National Data Buoy Center and located at 46°8'38" N, 124°30'42" W at the Columbia River Bar. The average, median, minimum and maximum values of the collected data are presented in table 3.1.4-1.

TABLE 3.1.4-1				
Data Collected by the National Data Buoy Center – Buoy 6029				
Data Category	Average	Median	Minimum	Maximum
Sustained Wind Speed (mph)	15.0	13.4	0.0	51.5
Gusting Speeds (mph)	19.0	17.9	0.0	67.1
Wave Height (feet)	9.8	8.5	2.6	43.6

Offshore marine terminal operations are not sustainable due to the extreme conditions experienced by the data buoy at the bar. For this data period, sustained winds were in excess of 20 miles per hour for over 27 percent of the readings. For an offshore installation engaged in the offloading of LNG, 20 mile per hour winds would present an operational metric valuable in illustrating the ability of an LNG carrier to operate safely in an unprotected marine environment. In addition, data indicates for the examined period that winds were in excess of 20 miles per hour for over 10 percent of the readings. Although it is recognized that the later part of the data collection period was characterized by seasonal adverse weather, the marginal terminal availability resultant from 27 percent availability (based on 20 mile per hour sustained wind limitation for offshore terminal/carrier operations) in addition to wave

heights greater than 20 feet over 10 percent of the time do not support safe marine operations to the extent that such an offshore terminal would be reliable and economically viable. Therefore, we conclude that offshore marine terminal operations are not preferable from an operational reliability standpoint and might not even be feasible.

The Pacific Ocean off the coast of Oregon is subject to rough weather and high sea states. The coastline in this area provides no islands, reefs, or prominent headlands for protection from rough seas or adverse weather (ABSG, 2006). The following information provides a comparison of conditions in Oregon with conditions for an existing location that has developed LNG infrastructure offshore (GOMEX) in the Gulf of Mexico and one proposed location in Massachusetts.

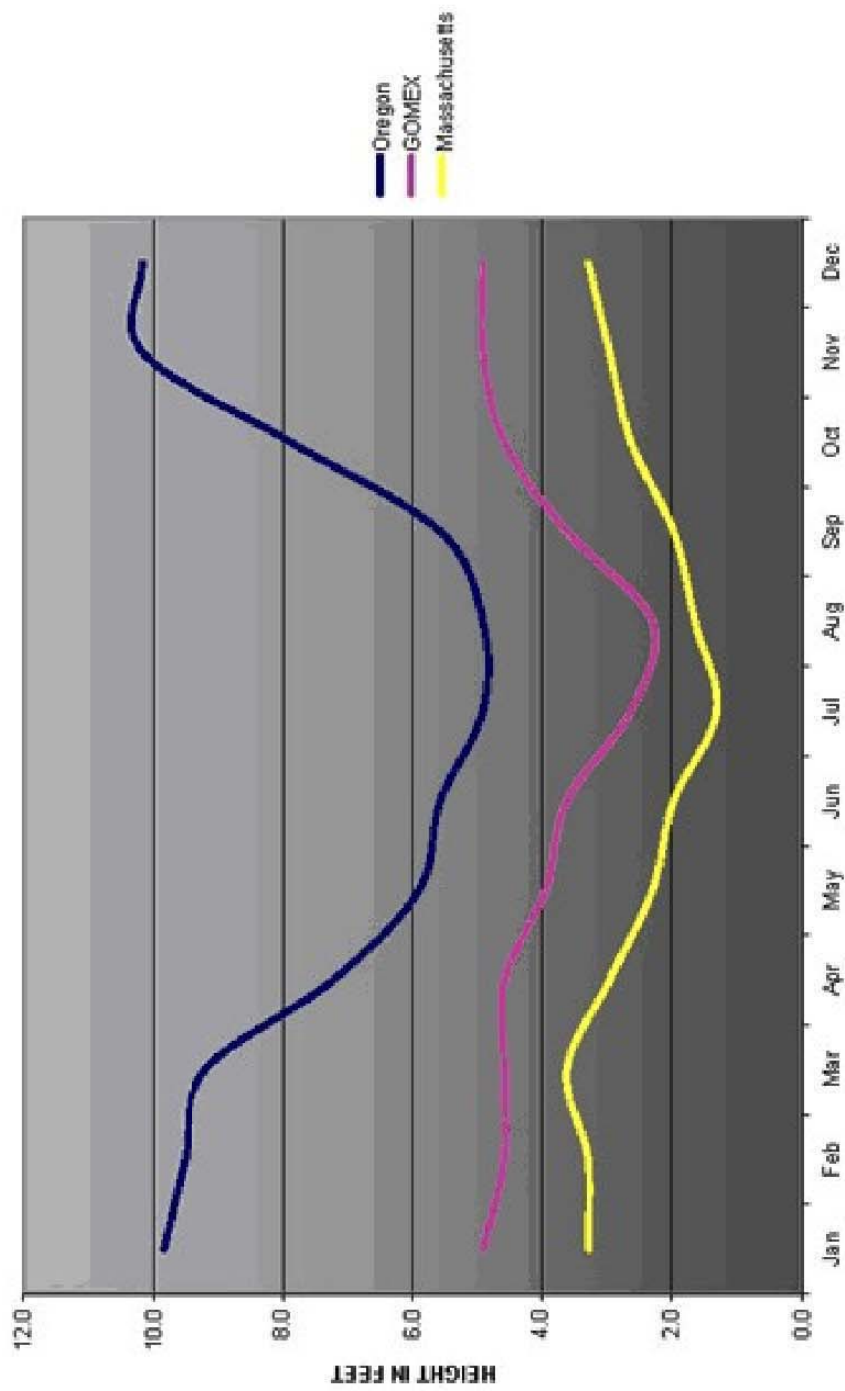
Wave height must be considered with the wave period to determine likely movements and associated forces such movements generate for a moored ship. Shorter wave periods are more manageable in terms of mooring design as they generally cause a larger ship to not respond with surge (forward and backward movement) as when longer wave periods exist. Figure 3.1.4-1 illustrates the comparison in recorded weather data for average wave height (ABSG, 2006).

The average sea condition for wave height offshore Oregon is between 5 and 10 feet (ABSG, 2006). Figure 3.1.4-2 provides a comparison of the average wave period for Oregon, Massachusetts, and the Gulf of Mexico. As figures 3.1.4-1 and 3.1.4-2 indicate, conditions are less favorable for an LNG import terminal off the Oregon coast compared to the other regions.

Offshore Terminal System Requirements

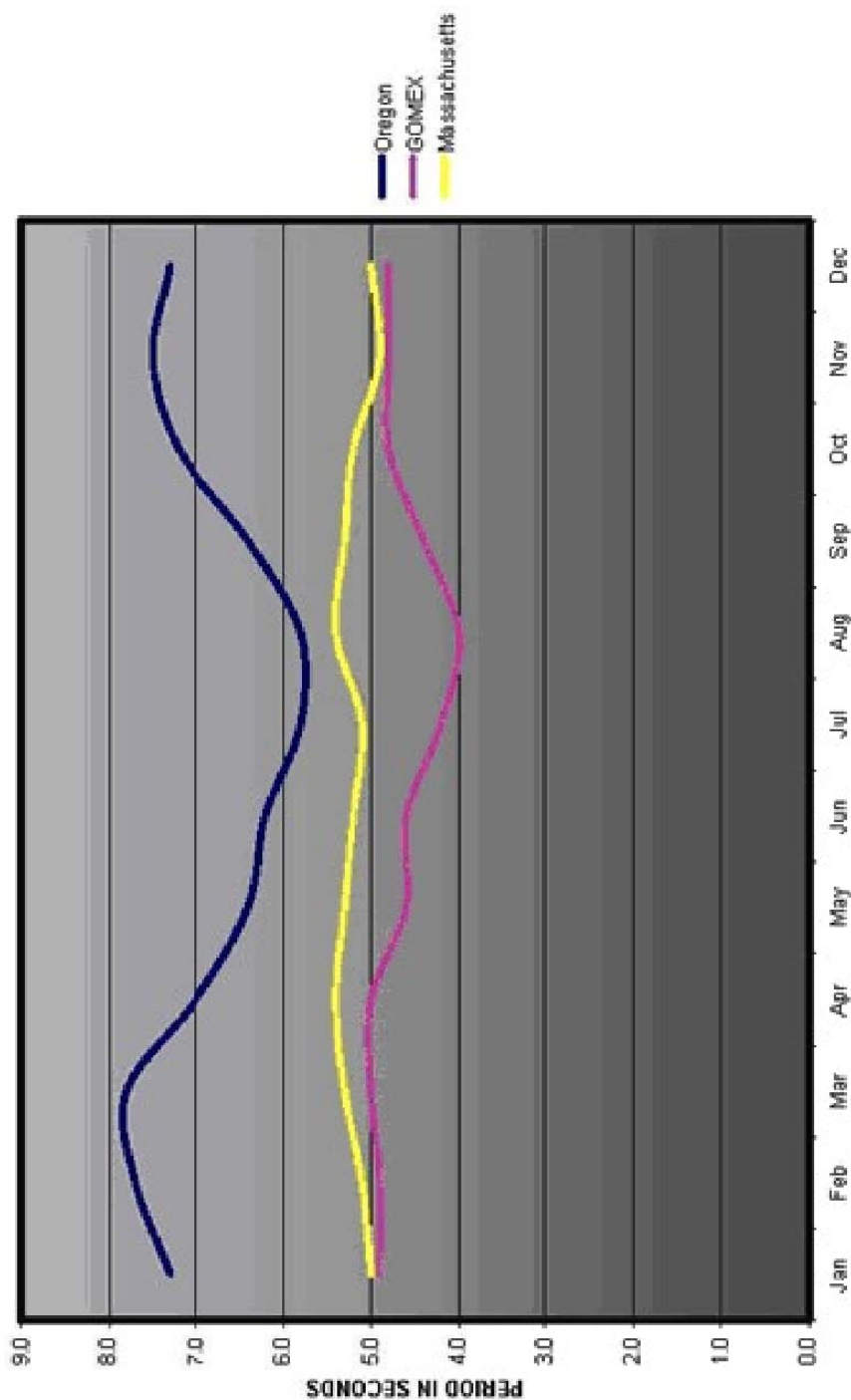
Success of an LNG facility offshore is dependent on the ability to transfer LNG from ship to facility without interruption once the LNG carrier is connected and is highly contingent on sea states encountered throughout the year (ABSG, 2006). Rough seas cause unfavorable ship motions, which can cause a ship to range against the mooring system and exceed limitations on piping systems and mooring lines, cause mass movement in the cargo tanks during discharge that could exceed the design load limitations for the containment system, and exceed design limits for operation of a regasification plant (if one is fitted to the ship).

LNG operations are more sensitive to sea conditions because of the specialized requirements for handling a very low temperature liquid (ABSG, 2006). LNG carriers do not normally have the capacity to discharge LNG as a gas. They normally pump liquid at about -263 °F to a facility that then regasifies the liquid for send-out. If a regasification plant is installed on the deck of an LNG carrier, cargo capacity of the LNG carrier is substantially reduced due to the weight of the equipment. Also, due to inherent space limitations on board the LNG carrier, regasification rates are considerably less than would normally be provided for a shore facility. (0.4 versus 1.5 Bcfd). Piping systems for unloading LNG must also be specially designed for extremely low temperatures and must have constrained movement envelopes to prevent oversteering and rupture. When LNG carriers discharge their cargo, the period during which the level of LNG inside the ship's LNG containment tanks is less than 70 percent and greater than 10 percent is critical. During this time, vessel movement (roll, pitch, and surge) causes waves of LNG within the tank. This is called "sloshing" and can seriously affect the tank containment system and must be avoided. For this reason, discharge must be completed within available windows of good weather and calm sea states. Finally, there are as yet no flexible lines that can be used for LNG transfer at sea. Too much movement will exceed limitations on the piping systems and mooring lines.



This information is for environmental review purposes only.

Figure 3.1.4-1
Bradwood Landing Project
 Average Significant Wave Height



This information is for environmental review purposes only.

Figure 3.1.4-2
Bradwood Landing Project
 Average Wave Period

Technologies Considered

Offshore Docking/Onshore Storage

Where deepwater access to a coastal port or harbor is unavailable, LNG can be transported to onshore storage tanks from ships using specially designed cryogenic pipelines. Such facilities enable LNG carriers to berth and transfer their LNG cargo to the cryogenic pipeline at docking facilities in offshore areas where natural water depths exceed 40 feet. Although feasible, a number of technical factors related to transporting LNG in a pipeline place limits on the practical maximum length of such a pipeline. This approach has been used at the existing Cove Point LNG terminal where the ship docking/unloading platform is located in the Chesapeake Bay about 1 mile from the shoreline. Similar facilities have been proposed for the Irving Oil LNG site in New Brunswick, Canada, and the Keltic Petrochemicals LNG and Bear Head LNG facilities in Nova Scotia, Canada. No such facility has been proposed for the West Coast.

While it would be possible to transfer LNG to shore through a cryogenic pipeline from an offshore docking structure, such a design would still require locating LNG storage tanks and process facilities at an onshore location, therefore resulting in similar environmental impacts as an onshore LNG import terminal, in addition to the disadvantages associated with an offshore docking structure and pipeline. Because of severe winter weather conditions and significant wave heights along the Oregon and Washington coasts (ABSG Consulting Inc. (ABSG), 2006), we did not identify a site where the use of this approach appeared practical for this project.

Fixed Offshore Terminals

There are basically two different types of fixed structures that can be used as an offshore LNG import terminal, either a GBS located directly on the seafloor or a pile-based platform. A GBS would contain LNG storage tanks and vaporizers on a platform with foundations directly on the seafloor. LNG could be offloaded from conventional LNG carriers, placed in the storage tanks within the GBS, and then vaporized for delivery as natural gas to the onshore market via an undersea pipeline. A GBS is only feasible in areas of relatively shallow water, where depths range between 45 and 100 feet. Given the costs associated with constructing and operating a GBS, it appears that these facilities are economical for projects with relatively large LNG storage (e.g., 250,000 to 330,000 m³) and large natural gas sendout volumes (e.g., 800 to 2,000 MMcfd). Another limitation would be the articulation of the unloading arms between the GBS and a docked LNG carrier, whose movement would be affected by high winds and large waves.

Chevron received approval from the Coast Guard to build an LNG import terminal in the Gulf of Mexico (the Port Pelican Project) using a GBS, but has formally put the project on hold indefinitely and license rescission is expected. The recently abandoned Terminal GNL Mar Adentro de Baja proposed by Chevron as an LNG terminal off the western coast of Baja, Mexico also would have used a GBS at a depth of about 65 feet.

Another strategy using a fixed offshore terminal involves constructing offshore platforms on piles or converting existing offshore platforms to LNG use. Such fixed-tower structures, could be located in deeper water than a GBS. The platforms could be fitted with docking, unloading, storage, and vaporization equipment. As with a GBS, LNG could be unloaded from a conventional LNG carrier, vaporized at the platform, and sent as natural gas to the onshore market via an undersea pipeline. A fixed platform would have limited space for LNG storage, and would need calm seas or protection from the elements (such as being located on the lee side of an island) to allow for safe LNG carrier docking.

Depending on the specific design, offshore platforms may or may not include LNG storage facilities. The Clearwater Port proposed by NorthernStar Natural Gas, Inc. would retrofit an existing offshore platform off the coast of Ventura County, California as an LNG import terminal, but would not have any LNG storage on the platform, and instead would use underground gas storage onshore to compensate for irregular deliveries of gas (LNG Express, 2005).

Transport/Regasification Vessels

Several companies have proposed the installation of vaporization equipment on conventional LNG carrier ships, which would be called transport and regasification vessels. These ships would be able to dock at a floating unloading buoy and riser system where LNG could be vaporized onboard the LNG carrier and injected directly into offshore pipelines that interconnect with onshore natural gas transmission systems. The vaporization equipment located on the ships would use technology that is similar to land-based LNG terminals.

Because LNG is vaporized on board the LNG carrier, this approach eliminates the need for fixed LNG storage. Some of the tradeoffs of this approach are that it requires a dedicated LNG fleet with vaporization equipment on all of the vessels. Additionally, it takes 6 to 10 days to unload a ship at a maximum design rate of about 0.5 Bcfd.

In March 2005, the first project using this strategy began operation, and is the only existing offshore LNG import terminal of any type in North America. Excelsite's Gulf Gateway Deepwater Port includes a submerged turret loading system and about 8 miles of 20-inch-diameter pipeline that connects to two existing subsea pipelines located about 116 miles south of Cameron, Louisiana (LNG Express, 2002 and 2003). Excelsite ordered three LNG carriers to be constructed to include onboard vaporization equipment. One of these ships is now in service and is delivering natural gas to the United States. Excelsite has indicated that it is exploring the installation of another offshore buoy and regasification vessel system to serve offshore northern California, known as the Pacific Gateway Project (see section 3.1.3.3).

As described above in section 3.1.3.3, Woodside has proposed a project using a similar technology at an offshore location 22 miles southwest of Los Angeles, California. The Ocean Way LNG Terminal Project would consist of a ship mooring facility with a flexible connection to an underwater natural gas pipeline that would come onshore at the Los Angeles International Airport and connect to the Southern California Gas Company delivery network (CEC, 2007b).

Floating, Storage, and Regasification Units

FSRUs are another approach being considered for importing LNG into the United States from offshore terminals. In essence, an FSRU would be an oversized LNG carrier vessel that is outfitted with LNG vaporizers and docking/unloading equipment. The FSRU would be up to 1,200 feet long, 180 to 215 feet wide, and would be able to store between 250,000 and 350,000 m³ of LNG; over twice the capacity of typical LNG carriers that are currently available. These units would be anchored offshore of the proposed market area where conventional LNG carriers could dock next to and unload LNG to the FSRU. After the LNG is unloaded, it could be vaporized and the natural gas could be transported to onshore markets through an undersea pipeline. Depending on the vaporizers and the size of the pipeline, these units could have a natural gas sendout capacity ranging from 700 to 1,500 MMcfd. BHP Billiton's Cabrillo Port Project, to be located about 14 miles off the southern California Coast, proposes to use an FSRU. The Moss-Marine LNG terminal proposed off the coast of Baja, California would also use an FSRU, as would the Broadwater LNG Project proposed for the Long Island Sound between Connecticut and New York (see FERC Docket No. CP06-54-000, et al.).

3.1.4.2 Application of Offshore Technologies to the Proposed Project

Relative to conditions in Oregon, NorthernStar evaluated four offshore technologies (GBS, fixed platform, transport/regasification vessels, and FSRU) to determine if they were viable alternatives to the Bradwood Landing Project and could meet the project objectives as stated in section 1.1. These technologies were compared to the proposed project and evaluated relative to existing offshore conditions near Astoria, Oregon. This analysis was based to a large degree on a study performed by ABSG (ABSG, 2006). The four offshore technologies are summarized and compared to the proposed onshore project in table 3.1.4-2 and are discussed in greater detail below.

TABLE 3.1.4-2 Assessment and Comparison of Offshore Technology to the Proposed Project					
	GBS	Fixed Platform	Transport/Regasification Vessels	FSRU	Proposed Project
Performance in rough seas/weather	Poor	Poor	Good	Poor	NA
Terminal Cost (\$ billion) ^a	1.8	1.3	2.5 ^b	1.3	0.7
Pipeline Cost (\$ billion) ^a	0.3	0.3	0.3	0.3	0.1
Environmental Impacts Terminal	Low	Low	Low	Low	Low
Environmental Impacts Pipeline	Medium	Medium	Medium	Medium	Low
^a Assumes a natural gas sendout capacity of 1.5 Bcfd. ^b Cost includes purchase of specialized LNG transport and regasification vessels as well as a mooring/unloading system. NA Not Applicable					

The Pacific Ocean off the coast of Oregon is subject to rough weather and high sea states. ABSG compared three wave characteristics (i.e., maximum significant wave heights, average significant wave heights, and average wave periods) for Oregon, the Gulf of Mexico, and Massachusetts. Relative to all three of these wave characteristics, conditions are less favorable for an LNG import terminal off the Oregon coast compared to the other regions. The coastline in this area provides no islands, reefs, or prominent headlands for protection from rough seas or adverse weather (ABSG, 2006).

Of the four offshore technologies evaluated, the transport/regasification vessel alternative (Excelerate's Energy Bridge technology) is the only one that would not be affected by rough sea conditions. For the other three technologies, LNG carriers would be able to unload only during calm sea conditions, thus leading to substantial operational limitations. While transport/regasification vessels would perform well in rough seas and weather, they generally have lower regasification rates (e.g., 0.5 Bcfd), require specially modified ships, and have no storage capabilities. This alternative would be the most expensive offshore option (assuming four buoys and eight ships to provide a comparable capacity and uninterrupted supply), and it would be nearly four times the cost of the proposed onshore terminal. The other offshore terminal alternatives would cost at least twice as much as the proposed onshore terminal.

Locating an LNG terminal on an offshore fixed platform may have impacts on the ocean bottom and affect aquatic habitat. A GBS would need to be constructed onshore and then towed out to sea. The onshore graving dock¹ facility for constructing the GBS would have associated environmental impacts

¹ A graving dock consists of an excavated area adjacent to a deepwater channel that is used to fabricate the GBS. When the GBS is complete, the graving dock is flooded, allowing the GBS to float and be moved into the adjacent channel, from which it can then be towed to the offshore LNG terminal location.

that the other offshore technologies would not have. These might include impacts on terrestrial wetlands, wildlife and vegetation, and cultural resources.

The kind of vaporizers used at an offshore LNG terminal would influence the kind of impacts the facility may have on the aquatic environment. For example, ORVs that use seawater may entrap or entrain small aquatic species and ichthyoplankton during intake. Further, once the water is run through the ORVs, it would be cooled, with the discharge changing sea temperature and perhaps impacting marine life and water quality. ORVs were proposed for the Port Pelican and Gulf Landing offshore LNG terminal projects in the Gulf of Mexico. However, neither of these projects is moving forward; as indicated above, the Port Pelican Project has been put on hold indefinitely, and Shell recently announced it was discontinuing plans for the Gulf Landing terminal off the shore of Louisiana (Reuters, 2007).

To further evaluate the feasibility of an offshore alternative, NorthernStar completed an evaluation of a hypothetical offshore facility. The location chosen for the offshore LNG terminal alternative is a point southwest of the mouth of the Columbia River, 10 miles offshore of Clatsop Plains, Oregon (see figure 3.1.4-3). NorthernStar selected this offshore alternative location after considering the most feasible route for an undersea pipeline to connect to onshore facilities. Water depths at the offshore terminal alternative location would be about 250 feet. This site could accommodate most offshore LNG terminal technologies, but not a GBS, which would need to be located in more shallow water. In order for a GBS to be used for an offshore LNG import terminal alternative, it would have to be within 2 miles of the Oregon shore.

Assuming the use of NorthernStar's hypothetical offshore LNG import terminal alternative location, the corresponding sendout pipeline would cross beneath the sea for 10 miles to shore. It would then have to continue as an underground pipeline onshore heading eastward for at least 40 additional miles, compared to the proposed project, to reach the existing interstate pipeline system of Williams Northwest. Such a pipeline would require a compressor station along the route and would cost more than twice as much as the proposed sendout pipeline for the Bradwood Landing Project. Environmental impacts associated with the offshore portion of the pipeline route would be most likely to occur during construction and could include:

- direct disturbance of the seafloor and associated habitats;
- increased turbidity and sedimentation affecting water quality and marine biota;
- disturbance of sensitive marine mammals, birds, and fish;
- disruptions to shipping, fishing, and recreational activities;
- air emissions from construction equipment; and
- disturbance of archaeological resources.

The types of environmental impacts associated with the onshore portion of the sendout pipeline for an offshore LNG terminal alternative would be similar to those associated with the pipeline for the proposed project. However, the impacts would be roughly twice as great due to the greater length.

An offshore LNG import terminal alternative would avoid some of the environmental impacts of the proposed Bradwood Landing Project, such as effects associated LNG marine traffic up the Columbia River, critical salmon habitat in the river, nearby population and visual effects, and impacts on terrestrial resources, including wetlands. However, based on our review of the analysis conducted by ABSG and NorthernStar, we do not consider an LNG terminal off the coast of Oregon to be a viable alternative to the proposed project because of the rough sea and weather conditions and the additional environmental impacts associated with the longer sendout pipeline.

3.1.5 Regional LNG Import Terminal Site Alternatives

The examination of alternative sites for an LNG import terminal involved a comprehensive process that considered environmental, engineering, economic, safety, and regulatory factors within a regional context. The first step included determining the most suitable area for an LNG terminal based on the stated purpose of the project of providing natural gas to customers in the Pacific Northwest. That limited the search for alternative sites to areas of Washington and Oregon that would be accessible for LNG marine traffic. The second step included the identification of ports within this region that would be capable of accommodating LNG carriers. The third step evaluated specific locations at qualified ports that had proper zoning and land necessary to support LNG carrier docking, storage, and regasification facilities of an onshore import terminal. As discussed above in section 3.1.4, offshore alternatives do not currently appear economically, technically, or environmentally feasible or reasonable in the Pacific Northwest. As such, only onshore terminal site alternatives were considered in more detail, below.

3.1.5.1 Regional Review

As discussed in section 1.1, there is a growing demand for natural gas in the Pacific Northwest. We considered alternative LNG terminal sites along the coast of Washington and Oregon that would be accessible to LNG carriers and within a reasonable distance of an interstate pipeline system.

3.1.5.2 Port Area/Waterway Review

Ships that are presently used to transport LNG typically have capacities of up to 154,000 m³. The larger ships are from 950 to 1,000 feet long with typical drafts up to 39 feet. To ensure that the LNG carriers do not easily or frequently run aground, up to an additional 2 feet of water is desirable under the keel. This means that LNG carriers will typically only access areas with depths of at least 40 feet. Although dredging in shallow water areas could provide access for LNG carriers, the dredging required in undeveloped ports or areas without deepwater channel access would be cost prohibitive and would most likely result in significant environmental impacts. Consequently, our analysis of alternative LNG terminal sites was limited to existing deepwater coastal ports that could readily accommodate LNG carriers without dredging or without significantly more dredging than would be required for use of the proposed site. We identified Puget Sound (Washington), Grays Harbor (Washington), Coos Bay (Oregon), and the Columbia River (Washington/Oregon) as appropriate areas for an LNG import terminal. Coos Bay was previously discussed in section 3.1.3.4 under the proposed Jordan Cove Energy Project alternative.

3.1.5.3 Site Review

In addition to providing reasonable access to the Pacific Northwest market from sites with depths that would allow LNG carrier access, coastal port areas or waterways were evaluated for the availability of sites suitable for developing an LNG terminal. To narrow the range and fully evaluate project alternatives, we developed criteria to assist in identifying and comparing specific sites for consideration as LNG terminal alternatives. The review process included the examination of required and favorable review criteria.

Required criteria included regulatory specifications regarding LNG facility layout and safety siting factors that are required to be met for the project to be feasible. If not met, the required criteria served to exclude a site from further consideration. Required criteria included:

- **Thermal Exclusion/Vapor Dispersion Zone** (49 CFR 193.2057 and 193.2059) – Thermal exclusion and vapor dispersion zones must be established in accordance with

NFPA 59A. Based on the proposed project design, we have assumed a representative exclusion zone with a radius of 1,000 feet from the center of the LNG storage tank.

- **Airports** (49 CFR 193.2155(b)) – LNG storage tanks must not be located within a horizontal distance of 1 mile from the ends of a runway, or 0.25 mile from the nearest point of a runway, whichever is longer. The height of LNG structures in the vicinity of an airport must also comply with Federal Aviation Administration requirements.
- **LNG Waterfront Handling Requirements** (33 CFR 127.105) – Waterfront facilities where LNG is handled must comply with Coast Guard regulations pertaining to layout and spacing of the marine transfer area. These regulations require that each LNG loading flange be located at least 985 feet from general public or railway bridges crossing navigable waterways or entrances to any tunnel under navigable waterways.

We evaluated alternative LNG terminal sites to determine if environmentally preferable alternatives to the proposed site exist. Favorable review criteria, although not absolute alternative requirements, were applied to identify those sites that would be reasonable and most likely to provide some environmental advantage over the proposed project. For example, criteria were identified that would specifically improve upon some aspects of the Bradwood Landing Project such as those associated with impacts on aquatic resources. Favorable criteria were not intended to strictly eliminate the evaluation of certain sites. Some sites were selected for further analysis because they satisfied a majority, but not all, of the favorable criteria. Given the limited availability of suitable sized parcels in areas with deepwater access, it was not possible to locate an alternative that met all of the favorable review criteria. Favorable criteria included:

- **Population Centers/Residences** – We made an effort to identify alternative LNG terminal sites in areas that are not in close proximity to population centers and/or residences. Similarly, alternative LNG terminal sites were considered preferable if the location did not require LNG carriers to transit near residentially and commercially developed shorelines. In addition to avoiding potential conflicts with existing land uses, application of this favorable criterion would ideally avoid conflicts regarding perceived safety issues related to transport and storage of LNG.
- **LNG Terminal Footprint** – Based on the proposed design and the need to contain the thermal exclusion zone, a waterfront site of about 45 acres (the size of the proposed terminal site) would be preferred to accommodate the proposed configuration of the LNG unloading, storage, and sendout facilities. An ideal waterfront site available for development would include an area in excess of the exclusion zone that would provide an additional buffer from development.
- **Dredging Required** – Given the environmental impacts associated with significant dredging projects, we considered the amount of dredging necessary to provide access to LNG carrier access one of the alternative site review criteria. Areas requiring minimal dredging to develop and maintain a ship berth and a shipping channel of sufficient depth for the LNG carriers were considered more favorable than those areas requiring more substantial dredging. In addition to avoiding impacts on water quality and aquatic resources, minimal dredging requirements provide the added benefit of reducing costs associated with disposal of dredged material.
- **Parcel Availability** – One of the greatest challenges of siting an LNG facility is finding suitable property that is available for industrial development. Availability is critical since

section 3 of the NGA does not provide the project proponent the authority of eminent domain in acquiring property for the LNG terminal project facilities. In some cases, a site may possess the size required for an LNG terminal but the owner is unwilling to sell or has placed unacceptable conditions on the acquisition of the site.

- **Existing Land Use** – Areas previously disturbed or cleared for industrial or commercial activities were preferred over undisturbed areas (greenfield sites) when identifying alternative LNG terminal sites. Additionally, we preferred sites where existing land use zoning, coastal zone management guidelines, or development plans were consistent with an LNG import terminal. For example, although we considered all areas with deepwater access, areas outside of designated ports were generally determined to be less preferable than areas within designated ports. Those sites in areas consistent with existing land uses were considered the most practical alternatives to the proposed site.
- **Sendout Pipeline Factors** – We considered sites proximal to existing interstate pipeline systems that could accommodate the proposed volume throughput more favorably than sites farther from existing pipelines. In addition, we favored pipeline routes that would cross fewer waterbodies and impact less wetlands. On top of the additional costs and environmental impacts, longer pipelines would likely directly and indirectly affect more landowners/residences.
- **Navigational Suitability** – Sites that offer minimal disturbances to existing shipping and allow for good access by LNG carriers were considered a favorable selection criterion. We also considered bridge transit along the navigation channel in our site analysis, since LNG carriers require a vertical clearance of at least 135 feet and horizontal clearance of not less than 165 feet.
- **Various Environmental Factors** – Environmental factors that were considered in our site selection included: minimizing wetland disturbance and preferring sites in uplands; avoiding areas that would conflict with recreational activities; and selecting sites where the LNG storage tank would have a minimal impact on the viewshed from roadways and surrounding communities.
- **Special Interest Areas** – We considered favorably those sites that avoided conflicts with special interest areas such as state or national parks and marine sanctuaries. When applying this criterion, we considered potential conflicts with special interest areas from either an LNG terminal or its associated sendout pipeline.

The sites discussed below include reasonable alternatives to the terminal location proposed by NorthernStar. We have also included a discussion of alternative LNG terminal sites that were brought up during project scoping. Figure 3.1.5-1 depicts the locations of these sites.

Puget Sound Area

During the public scoping process, we received comments that the Puget Sound area would be more suitable for an LNG import terminal than the Columbia River. We considered two locations along Puget Sound - Cherry Point and Port Angeles. As described below, both locations were eliminated before specific sites were identified.

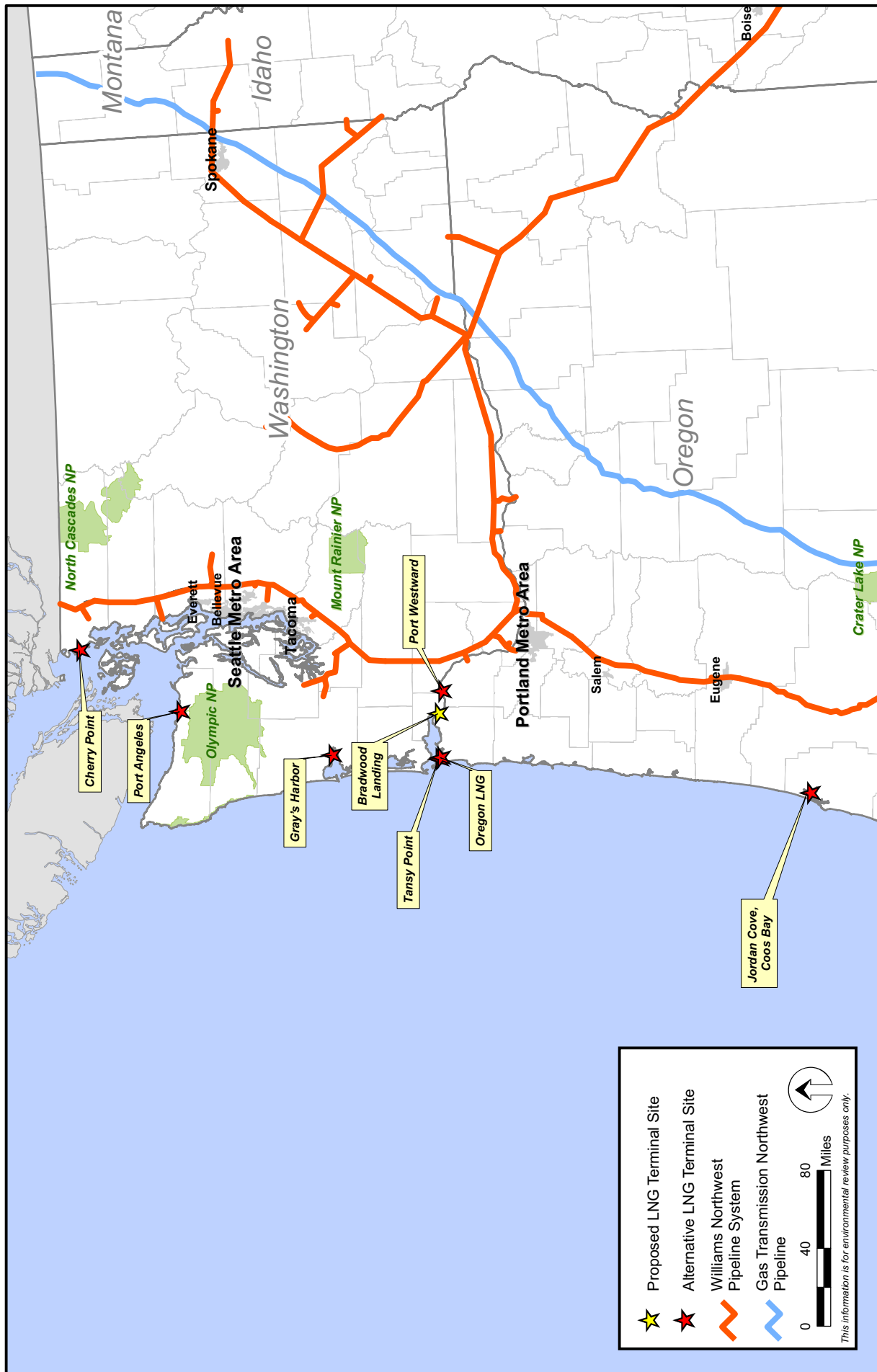


Figure 3.1.5-1
Bradwood Landing Project
 LNG Import Terminal Alternatives in Washington and Oregon

Cherry Point

The Cherry Point Urban Growth Area (UGA) extends along the coast of Georgia Strait from just south of Birch Bay State Park to the northern boundary of the Lummi Reservation in Whatcom County, Washington. The County has designated the Cherry Point UGA for industrial development and it is currently the site of two oil refineries and an aluminum smelter. A proposed 1,100-acre bulk commodities shipping port is also planned for the Cherry Point UGA. Approximately 1,800 acres (the equivalent of two sites with piers) remain for additional major industrial development with deepwater shipping access (Whatcom County, 2005). The Williams Northwest pipeline could be accessed approximately 18 miles east of the Cherry Point industrial area.

According to a recent newspaper article in the Bellingham Herald (Bellingham, 2007), the Lummi Nation, in partnership with Mercator Energy LLC, has been exploring the possibility of locating an LNG import terminal at Cherry Point since 2003. The Lummi Reservation is located adjacent and south of the Cherry Point UGA; however, the newspaper article indicated that new land would be acquired by the tribe for the terminal and would then be converted to tribal trust land. At this time the project is considered dormant by the tribe, because property for the proposed terminal has not yet been acquired.

At first glance, the Cherry Point location appears to be suitable for an LNG import terminal; however, the Washington Commissioner of Public Lands signed a Withdrawal Order creating the Cherry Point State Aquatic Reserve (CPSAR) on August 1, 2000. The land was set aside to protect various aquatic resources, including the declining stocks of Pacific herring in the area as well as the local crab fishery and migratory habitats for waterbirds and marine mammals. The CPSAR extends from the southern boundary of Birch Bay State Park along the coast to the northern boundary of the Lummi Reservation (roughly protecting the area from 0 MLLW to -70 MLLW).

The development of a specific management plan by the Washington State Department of Natural Resources (WDNR) for the CPSAR will not likely be finalized until late 2007 or early 2008. Interim guidelines for managing the CPSAR prohibit the development of any new in-water structures within the CPSAR (e.g., dock or pier construction). According to the WDNR, interim development restrictions for this aquatic reserve are consistent with Whatcom County's Shoreline Management Plan, which also prohibits development of new docks or piers in this area. Because of the restrictions on development associated with the CPSAR, the Cherry Point location was eliminated from further consideration for an LNG terminal site alternative.

Port Angeles

Port Angeles is a small city of around 20,000 people located on the south shore of the Strait of Juan de Fuca in Clallam County, Washington. It is the West Coast's northernmost deepwater port. The harbor is home to a top-side ship repair facility, a luxury yacht builder, and the terminal for the ferry to Victoria, British Columbia. The waterfront area is fully developed. The Clallam County Economic Development Council lists a number of large industrial parcels available for development, including 112 acres owned by the Port of Port Angeles; however, none of these parcels has waterfront access (Clallam County Economic Development Council, 2006).

We determined there was no available industrial use land with deepwater port access in the Port Angeles area that could be considered for an LNG terminal site alternative and therefore did not further consider this alternative.

Grays Harbor

Located on Washington's coast about 40 miles north of the mouth of the Columbia River, Grays Harbor includes a deepwater shipping port used by a variety of industrial tenants. Within the Port of Grays Harbor, we identified one site (located at Terminal 3) that could potentially accommodate an LNG terminal and that is available for sale or long-term lease. The Port of Grays Harbor Terminal 3 is a marine industrial site located in the City of Hoquiam less than 1.5 hours by ship from open sea and 1 hour by vehicle from Olympia, Washington. The site consists of 150 level acres with good drainage. A 600-foot by 120-foot deepwater marine terminal, with 38 to 40 foot depths, already exists adjacent to the site. The site is owned by the Port of Grays Harbor and is zoned for heavy industrial use. Electrical service, industrial water, and wastewater treatment facilities are available on site (Grays Harbor Economic Development Council, 2005).

The site is just east of Bowerman Field, a small general aviation airport with a 5,000-foot paved runway. According to 49 CFR 193.2155(b), LNG storage tanks must not be located within a horizontal distance of 1 mile from the ends of an airport runway, or 0.25 mile from the nearest point of a runway, whichever is longer. Because the entire site would be located within 1 mile of the east end of Bowerman Field runway, this site was eliminated from further consideration. We are not aware of other properties within Grays Harbor that would potentially be suitable for an LNG terminal.

Columbia River

Three alternative LNG terminal sites were identified along the Columbia River (Tansy Point, Oregon LNG, and Port Westward) in addition to the proposed Bradwood Landing Project. These alternative LNG import terminal locations are discussed above in section 3.1.3.4. In conclusion, none of the other alternative locations for an LNG import terminal along the Columbia River appear to be clearly environmentally superior to the Bradwood Landing Project. Other LNG import terminals in Oregon would not be considered mutually exclusive. If they do not cause significant environmental impacts, and the market could support them, multiple LNG import terminals could be authorized to serve a growing demand for natural gas in the Pacific Northwest.

3.1.6 Bradwood Landing LNG Terminal Design Alternatives

3.1.6.1 Alternative LNG Storage Tank Designs

The most visible component of an LNG import terminal facility is typically the LNG storage tanks. We evaluated three alternative LNG tank designs relative to their potential visual impacts and other environmental impacts, engineering/design feasibility, and costs. These three alternatives are summarized below.

Conventional at-grade LNG storage tanks would have the highest profile and thus the greatest visual impacts, particularly on sensitive viewers located on Puget Island. However, these impacts would be mitigated by use of appropriate color paint (i.e., natural colors such as green or brown) and appropriate surface material finishing (see section 4.7.2.7). This alternative would have the lowest cost, the highest engineering/design feasibility and, aside from visual impacts, the smallest environment impact of the three alternatives. Therefore, at-grade LNG storage tanks were selected for use on the proposed project.

Below-grade LNG storage tanks would use the same design as the at-grade tanks but would be placed in excavated pits to reduce the height of the tank located above the ground surface. The pits would be designed to mitigate potential earthquakes and flooding, impacts resulting from the excavation, and dewatering during excavation. Depending on the final depth of the tanks, 0.5 to 1.0 million cubic yards of

soil would be excavated and taken off site. The 40,000 to 80,000 truck trips necessary to transport this soil would have associated traffic, noise, and air quality impacts. The dewatering that would be required during excavation, and permanent groundwater control requirements, could have impacts on groundwater and surface water resources. Use of below-grade LNG storage tanks would extend the project schedule by up to 1 year compared to at-grade storage tanks, and it is the most expensive LNG storage tank alternative. Below-grade LNG tanks have not been used or proposed for any LNG import project in North America.

A type of low-profile LNG storage tank, referred to as LNG Smart Horizontal Tank Storage, has been developed by Mustang Engineering but has not been used on a scale as large as the proposed project. These tanks would consist of multiple horizontal vessels located inside a concrete box. Many smaller horizontal vessels would be required to provide the storage capacity required by the project, resulting in a 65 percent increase in the size of the LNG storage tank area. This increased area would have a corresponding increase on environmental impacts at the terminal site and could make future expansion of the terminal difficult or impossible. Although not as costly as the below-grade tank alternative, this alternative would be significantly more expensive than the conventional above-grade LNG storage tanks.

3.1.6.2 Alternative LNG Terminal Layout

As proposed, the Bradwood Landing LNG terminal would require the permanent development of 40 acres. This is a relatively small footprint compared to many existing LNG import terminals in the United States, which may occupy as much as 318 acres (i.e., Cove Point). In originally developing the LNG terminal layout at Bradwood, NorthernStar considered engineering/design, worker safety, economic, and environmental factors.

Through consultation with various resource agencies, NorthernStar has continued to refine the facility layout to minimize environmental effects. Specifically, NorthernStar considered alternative LNG terminal site configurations to reduce impacts on wetlands. The original site boundary was modified by truncating the northwest and southwest corners. This modification reduced the area of wetlands that would be filled with dredged material by 3.1 acres (16 acres covered by the original layout as compared to 12.9 acres by the modified layout). NorthernStar indicated that no additional reductions in wetland impacts, including retaining the log pond, are possible because remaining areas of the terminal site are needed for LNG terminal facilities, operations, utilities, a maintenance area, safety buffers, circulation, stormwater management, an emergency helicopter landing area, and laydown areas for construction. For example, the area used for stormwater management must have adequate capacity to temporarily retain water after a large storm event prior to infiltration. During annual critical maintenance events known as “turn overs,” the maintenance area would be fully occupied by a full range of construction equipment (including cranes, trucks, welding machines and other large pieces), contractor trailers, and facility parts. Furthermore, the helicopter landing area must be located a safe distance from equipment filled with flammable liquids. Additional reductions in the site size and/or other alternative site layouts would reduce efficient use of space and could risk worker safety during construction or operation of the facility.

As described in section 2.9, NorthernStar has not committed to expanding the proposed LNG terminal. However, if there is a future demand for additional natural gas in the market area, provisions have been made in the layout of the site to allow for a possible future expansion by adding a third LNG storage tank and other equipment/facilities. Failing to plan for a growth in market demand and subsequent expansion of the LNG terminal to serve this demand may severely compromise the ability of NorthernStar to expand in the future. If the facility is not designed to accommodate reasonable changes, future expansion activities could be unnecessarily expensive, require schedule delays for subsequent permitting, and/or involve additional environmental impacts. According to NorthernStar, designing a

project to allow for future expansion is a typical model for energy projects of this size and is necessary to make the project viable.

3.1.6.3 Alternative Vaporization Technologies

There are various designs of equipment that are used to warm LNG to the point it returns to a gaseous state. NorthernStar considered engineering feasibility, operational requirements, reliability, safety, past commercial application, environmental impacts, and permitting feasibility as the main criteria in selecting the vaporization equipment for the Bradwood Landing Project. The basic technologies assessed by NorthernStar were ORVs, SCVs, STVs, and water baths.

Various sources of heat were considered, including ambient air, river water, natural gas, electric power, wood chips, and waste heat from cogeneration. Ambient air-heated vaporizers were initially considered for the Bradwood Landing Project but were determined to be infeasible because of the long periods of cool, wet weather typical for this area. Technologies relying on electric power for heating were also eliminated because the amount of power necessary could not be generated on site and could not be purchased for an acceptable price. Burning of wood chips for a heating source was eliminated because of the large variability in wood chip costs over time, air emissions, lack of storage areas on site for the wood chips, and because of potential impacts associated with transporting large volumes of wood chips to the site.

Waste heat from cogeneration was eliminated as a source for vaporization because of substantial uncertainties regarding the transmission of power out of the facility. Specifically, in order to implement this alternative, there was a possibility NorthernStar might have to construct a 50-mile-long power line out of the facility to a connection with the existing BPA grid. To remove the uncertainty associated with the power line, NorthernStar would need to pay now for capacity in the grid that it would not need for some time in the future in order to use the grid. Constructing this transmission line and purchasing this capacity would be prohibitively expensive.

Based on its analysis of the various technologies and heat sources, NorthernStar chose SCV with natural gas for vaporization at the Bradwood Landing LNG terminal. Because NorthernStar selected a vaporizer design that utilizes the combustion of natural gas for heating, and air emissions would be generated, other designs were evaluated to determine if an alternative design could result in reduced impacts. For purposes of an environmental comparison, vaporizers can be broadly categorized into two groups depending on whether or not they require on-site combustion of a fuel to warm the LNG.

Natural Gas Combustion

Three vaporizers that use natural gas combustion were considered for the Bradwood Landing Project, the SCV, water bath, and STV.

SCVs are generally based around a concrete structure containing a water bath with submerged stainless steel pipe coils. LNG enters the coils and, as it is warmed by the water bath, the vaporized LNG (natural gas) exits the coils. The water bath is warmed by burning natural gas. Blowers provide combustion air at a pressure sufficient to force the combustion emissions up through the water bath where they heat the water. SCVs typically consume about 1.5 percent of the sendout natural gas from the terminal. This type of vaporization system is very efficient and is able to accommodate wide fluctuations in the amount of LNG vaporized. SCVs tend to have higher air emissions, particularly NO_x, than other combustion units because the use of selective catalytic methods to control emissions has not proven reliable. Excess condensate water, on the order of several million gallons per day (mgd), is produced.

Disposal of the excess water requires treatment with alkaline chemicals to neutralize the acidity caused by absorbed CO₂.

Water baths use an open bath containing combustion tubes and LNG tubes. The fired gases transfer heat through the combustion tubes to the water bath and the water bath transfers heat to the LNG piping. The combustion gases and the water bath are not in direct contact with each other (unlike in SCVs). The combustion gases are discharged to the atmosphere. Approximately 2 percent of the natural gas produced by the terminal would be used in this process resulting in more air emissions than SCVs. This system is less efficient than SCVs.

STV systems involve a heat exchanger in which tubes containing LNG pass through a shell containing a counter-current of heat exchange media such as a water/glycol mixture. On the opposite end of the heat exchanger loop, the water/glycol mixture is typically heated by using direct-fired combustors burning natural gas. However, the source of heat may vary depending on the particular design. For this project, a vertical shell and tube design with a closed-loop hot water system that provides heat to the vaporizers was considered. The water is heated using direct-fired heaters that run on natural gas. About 100,000 gallons of fresh water would be necessary to operate this closed-loop system. An advantage of the STV is that selective catalytic reduction systems and oxidation catalysts can be used on the heaters to reduce NO_x and CO emissions.

Estimated air emissions with the currently proposed SCVs, as well as water baths and STVs, are presented in table 3.1.6-1.

TABLE 3.1.6-1			
Estimated Air Emissions Associated with Vaporizer Combustion			
Vaporizer Design	Air Emissions (tpy) ^a		
	NO _x	CO ^b	PM ₁₀
SCV ^c	121.9	199.3	13.4
Water Bath ^d	310	261	24
STV ^d	310	261	24
^a Based on a sendout rate of 1.0 Bcfd and 12-month operation of vaporizers. ^b Carbon monoxide. ^c Currently proposed design. The SCV firing rate is estimated at 17 MMcfd, based upon a 120 MMBTU/hr heat rate. ^d Based on large wall-fired boiler with flue gas recirculation and low NO _x burners, assuming 17 MMcfd firing rate. Estimated from EPA AP-42 guidelines for external combustion engines – boilers.			

As indicated in the table, SCVs have lower emissions than STVs or water baths with limited controls. It should be noted, however, that if oxidation catalysts were to be used on any of the resulting gas streams, a reduction of 90 percent could be realized in CO and VOCs. If STVs were to be used, selective catalyst reduction could be used to significantly reduce NO_x emissions.

None of these vaporizer technologies would use water from the Columbia River. The water bath and STV would not discharge water to the river, but SCV would generate water condensate that would be discharged to the Columbia River at a rate of 160 gpm and a temperature of about 68 °F. This discharge water would contain approximately 0.4 percent of sodium carbonate and trace amounts of sodium nitrate and other sodium salts, but would not require treatment other than pH neutralization.

Non-Combustion Alternatives

At some locations with warm climates, it is possible to use ambient warm air or ambient warm water as a source of the heat needed to vaporize the LNG. The advantage of vaporizers that utilize ambient air or water vaporization systems is that air emissions tend to be lower than for a system that involves combustion of a hydrocarbon fuel (Coast Guard and MARAD, 2003). Although air or water vaporizers can result in very small quantities of air emissions associated with electrical generation required to power fans or pumps, the power is generally produced off-site and the amount needed for the vaporizers is relatively minor (Coast Guard and MARAD, 2003).

Ambient air-heated vaporizers use air warming structures to warm and vaporize the LNG. Because the surface area of the heat exchangers needs to be large for efficient heat transfer, the structures would be large and require significant space for construction and operation. Ambient air-heated vaporizers utilize air warming structures as heat exchangers to recirculate the cooled water from the water bath and warm it through exposure to the air. Because the surface area of the water–air interface needs to be large for efficient heat transfer, the structures are generally large and require significant space for construction and operation. Because water would condense on the warming structures, ambient air vaporizers at the Bradwood Landing LNG terminal would produce about 1.3 mgd of water during operation compared to approximately 0.4 mgd for operation of SCV units. Ambient air-heated vaporizers were not considered practical for the Bradwood Landing Project because of limitations associated with periods of cool weather along the Columbia River.

River water, used exclusively as a heat source for vaporization, was also eliminated as a practical vaporization technology for the Bradwood Landing Project. However, river water was considered further in combination with the use of either natural gas fired SCVs or STVs during the coolest 5 months of the year. If the river water temperature is above approximately 63 °F, the water can typically serve as the sole heat source for LNG vaporization. When water temperatures drop to between 50 °F and 63 °F, supplemental heat is typically required. As an indication of river water temperatures in the vicinity of the proposed site, in 1996, the mean temperatures measured 3 miles upstream from the proposed LNG terminal site ranged from a low of 41 °F in March to a high of 71.4 °F in July (U.S. Geological Survey (USGS), 1996).

For the Bradwood Landing Project, a water-based vaporization system would require withdrawing (and discharging) large volumes of water from the Columbia River. The water would be treated for sodium hypochlorite with sodium bisulphite before discharging at a rate of 100,000 gpm. On other LNG terminal projects (e.g., Long Beach LNG Import Project), agencies such as the NMFS have expressed concerns that significant numbers of fish and/or fish larvae could be entrained during the withdrawal of water. With the large number of federally protected species found in the Columbia River (see section 4.6.1.1), concerns related to entrainment are particularly relevant. Additional concerns have been raised about the thermal plume associated with discharging cold water back into the affected waterbody. NorthernStar estimates there would be a maximum decrease of 14 °F in the discharge water compared to the ambient river water temperature. Although the use of river water during 7 months of the year would result in decreased air emissions compared to technologies that use combustion year round, given the environmental concerns associated with withdrawal and discharge of the river water, this vaporization technology would not offer an overall environmental advantage compared to SCVs.

3.1.6.4 Alternative Fill Sources

Geotechnically suitable fill is required to raise the grade at the LNG terminal site to 20 feet NAVD. NorthernStar proposes to use up to about 700,000 cubic yards of material dredged from the maneuvering area in the Columbia River for this purpose. Additional dredged material may be placed at

the terminal site but would not be necessary for design purposes. During preliminary meetings held to discuss the content of the BA, the agencies requested an analysis be performed for an alternative source or sources of fill that would be from an upland area so that material dredged for the ship berth and maneuvering area could be used for in-river placement. NorthernStar determined that the most likely upland fill source would be Teavin's Pit, a permitted aggregate mine. The cost of the fill would be between \$3.5 million and \$5.2 million. Transporting about 400,000 cubic yards of fill to the proposed LNG terminal site would require about 10,500 truck loads at an estimated round-trip travel time of 30 minutes, totaling 5,250 hours of truck time. In addition, four pieces of heavy equipment would be required, totaling about 21,000 hours. The pollution generated from operation of the truck and heavy equipment would result in the following emissions:

- 53.5 tons of carbon monoxide (CO);
- 43.5 tons of NO_x;
- 6.3 tons of SO_x;
- 2.5 tons of particulates (does not include dust generated from the fill handling itself); and
- 1.3 tons of volatile organic compounds (VOC).

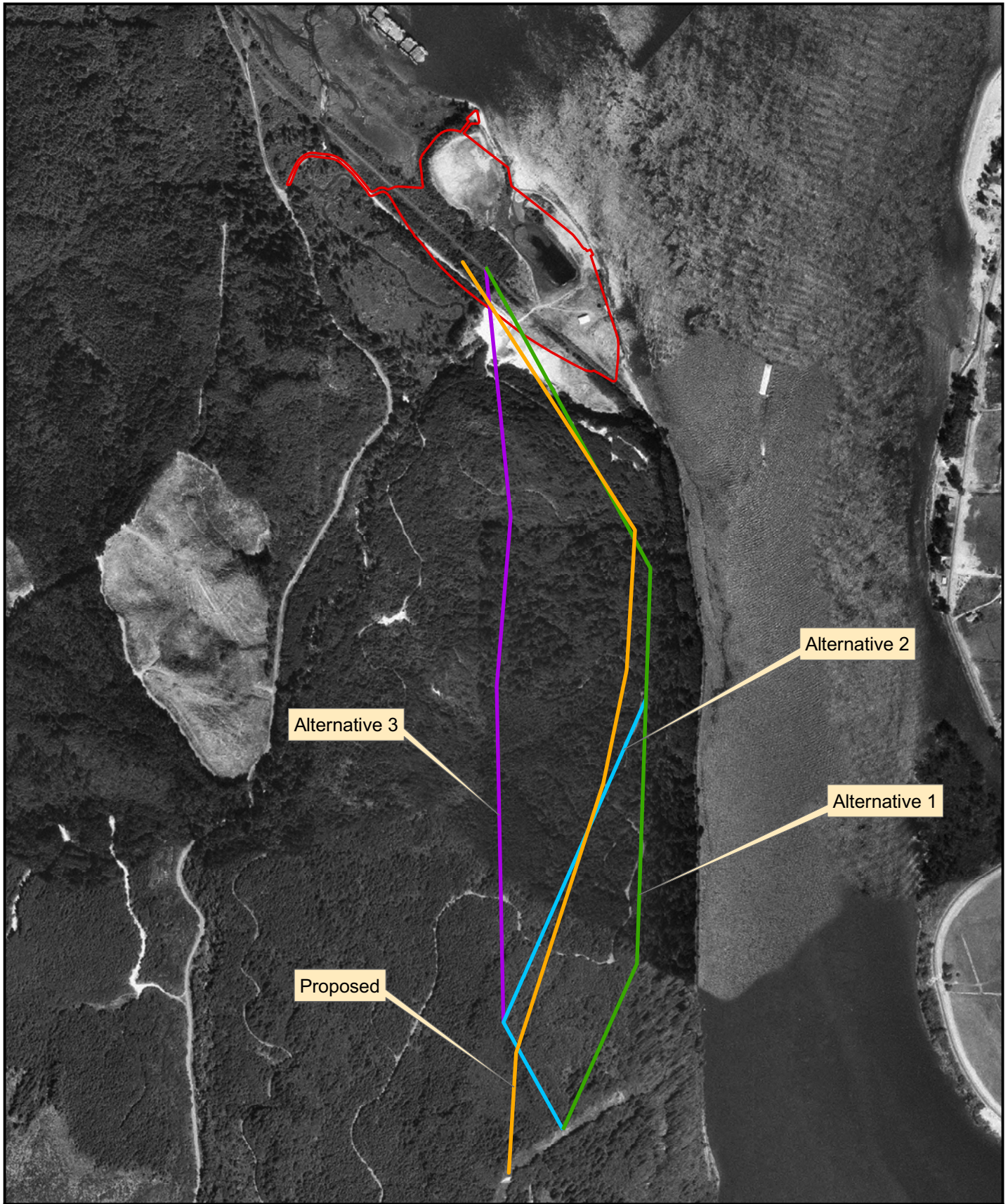
In addition, increased emissions would result from the increased time that the dredge would operate in order to transport the dredged material a greater distance to an alternative placement site. Given the increased air emissions and economic costs of trucking in fill material to raise the LNG terminal site, this alternative does not appear to offer a significant environmental advantage over the proposed source of fill.

3.1.7 Power Line Route Alternatives

As described in section 2.2.1, a 1.5-mile-long non-jurisdictional electric power line would be constructed on a 105-foot-wide right-of-way to bring electricity to the terminal. Five new 69-foot-high H-frame structures would be constructed for the power line and an existing BPA tower would be rebuilt. NorthernStar evaluated four alternative power line routes from the BPA system to the terminal: Alternative Route 1, located closest to the Columbia River; Alternative Route 2, located west of Alternative Route 1; Alternative Route 3, located west of Alternative Route 2, and the proposed route, located between Alternative Route 1 and Alternative Route 2. These routes are depicted on figure 3.1.7-1.

The alternative routes are generally similar with respect to overall length, habitats crossed, and most other important characteristics. Alternative Route 3 is slightly shorter than the other two routes. Use of Alternative Routes 2 and 3 would result in clearing of more closed canopy forest than Alternative Route 1. NorthernStar initially selected Alternative Route 1 for the power line on the basis that this route would result in less visual impacts on sensitive viewers on Puget Island because it is located at a lower elevation, and the hillside on which much of the route is located would be present as background when viewed from Puget Island. However, Alternative Route 1 crosses late-successional (old growth) conifer forest. The proposed power line route completely avoids the old growth forest. In some places the power line would be visible against the sky when viewed from Puget Island, but the overall visual impact would be minor.

The proposed power line route is 0.1 mile shorter than Alternative Route 1 and crosses better topography for construction. Existing access roads could be used for both Alternative Route 1 and the proposed route but the proposed route would require approximately 465 feet of additional access roads for construction and maintenance of the H-pole towers. No wetlands would be affected by construction of the additional access roads.



— Alternative 1 — Proposed Power Line Route
 — Alternative 2 — Proposed Bradwood
 — Alternative 3 Landing LNG Terminal

0 600 1,200 1,800 2,400
Feet



Figure 3.1.7-1
Bradwood Landing Project
Power Line Route Alternatives

NorthernStar also evaluated the feasibility of a power line route following Clifton Road. The absence of a right-of-way along Clifton Road and steep topography would make construction of the H-towers difficult and the route would be about 2 miles longer than the proposed route. The Clifton Road route would cross Hunt Creek twice. Such a route would have no advantages over the proposed route and the waterbody crossings would result in impacts on riparian and estuarine habitats.

3.1.8 Pipeline Route Alternatives

We assessed whether it might be possible to reduce the environmental impacts associated with construction and operation of the proposed sendout pipeline by following a major route alternative. Additionally, we evaluated minor variations to the proposed pipeline route to avoid or minimize impacts on specific, localized resources such as residences, waterbodies, forest habitat, and wetlands.

3.1.8.1 Major Pipeline Route Alternatives

Alternatives to the proposed pipeline route would have to meet the project objective of transporting natural gas from the Bradwood Landing LNG terminal to existing and future markets in the Pacific Northwest. Specifically, the project is designed to provide up to 1.3 Bcfd of natural gas to the region by: 1) delivering natural gas to the Georgia-Pacific paper mill at Wauna, Oregon and the PGE Beaver Power Plant at Port Westward, Oregon; 2) interconnecting with Northwest Natural's existing bidirectional intrastate pipeline facilities capable of transporting gas to their Mist underground storage facility; and 3) interconnecting with the Williams Northwest interstate pipeline system.

NorthernStar considered three major alternatives to the proposed sendout pipeline route: 1) the Railroad Route Alternative, 2) the Northern Route Alternative, and 3) the Southern Route Alternative (see figure 3.1.8-1). In addition, a route alternative requiring crossing of the Columbia River at Bradwood Landing was initially considered. However, due to the limitations of HDD technology and the length of the crossing at this location, the route was determined to be unconstructable and was eliminated from further consideration.

Railroad Route Alternative

The Railroad Route Alternative would parallel the existing PWRR from Bradwood Landing to Rainier, Oregon. The pipeline would then cross the Columbia River by HDD methods and terminate at Williams Northwest pipeline, southeast of Longview, Washington. The total approximate length of this alternative is 35.8 miles, which would be slightly shorter than the proposed route. NorthernStar evaluated this alternative in an effort to minimize project impacts on environmental resources by collocating the project within an existing industrial corridor.

Although this route alternative achieves delivery to interstate markets, it fails to meet the project objective of delivery to the PGE Beaver Power Plant at Port Westward without the construction of a lateral that would significantly increase the overall length of the pipeline system and subsequently increase the number of landowners and environmental resources impacted by the project. Additionally, the portion of the railroad bed between Bradwood Landing and the Georgia Pacific paper mill at Wauna, Oregon is adjacent to a basalt ledge that would require blasting for installation of the pipeline. Blasting could result in stability issues for the railroad bed.

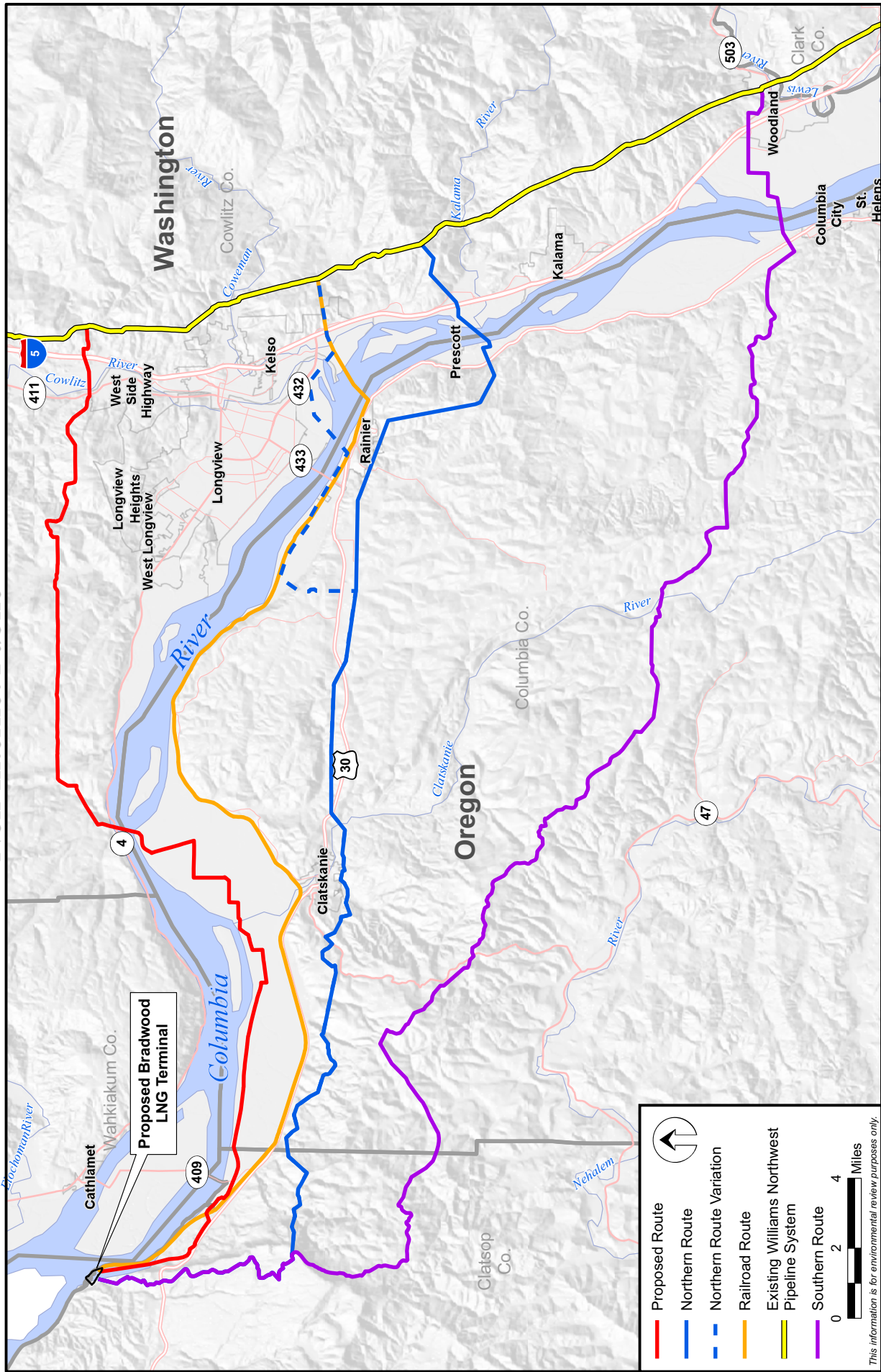


Figure 3.1.8-1
Bradwood Landing Project
 Major Pipeline Route Alternatives

Northern Route Alternative

The Northern Route Alternative would exit the LNG terminal site to the south and continue along Nikolai Ridge for approximately 6 miles. The pipeline would then turn to the east and parallel, where possible, existing logging roads and other rights-of-way, proceeding south of Clatskanie, and turning roughly southeast at Rainier, to the vicinity of Prescott, Oregon. The pipeline would cross the Columbia River using the HDD construction method near the decommissioned Trojan nuclear power plant, and continue east to tie-in with the Williams Northwest pipeline system north of Kalama, Washington. The approximate length of this alternative route is 42.6 miles. This was the route originally proposed by NorthernStar when it entered into the FERC's Pre-filing Process in March 2005.

Although this route alternative would achieve delivery to interstate markets, it fails to meet the project objective of delivery to the PGE Beaver Power Plant at Port Westward without the construction of a lateral, which would significantly increase the overall length of the pipeline system and subsequently increase the numbers of landowners and environmental resources impacted by the project. Additionally, crossing under the Columbia River near the decommissioned Trojan nuclear power plant using the HDD method would be problematic due to the width of the river at this location. The Port of Kalama raised objections about this route because of potential impacts the crossing of the Columbia River may have on future port development activities.

A variation of the Northern Route, referred to as the Longview Alternative, was also considered. The Longview Alternative would follow the Northern Route to near Rainier, cross the Columbia River into Longview, Washington, then proceed east to tie-in with the Williams Northwest pipeline system. The Longview Alternative would decrease the length of the Northern Route by 1.3 miles and avoid impacting the Port of Kalama property. However, this variation would still be 5.0 miles longer than the proposed route and the crossing of the Columbia River would be difficult at the Longview Alternative location.

Southern Route Alternative

The Southern Route Alternative would exit the LNG terminal site to the south and continue along Nikolai Ridge for approximately 9 miles. The pipeline would then follow a mostly southeast alignment to a point south of Deer Island, Oregon, cross the Columbia River by HDD methods, and terminate at a tie-in with the Williams Northwest pipeline system north of Woodland, Washington. The length of this alternative is about 55.0 miles, which would be 18.7 miles longer than the proposed route.

Although this route alternative achieves delivery to interstate markets, it fails to meet the project objective of delivery to the PGE Beaver Power Plant at Port Westward without the construction of a lateral which would significantly increase the overall length of the pipeline system and subsequently increase the numbers of landowners and environmental resources impacted by the project. Because of the large increase in length compared to the proposed route, the overall footprint of the project (including extra workspaces and access roads) would significantly increase the potential for environmental impacts compared to the proposed pipeline route.

Major Pipeline Route Alternatives Conclusion

Table 3.1.8-1 compares the proposed Bradwood Landing pipeline route to the three alternative routes. As indicated by table 3.1.8-1, the Railroad Route Alternative would be the shortest route and the Southern Route Alternative would be the longest. The proposed route, which would be only slightly longer than the Railroad Route Alternative, would have the fewest residences within 50 feet of the construction right-of-way; the Railroad Route Alternative would have the most nearby residences. The Railroad Route Alternative would also have the most commercial and industrial structures within 50 feet of the construction right-of-way. The proposed route would cross the most waterbodies; however, a relatively large number of manmade ditches (approximately 36) within agricultural land between Westport and Port Westward account for a majority of the additional waterbodies along the proposed route. The Railroad and the Southern Routes would cross the fewest waterbodies, but the Railroad Route Alternative would cross the most wetlands. Although the proposed route would cross significantly more agricultural land than three of the other alternative routes, the impacts on agricultural lands would generally be temporary (i.e., these lands would return to agricultural production within one growing season). With the exception of the Railroad Route Alternative, the proposed route would impact the least amount of forested land.

The proposed route presents advantages over the three alternative routes in terms of environmental impacts, constructability (i.e., blasting in proximity to a railroad bed), proximity to populations, and proximity to target markets. Because this route is shorter than the Southern Route and Northern Route, and the Railroad Route would require a lateral to meet the object of supplying natural gas to the Beaver Power Plant, the overall area that would be impacted would be less. Therefore, we agree that the proposed route is preferred over the alternative routes.

3.1.8.2 Minor Pipeline Route Variations

During refinement of the proposed Bradwood Landing pipeline route, a number of minor route variations were considered by NorthernStar in an effort to eliminate or minimize potential impacts on specific localized resources, including residences, wetlands, or waterbodies. Route variations were also identified as specific landowner concerns were raised. In some cases, NorthernStar determined that the new route variation would be preferable to the initially proposed route segment and in other cases, the initial route segment was determined to be the best option. We reviewed the route variations identified by NorthernStar and agree that the selected route segments (whether initial route segment or an alternative route variation) would reduce the overall environmental impacts of the project. These route variations are summarized in table 3.1.8-2, and depicted on the proposed route maps in Appendix B. Additional route variations might be proposed in conjunction with completion of the Final Pipeline Design Geotechnical Report to minimize slope stability problems along the route.

3.1.9 Dredging and Dredged Material Placement Alternatives

As discussed in section 2.4.1.2, NorthernStar would dredge up to about 700,000 cubic yards of sediment from the ship berth and maneuvering area to enable LNG carriers to dock and turn in the Columbia River. This volume was determined based on the minimum amount needed to safely accommodate LNG carriers. Alternatives requiring more dredging could be identified; however, alternatives requiring less dredging would not be able to safely accommodate LNG carriers. As such, we did not consider it feasible to reduce the volume or extent of dredging and still satisfy the objectives of the project at the proposed site.

TABLE 3.1.8-1

Comparison of the Proposed Bradwood Landing Pipeline to the Alternative Routes

Environmental Factor	Proposed	Railroad	Northern	Northern with Longview Alternative	Southern
Total length (miles)	36.3	35.8	42.6	41.3	55.0
Permanent Right-of-Way (acres) ^a	220.0	216.0	258.2	250.3	333.3
Extra Work Spaces (number)	61	109	86	89	124
Residences within 50 feet of Construction Right-of-Way (number)	13	32	28	20	15
Commercial or Industrial Structures within 50 feet of Construction Right-of-Way (number)	13	19	1	5	0
Perennial Waterbodies Crossed (number) ^b	61	26	43	44	28
Wetlands Crossed (miles) ^c					
<i>Palustrine Forested</i>	0.2	1.4	0.2	0.8	0.6
<i>Palustrine Nonforested</i>	5.8	3.7	0.9	1.7	0.5
<i>Palustrine Combination Forested/Nonforested</i>	0	0.9	<0.1	0.0	0.0
<i>Riverine</i>	0.9	1.8	0.6	0.4	0.6
<i>Total</i>	6.9	7.8	1.7	2.9	1.7
Federal and/or State Threatened and Endangered Species					
<i>Fish species inhabiting waterbodies crossed (number)</i>	10	9	9	10	9
<i>Waterbody crossings through habitats of one or more fish species (number)</i>	13	14	11	11	12
<i>Bird species within 0.5 mile of route (number)</i>	2	4	3	4	5
<i>Bird nest locations within 0.5 mile of route (number)</i>	7	4	4	4	3
<i>Priority bird habitats, species, and nest buffers within 0.5 mile of route (number)</i>	9	7	9	7	7
<i>Bird habitat to be disturbed (acres) ^d</i>	4.9	18.2	61.4	68.9	66.7
<i>Amphibian species/habitats within 0.25 mile of route (number)</i>	1	0	0	0	0
<i>Reptile species/habitats within 0.25 mile of route (number)</i>	0	0	0	0	0
<i>Plant species/habitats within 0.25 mile of route (number)</i>	2	1	4	3	3
<i>Plant species habitat to be disturbed (acres) ^d</i>	68.9	63.7	2.5	68.6	57.8
<i>Mammals species/habitats within 0.25 mile of route (number)</i>	4	3	2	2	1
<i>Mammal species habitat to be disturbed (acres) ^{d,e}</i>	99.8	82.1	29.8	29.8	25.1
Public Lands Crossed (miles)	0.2	0.0	6.7	4.9	12.1
Agricultural Land Affected (acres) ^d	166.1	163.2	22.5	48.1	52.1
Forest Required to be Cleared (acres) ^d	228.9	163.1	462.9	378.8	587.0
Roads Crossed (number)	49	103	82	81	121
Major Utilities Crossed (number)	5	4	9	7	5

^a Assumes a 50-foot-wide permanent right-of-way throughout.

^b Includes manmade ditches.

^c Based on NWI data for all routes, including the proposed route.

^d Assumes a 100-foot-wide construction right-of-way throughout.

^e Based on GIS calculation of the sum of habitats from the WDFW, Priority Habitats and Species and Oregon Natural Heritage Information Center databases.

TABLE 3.1.8-2

Minor Route Variations Evaluated for the Proposed Pipeline Route by NorthernStar

Variation	Beginning MP	Reason Route Variations Were Evaluated and Selected	Initial Route Segment Length (miles)	Alternative Route Variation Length (miles)
NS-1	0.0	Impacts on environmental resources, including forest habitat, waterbodies, and wetlands, would be avoided along Nikolai Ridge by using the HDD method along the initial route segment as opposed to trenching along the alternative route variation. Also, the initial route segment would be 0.19 mile shorter.	1.6 selected	1.7
NS-2	2.6	The initial route segment is slightly longer; however, alignment along a secondary road within Georgia-Pacific property and within scrub-shrub habitat (an area that appears to have been clear-cut and is dominated by non-native Himalayan blackberry) avoids impacts on forest habitat.	0.2 selected	0.2
NS-3	10.7	The selected alternative route variation follows property boundaries and would minimize impacts on agricultural fields in response to landowner concerns. Additionally, the selected route would be further from residences than the initial route segment. Slightly more emergent wetlands would be temporarily impacted along the selected alternative route variation compared to the initial route segment.	1.7	2.2 selected
NS-4	13.5	The alternative route variation was selected in response to landowner concerns. Although longer than the initial route segment, the alternative follows property boundaries and road alignments and would minimize impacts on active agricultural areas without significant additional construction impacts on natural resources.	3.1	4.7 selected
NS-5	19.0	The initial route segment was considered so existing roads could be used to avoid impacts on forested areas. The alternative route was selected because it would minimize impacts on landowners associated with the use of private roads. Impacts on natural resources are generally consistent between the two segments.	1.3	1.2 selected
NS-6	20.3	The initial route segment was selected over the alternative route variation because it would minimize impacts on property owners. Other impacts are generally consistent between the two route segments.	1.4 selected	1.6
NS-7	31.1	The alternative route variation was selected to accommodate landowner concerns related to a pond/spring on their property. The alternative route follows a ridgeline on the property to increase the distance between the pipeline and the pond/spring - the nearest portion of the proposed construction work area is 450 feet west and 1,150 feet south of the pond/spring.	0.3	0.3 selected
NS-8	33.9	This alternative route variation considered a different location for the entry pit of the HDD borehole that would cross the Cowlitz River, taking into consideration the proximity of residences, oak trees, and the scales of a rock pit. The HDD entry pit work space for the alternative route variation would be within 300 feet from several residences compared to more than 600 feet for that of the initially proposed route; however, the initially proposed work space would be 50 feet from a residence and would damage oak trees and the rock pit scales. Also, the selected alternative route variation would use an abandoned power line right-of-way.	1.1	1.1 selected
NS-9	35.1	Although 1.25 acres more forest habitat would be impacted, the initial route segment would avoid several residences east of Interstate Highway 5 compared to the alternative route variation.	1.2 selected	1.1

Note: Comparisons of wetland impacts were made using NWI data for consistency rather than actual field delineations.

Dredging and dredging related activities would be conducted in accordance with applicable federal, state, and local permit stipulations. To avoid or minimize impacts on water quality or biological resources associated with these activities, alternative dredging methods and dredge disposal alternatives were considered.

Dredging and placement of structures within waters of the United States requires authorization from the COE under section 404 of the CWA and section 10 of the RHA (see section 1.3). As an element of its review, the COE is required to consider whether a proposed project represents the least environmentally damaging practicable alternative pursuant to the CWA section 404(b)(1) guidelines (40 CFR 230). The term practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. As a cooperating agency, the COE has recommended that the alternatives analysis in this EIS consider project design, configuration, and construction alternatives that avoid or minimize effects on the aquatic environment. In this way, this EIS could be used to identify the COE's least environmentally damaging practicable alternative.

Ultimately, activities associated with dredging, as well as construction of the LNG carrier berth and unloading facility, would be conducted in accordance with COE permit stipulations as well as the requirements of state and local permits (see section 1.3). To avoid or minimize impacts on water quality or biological resources associated with these activities (see sections 4.3.2.2 and 4.5.2.1), alternative dredging methods and dredged material placement areas were considered.

3.1.9.1 Alternative Dredging Methods

Dredging technologies can be separated into two basic categories, hydraulic and mechanical. Two types of hydraulic dredge units (self-propelled hopper dredges and cutterhead pipeline dredges) have historically been used in the Columbia River area. The hopper dredge is a seagoing vessel that can move from one area to another under its own power. It excavates dredged material by lowering drag arms onto the bottom to dislodge material, and then suctions the material into the hopper, or holding area. In order to effectively operate, a hopper dredge must be moving forward while dredging, and it typically operates most efficiently over long distances, such as in navigation channels. A hopper dredge would not be well suited for this project because of the relatively confined work space at the proposed LNG terminal.

A hydraulic cutterhead pipeline dredge uses its cutterhead to break up the materials to be dredged, then suctions the material into a pipeline. Prior to dredging, the pipeline is laid between the site to be dredged and the dredged material placement area. The pumping distance is a limiting factor for selection of this method. The typical maximum pumping distance is roughly 2 miles but use of booster pumps can increase the distance to 5 to 8 miles, depending on the grain size of the sediment. Dredging production rates are dependent on the characteristics of the materials to be dredged, the equipment employed in the operation, and the length of the pipeline. Hydraulic dredging has the potential to capture small fish and aquatic invertebrates in the flow of water and entrain them along with dredge materials being suctioned. NorthernStar proposes to use a cutterhead pipeline dredge to remove the sediments in the ship berth and maneuvering area.

The two types of mechanical dredges used in the Columbia River area are clamshell dredges and dipper dredges. A dipper dredge is basically a barge-mounted power shovel. Dipper dredges are best suited for excavating hard, compacted materials such as glacial till, stone, or blasted rock. Although they can be used to remove softer bottom sediments, the action of this type of equipment may cause considerable sediment disturbance and resuspension of fine-grained material. With mechanical dredging, mobile aquatic species such as fish would be less likely to be entrained with the dredged materials compared to hydraulic dredging.

A clamshell dredge consists of a crane with a cable attached to a clamshell bucket. Clamshell dredges can be used in tight quarters or shallow areas. Studies by the COE indicate that clamshell dredging generally results in greater sediment resuspension than other forms of dredging (e.g., hydraulic cutterhead dredges) (COE, 1988). Clamshell and dipper dredges both use barges or scows to haul the dredged material to placement areas. The bottoms of these barges or scows are generally designed to be opened, whereby the dredged material is dropped to the river bed or seafloor at the placement area. Typical production dredging with these two methods includes multiple barges or scows and tugs so that production can be maintained while full barges are towed to the placement site(s). The production rate is dependent upon several factors including dredged material characteristics, bucket size, and the efficiency of exchanging the barges or scows. Mechanical dredging would typically not be cost effective compared to hydraulic cutterhead pipeline dredging when the dredged material placement site is less than 5 to 8 miles from the dredging area.

3.1.9.2 Dredged Material Placement Alternatives

NorthernStar proposes to place up to the full amount of dredged material from the ship berth and maneuvering area (700,000 cubic yards) at the LNG terminal site, and any material not placed at the terminal site would be placed at the Wahkiakum County Sand Pit site on Puget Island. Other alternatives considered for dredged material placement include additional upland placement sites, Columbia River placement, and ocean placement. Table 3.1.9-1 lists the various dredged material placement alternatives, the associated dredging method, and a summary of potential advantages and disadvantage for each alternative. A detailed discussion of the alternatives follows.

Upland Placement

Available designated upland dredged material placement sites are limited along the lower Columbia River. The two closest are Bradwood Landing itself and Tenasillahe Island.

The Bradwood Landing site is designated as a dredged material management site on the Clatsop County Comprehensive Plan. Between 1966 and 2002, the COE placed almost 900,000 cubic yards of material from maintenance dredging of the Columbia River navigation channel at the Bradwood Landing site. NorthernStar proposes to place up to 700,000 cubic yards of material dredged from the Columbia River during creation of the ship berth and maneuvering area at Bradwood Landing. The material would be used to raise the grade of the site in preparation for construction of the onshore components of the LNG terminal.

Tenasillahe Island is located directly across Clifton Channel from the Bradwood Landing site and would be close enough that cutterhead pipeline dredging could be used. The island has been designated as a dredged material placement site for Columbia River improvement and maintenance projects. Based on consultation with the COE, ODSL, and the Port of Portland, this placement site would not be available for material from the Bradwood Landing Project. Available space for additional dredge disposal on the eastern end of the island has already been committed to other future projects; the rest of the island is protected as part of the Julia Butler Hansen National Wildlife Refuge (JBHNR). Tenasillahe Island has therefore been eliminated from further consideration as an alternative dredge disposal location for the Bradwood Landing Project. No other upland placement sites were identified that would be close enough to the Bradwood Landing site to be reasonable, practicable alternatives.

TABLE 3.1.9-1			
Dredged Material Placement Alternatives			
Placement Alternative	Primary Dredging Methodology	Advantages	Disadvantages
Upland Placement			
Bradwood Landing	hydraulic cutterhead pipeline	Proximity of site; already designated a dredged material placement area; could accommodate entire volume; most cost effective alternative.	Not an environmentally beneficial use. Sediment is removed from the river system.
Tenasillahe Island	hydraulic cutterhead pipeline	Proximity of site, already designated a dredged material placement area.	Not an environmentally beneficial use. Sediment is removed from the river system. Site is reserved for Columbia River channel and maintenance projects and not available for the Bradwood Landing Project.
Columbia River Placement			
Flow-Lane: Price Island and Brookfield Reach	hydraulic hopper or cutterhead pipeline	Beneficial use; sediments remain in river system.	Dredging area configuration is not suited for hopper dredge, which would be required for more distant placement sites. Minor impact on benthic communities. Permitting for in-water placement is more rigorous than for upland placement.
Scour Holes: Welcome Slough and Pancake Point	mechanical clamshell	Proximity of site; beneficial use; cost effective.	Could only accommodate up to 30 percent of material. The COE may fill sites first. Placement area is within designated salmonid critical habitat and EFH for coho and Chinook salmon.
Ocean Placement			
Shallow Water	mechanical clamshell	No significant environmental concerns provided the sediments to be dredged pass required testing. Could accommodate entire volume.	Sediment is removed from the river system. Distance of site results in relatively high cost. Requires permit under section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA).
Deepwater	mechanical clamshell	No significant environmental concerns provided the sediments to be dredged pass required testing. Could accommodate entire volume.	Not an environmentally beneficial use. Sediment is removed from the river system. Distance of site results in relatively high cost. Requires permit under section 103 of the MPRSA.
Beach Nourishment			
Wahkiakum County Sand Pit on Puget Island	hydraulic cutterhead pipeline	Proximity of site; beneficial use; could accommodate a significant volume.	Placement area is within designated salmonid critical habitat and EFH for coho and Chinook salmon. Additional post-placement handling costs. Wahkiakum County has not yet obtained permits.

Columbia River Placement

The lower Columbia River is sediment deficient because upstream dams limit downstream movement of sediment. Consequently, placing the dredged material at another location in the river can have environmental benefits, such as counteracting shoreline and beach erosion. On the other hand, such actions can affect water quality, sediment transport, and water circulation, which in turn can have potential impacts on fisheries and biological communities. It follows that the permitting process for in-water placement of dredged materials is more rigorous and requires detailed testing and analysis of the potential environmental impacts of the proposed placement alternative. NorthernStar evaluated two types of in-water placement sites in the Columbia River, flow lanes and scour holes.

Flow Lanes

Flow-lane placement sites are located in or adjacent to the Columbia River navigation channel at depths generally from -50 to -65 feet CRD. Flow-lane placement sites are used by the COE for the Columbia River channel improve project. The locations of these sites vary from year to year depending on the condition of the channel. Placement of dredged material at a flow-lane site would raise the bottom elevation from 2 to 6 feet, depending on the location. This rise in the river bottom would not be expected to cause significant changes in water circulation, current pattern, water fluctuation, or water temperature. The dredged material would be similar in characteristics to the existing sediments. Flow-lane placement is used in areas where no other alternatives are available or where the quantity of material to be dredged is too small to warrant use of a cutterhead pipeline dredge that would be necessary for upland disposal. Flow-lane placement would not have a significant impact on aquatic resources because benthic invertebrate productivity is generally low in the deeper channel areas.

NorthernStar assessed two potential flow-lane sites that are located downstream of the Bradwood Landing site and would require use of a hopper dredge or bottom-dump barge, based on the distance from the dredging area. The Price Island site is located immediately north of the navigation channel at CRM 34.8 (see figure 3.1.9-1). NorthernStar determined that existing pile dikes at this location would present an operational safety hazard for dredge vessels and the Price Island site was not considered further. The Brookfield Reach site is located north of the navigation channel at CRM 30.5. Because of the distance between the dredging area and the Brookfield Reach site, which would require the use of a hopper dredge or bottom-dump barge, this alternative was also eliminated from further consideration.

Scour Holes

In addition to flow lanes, NorthernStar identified two scour holes locations as possible dredged material placement sites in the Columbia River. Currently, Wahkiakum County is in the process of obtaining a permit to place clean sands in two scour holes, Pancake Point and Welcome Slough, located along the southwestern side of Puget Island (see figure 3.1.9-1). While Wahkiakum County expects to receive sands from the COE as part of Columbia River navigation channel improvement or maintenance projects, it may consider receiving material from other sources. The Welcome Slough scour hole, located at CRM 40.5, covers 2.3 acres. The Pancake Point scour hole, at CRM 43.6, covers 6.1 acres. Currently, the bases of the scour holes reach depths of -90 feet CRD. A total of 192,000 cubic yards of material will be required to bring the riverbed elevation up to the desired elevation of -20 feet CRD. Supplemental material will be required over time to maintain this level.

The scour-hole sites could be used for up to 30 percent of the dredged material from the ship berth and maneuvering area if the space is still available when the dredging for the Bradwood Landing Project begins. The material would need to be clean sand. The scour holes may also be options for placement of material generated during maintenance dredging at the LNG terminal.

Ocean Placement

Ocean placement of dredged materials beyond the 3-mile state waters boundary requires a permit under section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA). Such placement is only allowed if no other reasonable alternatives are available, and the material must pass specific testing requirements.

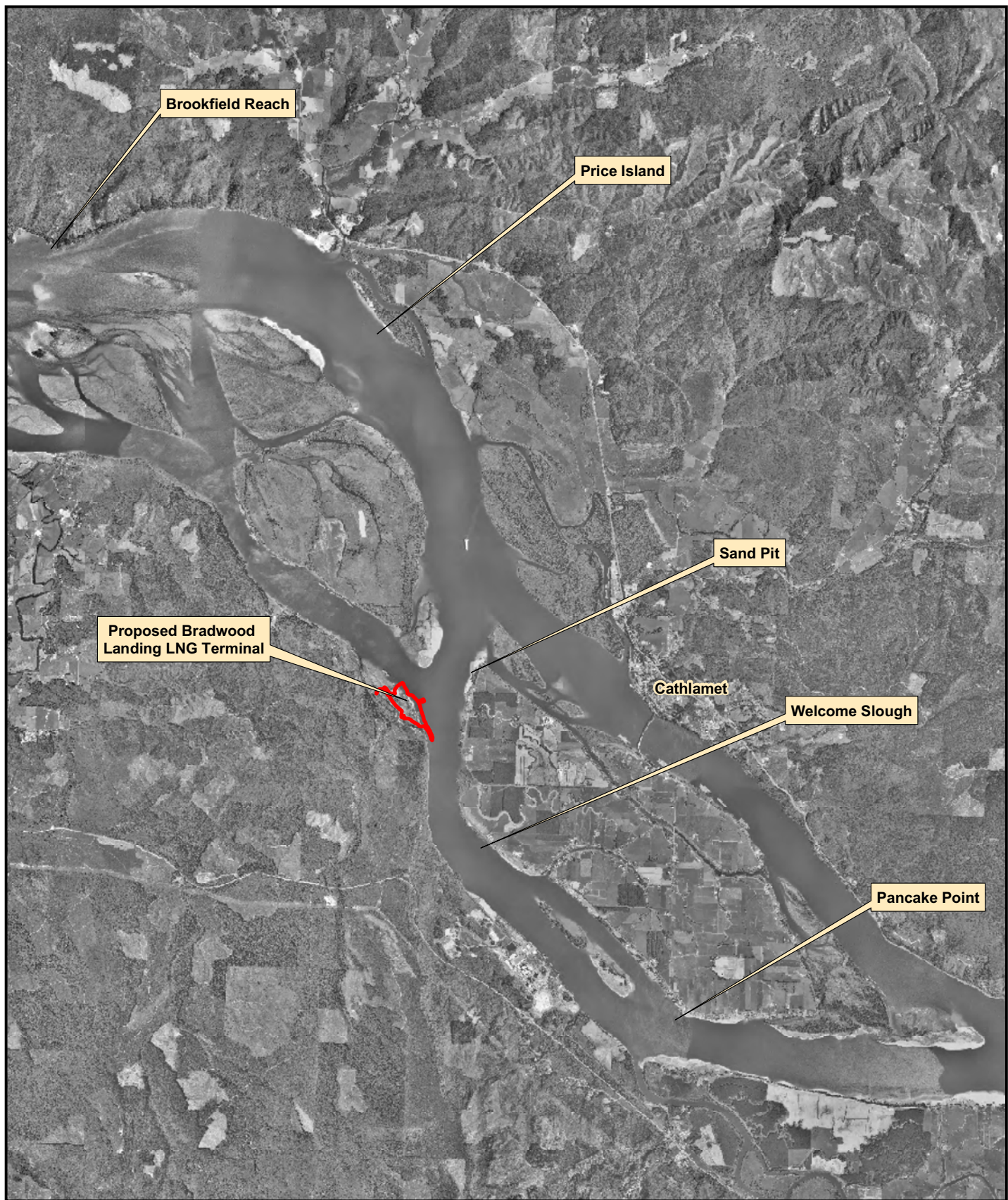


Figure 3.1.9-1
Bradwood Landing Project
 Dredged Material Placement Site Alternatives

0 3,500 7,000 10,500 14,000 Feet

The EPA has designated two open water dredged material placement sites offshore of the mouth of the Columbia River as part of the Columbia River Deepening Project. The first is a shallow water placement area located approximately 40 miles from the Bradwood Landing site. The site is a near-shore dispersive environment where material is expected to disperse into the littoral (beach) zone after placement. This placement area may be capable of accommodating all of the proposed dredged material from the Bradwood Landing Project. The second ocean placement site is a deepwater placement area located south of the Columbia River and 47 miles from the Bradwood Landing site. This placement area was selected to avoid biologically diverse areas and has enough capacity to be useable for at least 50 years.

Because of the distance of the ocean placement alternatives from the dredging area, a mechanical clamshell dredge would be used and the dredged material would be transported by bottom-dumping barges or scows to the placement site. The long distances, particularly for the deepwater placement area, needed to transport the dredged material make these placement alternatives the most costly, and they were eliminated from further consideration.

Beach Nourishment

Beach nourishment provides a beneficial use for dredged material that consists of clean sands. Based on consultation with Wahkiakum County, NorthernStar initially identified several beaches along Puget Island that would benefit from a beach nourishment project. Generally, beach nourishment projects entail placing dredged materials on a beach and in the adjacent aquatic areas. After the material has been placed, the beach must be graded at a uniform and gentle slope to minimize fish stranding problems and provide a safe beach. The dredged material must closely match the sediment composition of the eroding beach and be relatively free of contaminants. Costs for the beach nourishment alternative would be comparable to the Columbia River placement options plus some additional costs for grading and contouring.

Based on a feasibility study, the Wahkiakum County Sand Pit site was selected as a second proposed dredged material placement site along with the LNG terminal site for sediments dredged during construction of the ship berth and maneuvering area. The Sand Pit site is located on the northwest point of Puget Island across the Columbia River navigation channel from the Bradwood Landing LNG terminal site (see figure 3.1.9-1). The shoreline located between the Wahkiakum County Sand Pit and the federal navigation channel is subject to a combination of ship wakes, wind, and tidal effects that are currently eroding sand from the river beach at a rapid rate. Dredged material was most recently applied to the beach area in 2001 to mitigate the erosion.

Dredged material from the Bradwood Landing site would be placed within the existing upland settling basin at the Sand Pit site through a pipeline using a cutterhead pipeline dredge. Once drained, the sand would be moved from the settling basin and distributed by earthmoving equipment along the eroding shoreline and pushed into scour holes adjacent to the shoreline. The material would be dispersed as evenly as possible to avoid creating mounds. Furthermore, the beach would be graded to a minimum steepness of 10 to 15 percent to prevent the possibility of creating areas where fish could be stranded by wave action. No riparian vegetation is present that would be disturbed by the placement activities and no emergent vegetation was observed in the beach area. Up to 20,000 cubic yards of the dredged sand would be left within the settling basin to be used by Wahkiakum County for public projects. However, this alternative would only be viable if Wahkiakum County could successfully renew its permit for operation of the Sand Pit site. Wahkiakum County is currently seeking a permit to receive 205,000 cubic yards of material for beach protection at the Sand Pit site. Currently, it is uncertain when, or if, Wahkiakum County could obtain that permit. Project dredge material would be placed at the Sand Pit site up to the maximum permitted amount available at the time of dredging.

NorthernStar proposes to place approximately 80,000 cubic yards of material generated during maintenance dredging once every approximately 2 to 4 years at the Wahkiakum County Sand Pit site or another approved dredged material disposal site. Each round of maintenance dredging would take about 2 weeks and would be accomplished using a cutterhead suction dredge if placement is at the Sand Pit site. If a different dredge material disposal site is used, a clamshell/barge or hopper dredge would be necessary.

3.2 COAST GUARD ALTERNATIVES

On February 28, 2007, the Coast Guard issued its WSR to the FERC (Appendix G). This report indicated that the Columbia River waterway may be suitable for LNG marine traffic if certain safety and security measures are adopted. After the final EIS is produced, the Coast Guard will complete its review and issue an LOR to address the suitability of the waterways for LNG carrier transport.

The Coast Guard's proposed action is to issue an LOR finding the waterway suitable for LNG marine traffic with conditions. These conditions would include the safety and security measures described in the WSR, as discussed in detail in section 4.11.5.5. Among these measures are: 1) establishment of a 500-yard moving safety/security zone during LNG vessels' transit of the waterway, including the requirements for one-way LNG marine traffic along certain portions of the waterway such as at turns and for a 200-yard security zone around the LNG vessel when it is moored at the LNG terminal; 2) a 50-yard security zone around the LNG terminal when there is not a vessel at the dock; 3) an annual review by NorthernStar of its WSA to evaluate if any conditions in the waterway have changed that would require issuance of a new LOR and submit the annual review to the COTP for his/her review and issuance of a new LOR if necessary; 4) the requirement that LNG vessels must board a pilot(s) at least 5 miles before the CR Buoy and for at least the first 6 months, at least two pilots must be on board throughout the transit and that at least two tugs escort the vessel along the waterway with a third to assist with turning and mooring; 5) implementation of a Coast Guard-approved *LNG Vessel Transit Management Plan*; 6) improvements to the Columbia River's Vessel Traffic Information System; and 7) availability of Coast Guard as well as other safety and security resources to implement the above security measures. If these conditions to the LOR are imposed, the potential for accidental releases or releases from terrorist attacks would be minimized.

Reasonable alternatives to the Coast Guard's proposed action with conditions include: 1) issuance of an LOR finding the waterway suitable for LNG marine traffic without conditions; and 2) issuance of an LOR finding the waterway not suitable for LNG marine traffic (no action alternative). The Coast Guard's preferred alternative is to issue an LOR finding the waterway suitable for LNG traffic with certain conditions.

If the Coast Guard finds the waterway not suitable, project-related environmental impacts resulting from LNG marine traffic would not occur. However, the no action alternative would mean that the project objectives would not be met. If LNG carriers are not able to transit up the Columbia River to the import terminal, then the Bradwood Landing Project could not supply new sources of natural gas to meet projected future demands in the Pacific Northwest. As discussed in section 3.1.1, there are a number of environmental consequences that may result as potential users seek other sources of energy to replace the natural gas not imported in the case of a no action alternative where the Bradwood Landing Project is not constructed and operated.

A reasonable alternative to the Coast Guard action of issuing an LOR, which finds the waterway suitable for LNG marine traffic with certain conditions, is to issue an LOR without any conditions. With this alternative, some of the economic effects of the conditions would be lessened. For example, the cost to the Coast Guard for escort patrols would not be required if the condition of establishment of a moving

safety/security zone was not imposed; the cost to the facility for additional WSAs would not be required if the condition of requiring an annual review of the WSA was not imposed; the cost for vessel traffic information system improvements would not be required if the condition for additional equipment and personnel was not imposed; the cost to the facility for tug assistance would not be required if this condition was not imposed; and the cost for shoreline security patrols would not be required if the condition for a security zone around the facility was not imposed.

However, the potential for adverse environmental effects would be greater if conditions were not imposed. There would be an increase in the potential for adverse environmental effects from collisions, allisions, and terrorist threats if: 1) moving and stationary safety zones were not required; 2) the WSAs were not updated with the most current information on changes in the waterway; 3) vessel traffic information system improvements were not required; 4) an *LNG Vessel Transit Management Plan* was not implemented; and 5) the Coast Guard lacks resources to ensure implementation of the safety zones and other security measures.

The preferred alternative of issuing a conditional LOR would allow LNG marine traffic to reach Bradwood Landing and provide a new source of imported natural gas for customers in the Pacific Northwest to meet future demands. The conditions in the LOR would reduce adverse impacts associated with LNG marine traffic in the waterway by providing mitigation measures for safety and security of vessels in transit.

4.0 ENVIRONMENTAL ANALYSIS

The environmental consequences of constructing and operating the proposed Bradwood Landing Project would vary in duration and significance. Four levels of impact duration were considered: temporary, short term, long term, and permanent. A temporary impact generally occurs during construction with the resource returning to preconstruction condition almost immediately afterward. A short-term impact could continue for up to 3 years following construction. Impact was considered long term if the resource would require more than 3 years to recover. A permanent impact could occur as a result of any activity that modifies a resource to the extent that it would not return to preconstruction conditions during the life of the project. We considered an impact to be significant if it would result in a substantial adverse change in the physical environment.

In this section, we discuss the affected environment, general construction and operational impacts, and proposed measures to avoid, reduce, or mitigate impacts. Our discussion encompasses project-related impacts associated with the construction and operation of the LNG import terminal and the sendout pipeline. We also discuss the potential impacts on resources along the waterway for LNG marine traffic, extending to the Zones of Concern,¹ resulting from an accidental or intentional release of LNG from a ship in transit or at dock at the LNG terminal.

NorthernStar, as part of its proposal, agreed to implement certain measures to avoid, minimize, or mitigate impacts on specific resources. We evaluated NorthernStar's proposed measures to determine if they would adequately mitigate impacts. In cases where we felt that NorthernStar's proposed measures were less than adequate, where no mitigation measures were proposed, or where final design details requiring Commission review have yet to be developed, and to ensure that appropriate design requirements are implemented, we have added our recommendations to reduce impacts. These additional measures appear as bulleted, boldfaced paragraphs in the text. We will recommend that these measures be included as specific environmental conditions attached as an appendix to the Commission Order authorizing this project.

This EIS represents our independent analysis of the proposed action and the data submitted by NorthernStar. It includes the review of the proposal by the federal agencies cooperating in the production of the EIS: the Coast Guard and COE. Conclusions in this EIS are based on our analysis of environmental impacts, given the following assumptions:

- NorthernStar would comply with all applicable laws and regulations;
- the proposed facilities would be constructed as described in section 2.0 of this document; and
- NorthernStar would implement the mitigation measures included in the application and supplemental filings to the FERC.

¹ The "Zones of Concern" are described in Enclosure 11 of the Coast Guard's NVIC 05-05. These zones are based on the report entitled, Guidance on Risk Analysis and Safety Implications of a Large LNG Spill Over Water, produced by the U.S. Department of Energy, Sandia National Laboratories (2004). This "Sandia Report" and the Zones of Concern are discussed in more detail in section 4.11.5.3 of this EIS.

4.1 GEOLOGY

4.1.1 Regional Geologic Setting

The geology of the Pacific Northwest region is dominated by the Cascadian Subduction Zone (CSZ) driven by the convergence of the Juan de Fuca plate beneath the North American plate. The oblique northeast-trending subduction of the Juan de Fuca plate relative to the North American plate has created a seismically active margin, producing faulting, folding, and volcanic activity. The CSZ contains four distinct seismotectonic provinces: the Cascadia Accretionary Wedge, Rotating Block, Uplift and Transpression Zone, and Cascades (Wells et al., 1998). The proposed Bradwood Landing Project would be located within the Rotating Block, which includes the Oregon Coast Range and the Willapa Hills physiographic provinces.

The Coast Range province is bound by the western edge of the Willamette Valley to the east, the continental shelf to the west, the Columbia River to the north, and the Coquille River to the south. The province measures approximately 200 miles north to south, and ranges from 30 to 60 miles wide from east to west. Elevations of the Coast Range extend from sea level to an average crest elevation of 1,500 feet (Orr and Orr, 2000).

The Willapa Hills province is a portion of the Coast Range that extends north of the Columbia River into Washington. The Willapa Hills province extends west to the Pacific Ocean, southeast to the southern Cascades, northeast to the Puget Lowlands, and north to the Olympic Mountains (Livingston, 1978). The province measures nearly 100 miles north to south and approximately 80 miles east to west. Elevations of the Willapa Hills province range from sea level to approximately 3,100 feet.

Rock units of the northern Coast Range and the southern Willapa Hills physiographic provinces consist primarily of volcanic accreted terrain and tectonically uplifted sedimentary rocks. Portions of the provinces are covered with the Columbia River Basalt Group (CRBG), large scale basalt flow units originating from volcanic vents to the east. The CRBG units are exposed in 200-foot-high cliffs immediately southeast of the proposed LNG terminal. The most recent geologic units consist of stream deposited alluvium in the low-lying areas of the provinces (Orr and Orr, 2000).

Most of Oregon was below the surface of the Pacific Ocean at the beginning of the Tertiary Period, approximately 67 million years ago (mya). Topography in the western portions of Oregon and Washington began to take shape in the Tertiary Period as the Juan de Fuca plate accreted a series of volcanic islands onto the North American Continent. In addition, this tectonic activity uplifted the region, creating the mountains of the Coast Range. This regional uplift exposed the sedimentary rocks of the Coast Range in the middle to late Miocene (17 to 10.8 mya) (Orr and Orr, 2000; Newton and Van Atta, 1976).

During the same period of time, the Wanapum and Frenchman Springs members of the CRBG flowed into the low-lying areas along the Columbia River and the northern Oregon coast (Walsh, 1987). These basalt flows created rock units that are up to 500 feet thick and are believed to have formed intrusive dikes and sills in unconsolidated marine sediments of the Coast Range (Orr and Orr, 2000; Niem and Niem, 1985).

In recent time, the coastal regions of Oregon and Washington have continued to deform as a result of the Juan de Fuca plate subducting beneath the North American plate. Data suggests the coast range in the vicinity of the pipeline is deforming in a tilting manner, with uplift in the vicinity of Astoria, Oregon occurring at a rate similar to the depression rate in the vicinity of Rainier, Oregon (Orr and Orr, 2000). While published vertical deformation rates vary greatly, vertical uplift rates west of the LNG

terminal are believed to be on the order of 1 inch per 30 to 130 years (Orr and Orr, 2000; West and McCrumb, 1988). One study suggests the vertical deformation rate near Tillamook Head, Oregon is approximately 1 inch per 13 years (Kelsey et al., 1994).

The Columbia River has formed erosional features along the northern Coast Range and Willapa Hills exposing cliffs in the basalt and sedimentary rock units, and depositing alluvium on the order of 100 feet thick (Niem and Niem, 1985). Table 4.1.1-1 lists the stratigraphic units that underlie the Bradwood Landing Project area.

4.1.2 Waterway for LNG Marine Traffic

4.1.2.1 Stratigraphy

Rock units along the Oregon side of the waterway from east to west between the LNG terminal site and Youngs River are: the middle Miocene Gnat Creek Formation, consisting of nonmarine sandstones and mudstones; and the middle to lower Miocene Astoria Formation, consisting of deep marine mudstones and arkosic sandstones (Niem and Niem, 1985). Unconsolidated deposits along the waterway generally consist of Quaternary sand bars; islands; and estuarine clay, silt, and fine sand in low-lying coastal areas in and along the Columbia River. Unconsolidated deposits west of about Tansy Point consist of Quaternary dune sand and beach sand. Some of these deposits represent fill from dredged material placement. The Geologic Map of Washington (Schuster, 2002) also depicts primarily Tertiary sedimentary rocks along the Washington side of the waterway, with lower Tertiary volcanic rocks between Megler and Chinook.

4.1.2.2 Mineral Resources

Mineral resources in the area adjacent to the waterway include sand and gravel, as well as basalt rock, which can be crushed for construction material (Schlicker et al., 1972). With the possible exception of increased shoreline erosion (see section 4.1.2.3), LNG marine traffic would not effect mineral resources along the waterway. Because the LNG carriers would be restricted to the established navigation channel, where any mineral resource development is already precluded, the LNG marine traffic associated with the Bradwood Landing Project would not have an impact on future development of mineral resources.

4.1.2.3 Geologic Hazards

The only geologic hazard that would affect or be influenced by the LNG marine traffic along the waterway is shoreline erosion. The effect of LNG carriers on shoreline erosion at and in the vicinity of the proposed LNG terminal is discussed in section 4.1.3.3. Shoreline erosion along the remainder of the waterway is discussed below.

Shoreline erosion along the Columbia River is caused by river currents, wind waves, and ship wakes. River currents can erode banks and carry sediment away from the shoreline. Wind waves and ship wakes can also erode banks but they only move sediment locally within the shallow water zone near the shore. The amount of erosion that occurs at a particular location depends on the interaction between the eroding forces of river currents and waves and the resisting forces of the river bank (COE, 1999).

The Columbia River's natural shoreline consists of basalt outcrops and sand, silt, and clay deposits. Most of the natural shoreline is resistant to erosion, there has been little change in the river's location over the last 6,000 years. Erosion of the natural shoreline has only occurred at a few isolated locations. One such location is the upstream end of Price Island (CRM 34-35) where river currents are eroding a 1-mile stretch of bank at a rate of about 10 feet per year (COE, 1999).

TABLE 4.1.1-1

Generalized Stratigraphy in the Proposed Bradwood Landing Project Area

Age	Formation / Estimated Thickness	Aquifer	Lithology	Water Bearing Properties
Recent	Fill and spoil Variable	NA	Predominantly poorly graded fine sand with occasional silt, gravel, and construction debris.	NA
Quaternary Holocene to Pleistocene	Alluvium 100 feet	Quaternary sediment deposits	Unconsolidated flood plain deposits of clay, silt, sand, and basalt gravel.	Yields small to large supplies of water of variable quality sufficient for municipal, domestic, and stock use.
	Landslide debris Variable		Unconsolidated sand, silt, and clay.	Yields small supply of water, but is limited in aerial extent.
	Terraced sediments 25-100 feet		Silt, sand, and gravel of diverse compositions and origins, such as proglacial outwash, older alluvium, lahars, and uplifted coastal marine and estuary deposits.	Yields moderate to large supply of water, but is limited in aerial extent. Sufficient for municipal, domestic, and stock use.
Tertiary Middle to Upper Miocene	Saddle Mountain Basalt 300 feet	Undifferentiated	Fine grained, sparsely phyric tholeiitic and olivine flood basalt with sedimentary interbeds of tuffaceous sandstone, siltstone, and pumiceous conglomerate.	Rock formation yields small amounts of water, but joints and fissures within rock and coarse grained interbeds can produce large quantities of freshwater suitable for public, domestic, and stock use.
Tertiary Middle Miocene	Gnat Creek Formation 700 feet	Tertiary Rocks of the Coast Range	Massive, coarse to fine-grained, arkosic sandstone to siltstone.	Yields small to moderate supplies of water of variable quality sufficient for domestic and stock use.
Tertiary Middle Miocene	Wanapum Basalt, Frenchman Springs Member 500 feet	Undifferentiated	Sub-aerial, fine to medium basalt flows and associated pillow basalt breccias.	Rock formation yields small amounts of water, but joints and fissures within rock and coarse grained interbeds can produce large quantities of freshwater suitable for public, domestic, and stock use.
Tertiary Middle Miocene	Miocene Sandstone Interbed 200 feet		Arkosic, fine-grained sandstone interbedded between Frenchman Springs and Grande Ronde Formations.	
Tertiary Middle Miocene	Grande Ronde Basalt 500 feet		Mostly sub-aerial, columnar-jointed basalt flows and associated basal basalt breccias and pillow lavas.	
Tertiary Middle to Upper Eocene	Grays River Basalt Unknown		Aphyric to sparsely phyric basalt flows, flow breccias, aquagene tuff, pillow basalt, and interbedded siltstone and sandstone.	
Tertiary Eocene	Cowlitz Formation 2,000 feet		Very fine to coarse grained feldspathic sandstone, laminated siltstones, tuffaceous siltstone, and lignite.	
NA	Not Applicable			
Sources:	Beaulieu, 1973; Myers, 1970; Newton and Van Atta, 1976; Niem and Niem, 1985; McFarland, 1983; URS, 2005; Walsh et al., 1987.			

About half of the Columbia River shoreline between CRMs 21 and 106 consists of material deposited in the course of earlier dredging. These dredged material placement sites are highly susceptible to erosion by river currents and waves. The rate of erosion at these sites depends on river bathymetry, time since placement of dredged materials, proximity to the navigation channel, wind fetch, current pattern, and the amount and type of bank protection (COE, 1999).

The only element of the proposed project with the potential to affect the rate of shoreline erosion along the waterway is the passage of LNG carriers. Little information is available on the degree to which erosion of the Columbia River shoreline can be attributed to ship wakes. A 1990 study measured erosion rates at three locations, Price Island (CRM 34-35), Puget Island (CRM 38-44), and Gull Island (CRM 55), in the first year after placement of dredged material and concluded that 4 to 24 percent of the erosion was attributable to ship wakes (COE, 1999).

Large waves contain more energy than small waves and thus, have a greater ability to erode river banks. The size of waves produced by a vessel passing through a channel depends on the characteristics and speed of the vessel and the characteristics of the channel. An analysis undertaken for the COE concluded that the size of ship-produced waves in the Columbia River depends on the blockage ratio, which is the ratio of the cross-sectional area of the ship to that of the channel (COE, 2003).

NorthernStar commissioned a study of wave generation by LNG carriers, which compared wave generation by an Aframax tanker, representative of a large ship that works the Columbia River, with an LNG tanker. The Aframax tanker had an overall length of 761.2 feet, a beam or breadth of 137.8 feet, a loaded draft of 39.7 feet and a submerged or blockage area of 5,471 square feet. The LNG carriers would have an overall length of 944.6 feet, a beam of 148.3 feet, a loaded draft of 38.4 feet and a submerged or blockage area of 5,695 square feet. The study indicated that waves generated by LNG carriers would be only slightly larger than those generated by an Aframax tanker operating at the same speed.

The proposed project would only increase ship traffic along the reach of the river between its mouth and the LNG terminal site by about 7 percent; however, deep-draft vessel traffic would increase by about 25 percent. The LNG carriers would be larger than most of the deep-draft ships currently using the Columbia River, although larger ships are expected to transit the Columbia River once the Columbia River Channel Improvement Project is completed. Because the blockage ratio of the LNG carriers would be greater than that of most of the deep-draft ships currently traveling the Columbia River, the LNG carriers could potentially produce larger waves than most of the current ships operating at the same speed. LNG carriers would travel at speeds between 8 and 12 knots while on the Columbia River.

In summary, the degree to which current ship traffic affects shorelines along the waterway is difficult to quantify due to the various other factors which contribute to shoreline erosion and accretion processes. Therefore, it is difficult to determine what additional impacts on shorelines the proposed LNG marine traffic would contribute. The FERC staff continues to study this issue and additional analysis regarding shoreline erosion will be included in the revised BA. The potential impacts of shoreline erosion on wetlands are discussed in section 4.4.1.1 and on aquatic resources in section 4.5.1.1.

4.1.2.4 Paleontological Resources

Although LNG marine traffic could contribute to the shoreline erosion caused by ship traffic in general, such erosion mainly affects unconsolidated recent sediments, which would not contain any significant paleontological resources. Therefore, LNG marine traffic would not have an impact on paleontological resources.

4.1.3 LNG Terminal

4.1.3.1 Stratigraphy

The Bradwood Landing LNG terminal site is currently covered by fill and native alluvium. Fill was originally placed at the site by the COE around 1930 to raise the land prior to construction of the former saw mill and town of Bradwood. After the mill was closed, between 1966 and 2002 the COE placed at Bradwood approximately 873,000 cubic yards of material dredged while maintaining the Columbia River navigation channel (AMEC, 2005). Recent alluvial deposits are present in the southwestern portion of the site along the banks of Hunt Creek. The site is relatively flat and level, with the exception of the dredged sand fill stockpiles, which are several feet in height. The average elevation of the site is approximately 14 feet above mean sea level (msl). The stratigraphic units at the proposed LNG terminal are briefly described below.

Fill. Fill material at the proposed Bradwood Landing LNG terminal site is mostly comprised of poorly graded fine sand with occasional silt, and gravel. One of the geotechnical soil borings placed at the site by NorthernStar indicates possible fill occurring from the surface to a depth of about 10 feet. The other soil borings do not distinguish subsurface fill material (URS Corporation (URS), 2005). The dredged material occurs in stockpiles at least 15 feet high.

Alluvium. Alluvium underlies the fill at the proposed LNG terminal and is present at the ground surface along the Columbia River. The alluvium consists of unconsolidated sands, silts, and clays that were stream deposited during recent geologic time as sorted or semi-sorted sediment in the stream bed, on its flood plain or delta, or as a cone or fan at the base of a mountain slope (Niem and Niem, 1985; Beaulieu, 1973).

The alluvial deposits at the proposed LNG terminal can be further broken down into the following stratigraphic units, based on soil borings conducted at the site (URS, 2005):

- *Near Surface Fine-Grained Soils.* A 20- to 25-foot-thick layer of silts, clays, and silty sands is present at the surface. These deposits represent the former surficial soils deposited on the Hunt Creek floodplain and consist predominantly of soft to clayey silts, elastic silts, and silty clays with interbedded layers of loose to medium dense silty sands and sandy silts.
- *Upper Alluvial Sand Sequence.* A 50- to 60-foot-thick layer of alluvial sands underlies the surficial floodplain deposits and consist predominantly of relatively uniform poorly graded sands and silty sands deposited by the Columbia River.
- *Estuarine Silts and Clays.* A thick package of relatively uniform silts and elastic silts ranging in thickness from 50 to 60 feet underlies the upper alluvial sands. These silts range from very soft to stiff in consistency and locally exhibit organics and interbeds of sandy and clayey silts as well as lean clays. This unit likely represents an estuary that formed adjacent to the ancient Columbia River. When sea level rose at the close of the last ice age, this estuary was buried by modern alluvial deposits.
- *Lower Alluvial Sand Sequence.* A 25- to 45-foot-thick layer of alluvial sands was encountered below the estuarine silts in the borings advanced to depths of 150 feet or greater at the site. These sediments were deposited by the ancient Columbia River when global sea levels were much lower than at present and consist predominantly of poorly graded sand with silt and silty sands.

Gnat Creek Formation. During periods between flood basalt eruptive sequences in the middle Miocene epoch, local streams and the ancient Columbia River system deposited micaceous and carbonaceous arkosic sandstone with minor siltstone beds known as the Gnat Creek Formation, which was eventually capped by subsequent flows of flood basalts. The Gnat Creek Formation unconformably overlies the Frenchman Springs Member of the CRBG, is overlain west of the proposed LNG terminal site by the Pomona Member of the CRBG, and can occur in thickness up to 650 feet (Niem and Niem, 1985). In outcrop the Gnat Creek Formation consists of a light brown, very weak, moderately to highly weathered friable sandstone that is poorly bedded. Exposures of the Gnat Creek Formation are visible along the base of the cliffs immediately southeast of the proposed LNG terminal, as well as along road cuts east of the site entrance. Sandstones along these cuts are complexly interbedded with siltstone and some conglomerates. These exposures of the Gnat Creek Formation in the vicinity of the proposed LNG terminal site are relatively devoid of joints, cleavage, or evidence of shears or faulting (URS, 2006a).

Columbia River Basalt Group. The CRBG represents Miocene age flood basalts that erupted from feeder dikes and vents in Northeastern Oregon and Southeastern Washington during Miocene time (between 6 and 17 mya), eventually mantling over 63,000 square miles of the Pacific Northwest with basalt flows. Some of these flows traveled down the ancestral Columbia River channels, eventually reaching the Pacific coastline. At the proposed LNG terminal, basalt flows exposed in the cliffs south of the site can be traced from southeast of the site to the west and past Hunt Creek. The waterfall near the mouth of Hunt Creek spills over this basalt outcrop, which appears to pinch out a few hundred feet to the west of the waterfall. In outcrop the basalt is dark gray, strong to very strong, and is slightly to moderately weathered. Specific units encountered in the vicinity of the proposed LNG terminal are discussed below.

- *Wanapum Basalt.* Outcrops of the Frenchman Springs Member of the middle Miocene Wanapum Basalt formation are located in cliffs to the southeast of the proposed LNG terminal. The Frenchman Springs basalt is fine to medium-textured and can contain extensive areas of pillow basalt breccias. The Frenchman Springs Member is approximately 500 feet thick in the vicinity of the proposed LNG terminal (Niem and Niem, 1985).
- *Miocene Sandstone Interbed.* The Miocene Sandstone Interbed separates the Wanapum Basalt and the underlying Grande Ronde Basalt. The sandstone is arkosic, fine grained, and can occur in thicknesses of up to 200 feet. A small outcrop is present approximately 2 miles to the south of the proposed Bradwood Landing LNG terminal (Niem and Niem, 1985).
- *Grande Ronde Basalt.* The Grande Ronde Basalt formation is located at depth below the proposed LNG terminal. Like the Wanapum Basalt, the Grande Ronde Basalt is a middle Miocene member of the CRBG. However, the Grande Ronde Basalt is approximately 300,000 years older than the Wanapum Basalt. The Grande Ronde formation is sub-aerial, columnar jointed, and includes some areas of basalt breccias and pillow lavas (Niem and Niem, 1985).

4.1.3.2 Mineral Resources

NorthernStar conducted a data search to identify any mineral resources or mining activity within 1,500 feet of the LNG terminal. Data on file with the Oregon Department of Geology and Mineral Industries (DOGAMI) and the BLM indicate that one permitted rock quarry is within the specified search radius. This small quarry, referred to as the Bradwood Quarry, is located within the 411-acre parcel under option to NorthernStar (see figure 2.3.2-1). The quarry was permitted in 1984 as a potential source of

basalt for construction purposes, and the soil overburden was removed from an area of about one-half acre in size. The quarry has never been actively worked; however, the permit has been kept current.

The current landowner (Ken Leahy) possesses the permits for and mineral rights to the Bradwood Quarry. These rights and permits (including DOGAMI Permit No. 04-0067) would transfer to NorthernStar with the sale of the property. NorthernStar may use the quarry as a source of basalt rock to be crushed for sand and aggregate during site construction. NorthernStar would obtain all necessary additional permits (e.g., Clatsop County development permit and NPDES stormwater discharge permit) and comply with applicable regulations associated with further development of the quarry. Before operation of the LNG terminal, the quarry would be decommissioned and reclaimed in accordance with DOGAMI regulations. The reclamation plan would be submitted with the operating permit application. Accordingly, there would be no risk to the operation of LNG terminal from mining activities related to the Bradwood Quarry, such as blasting, or other mining related impacts. Further, because any below-grade quarry excavations would be filled with appropriate fill material to site grade during reclamation, as required by DOGAMI regulations, no subsidence, slumping, landsliding, or other ground failure would occur in the quarry area during operation of the LNG terminal.

4.1.3.3 Geologic Hazards

Potential geologic hazards that could impact the terminal and pipeline facilities of this project can be separated into short-term and long-term events or conditions. Short-term events include:

- soil mass wasting and rock slope failure;
- seismicity and faulting;
- soil liquefaction and lateral spreading;
- volcanism and lahars; and
- flooding, tsunamis, seiches, and landslide-induced waves.

Long-term events or conditions include:

- slope instability and inadequate load bearing capacity of soils;
- shoreline erosion;
- subsidence;
- karst features; and
- corrosive soils.

These geologic hazards, their potential to occur in the project area, and proposed mitigation measures, where applicable, are further described below for the LNG terminal and the general project area. Geologic hazards that are specific to the pipeline are discussed in section 4.1.4.3. Geologic hazards as they relate to the waterway for LNG marine traffic were addressed in section 4.1.2.3. In general, the risk of damage resulting from geologic hazards would be avoided or reduced by specific engineering design criteria, ground modification, other construction techniques, and operating procedures to be implemented by NorthernStar.

Soil Mass Wasting and Rock Slope Failure

Mass wasting and rock fall result from the natural process of gravity acting upon a block of material over time. Mass wasting refers to all soil-related slope failures, including landslides, slumps, and debris flows. Rock slope failures include slab failures, wedge failures, falls, and toppling.

The existing topography at the proposed LNG terminal site does not present any slope geometry that would likely result in a soil mass wasting event that could reach the terminal facility. Debris flows or landslides initiated within the Hunt Creek drainage would proceed northward through the wetlands and mitigation areas west of the terminal and could not reach the terminal facilities.

Rock slopes near the site are relatively flatly bedded. Accordingly, slab and wedge failures are not anticipated in the vicinity of the terminal. However, the basalt cliff located south of the site contains many discontinuous joints, presenting a potential rock fall or toppling hazard at the base of the cliff. The rock fall may be produced by toppling, block failure, or planar and/or wedge failure.

The risk of rock fall runout proceeding north of the proposed railroad track realignment is not considered likely due to the beneficial energy dissipation characteristics of the on-site soils as well as site geometry. The separation distance between the cliffs and the nearest LNG storage tank is about 250 feet, greater than likely rock fall runout distances. Moreover, the sand deposits at the base of the cliff have excellent energy dissipation characteristics, and the construction of the proposed 5-foot-high tertiary containment berm would prevent rocks that overcame the first two conditions from reaching the facilities.

In 1965, a landslide occurred approximately one-half mile upriver of the Bradwood Landing site. The landslide created a wave in the Columbia River that resulted in the loss of one life and property damage on a small portion of Puget Island (Wahkiakum County Eagle, 1965).

The *Washington State Hazard Mitigation Plan* (Washington Emergency Management Division, 2004) indicates that in the 1890s, a poorly documented, landslide-triggered wave near Cathlamet killed one person on Puget Island. As described above, landslides in the vicinity of the proposed LNG terminal would be unlikely to reach the terminal facilities. Tsunami risks are discussed below.

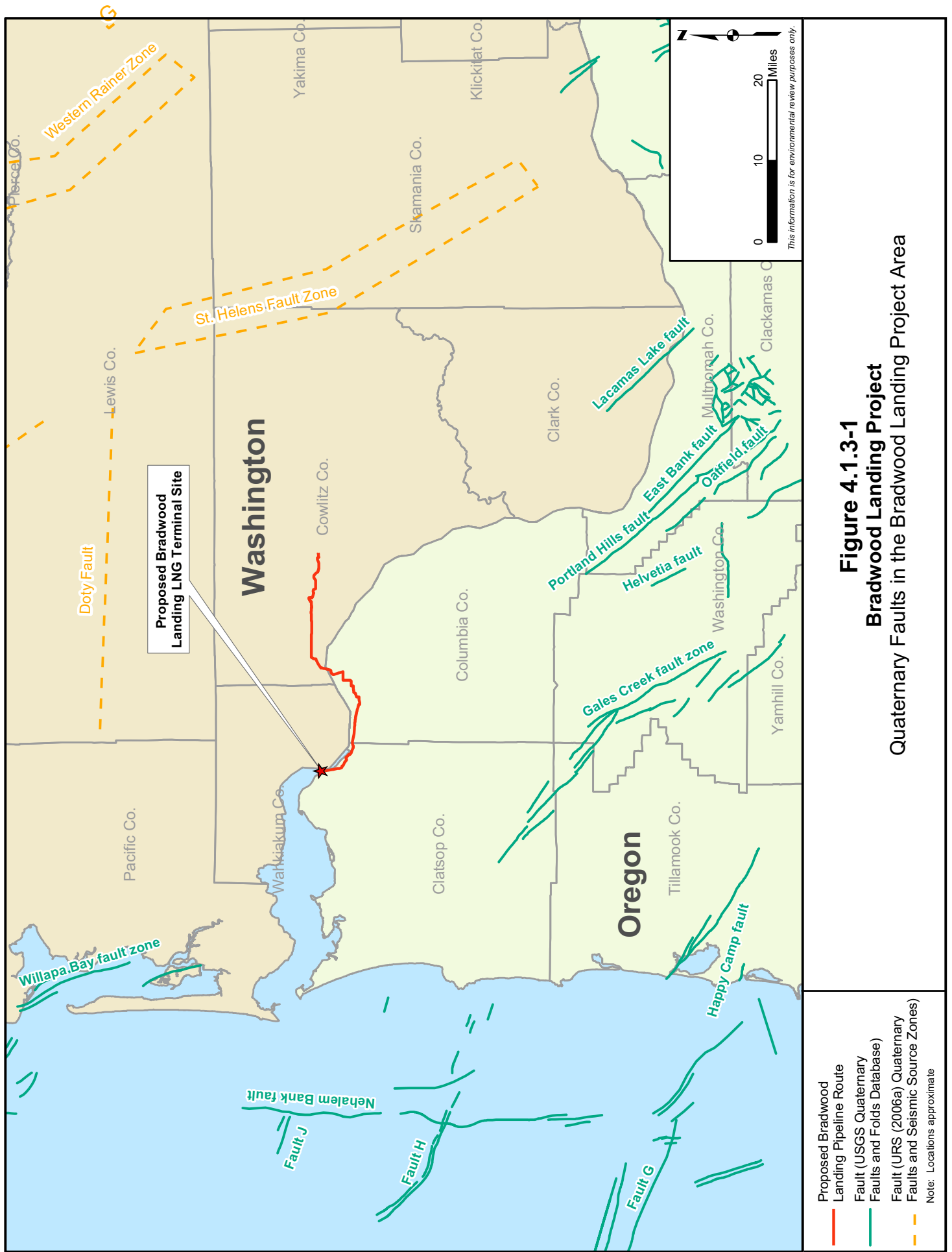
Seismic-Related Hazards

Potential seismic-related hazards include earthquakes, surface faulting, soil liquefaction, and related soil failures. The Pacific Northwest coastal region of the United States is a tectonically active region that has significant potential for seismic activity. Northwestern Oregon and southwestern Washington comprise an area of diffuse seismicity with a few areas of concentrated seismicity. The Portland area is the most seismically active area in Oregon (URS, 2006a). Most events are not associated with known faults. Figure 4.1.3-1 depicts Quaternary faults, primarily from the USGS Quaternary faults and folds database (USGS, 2006).

Significant earthquakes that have occurred in the project region are described in the seismic hazard analysis for the LNG terminal (URS, 2006a).² The most recent of these are the 1993 Scotts Mills earthquake (magnitude 5.6), the 1999 Satsop earthquake (magnitude 5.9), and the 2001 Nisqually earthquake (magnitude 6.8).

According to URS (2006a), the seismogenic crust, typically 15 to 20 kilometers thick, may be significantly thicker (20 to 30 kilometers) within the project area, resulting in fewer surficial faults in the region. URS (2006a) estimates that in the vicinity of the LNG terminal site, an earthquake with a magnitude of 7.0 or greater would be required to cause surface rupture. As such, deep seated faults could potentially exist in the project area without showing visible signs of faulting or deformation at the ground surface.

² URS's Final Report, Seismic Hazard Analysis for LNG Import Terminal, Bradwood, Oregon dated February 2006 is available on the FERC's website. Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number, excluding the last three digits, in the "Docket Number" field (i.e., CP06-365 and CP06-366). Be sure to select an appropriate date range.



URS (2006a) found no evidence of active faults within 1 mile of the proposed LNG terminal site based on: 1) review of relevant literature; 2) examination of aerial photographs; 3) review of boring logs and cross sections; and 4) site reconnaissance. Review of geologic maps indicated only one potential fault within 2 miles of the site (Niem and Niem, 1985). Site reconnaissance revealed no evidence of ground rupture or faulting. The closest mapped Quaternary faults to the LNG terminal site are the Doty fault, approximately 27 miles to the north, and the Gales Creek fault zone, approximately 25 miles to the south (see figure 4.1.3-1). Based on these observations, URS concluded the potential for ground rupture at the Bradwood Landing LNG terminal is negligible.

Since 1980, when seismograph coverage became adequate to record and locate smaller earthquakes, seismicity has occurred at a moderate level within 30 miles of the proposed LNG terminal (URS, 2006a). The largest recorded event was a local Richter magnitude 3.7 earthquake that occurred in 1984 about 21 miles east of the site.

As discussed in URS (2006a), the CSZ has experienced no significant earthquakes in the historical period (i.e., since about 1850) (Weaver and Shedlock, 1996; Personius and Nelson, 2003), with the possible exception of the 1992 magnitude 7.0 Petrolia, California, earthquake that may have occurred on the interface or within the overriding plate. The absence of seismicity, as well as geodetic (e.g., Flück et al., 1997; Savage et al., 2000) and geologic (e.g., Atwater, 1987; Atwater et al., 1995; Clague, 1997) studies, indicate that the interface is locked and storing strain that is released in great earthquakes. Some geologic investigations on and offshore suggest that the CSZ is segmented and ruptures in approximately 8 to 8.5 magnitude earthquakes. However, the most recent event is believed to have ruptured the entire length of the subduction zone in an earthquake estimated by Japanese tsunami records at a magnitude of 8.7 to 9.2 (Satake et al.; 1996, 2003). Paleoseismic studies indicate a range of recurrence interval estimates for megathrust events along the CSZ, but the most complete studies suggest an average recurrence interval of about 500 years (e.g., Adams, 1990; Atwater and Hemphill-Haley, 1997; Goldfinger et al., 2003; Witter et al., 2003).

DOT Seismic Design Requirements (NFPA 59A-2001)

The seismic design requirements for LNG facilities are contained in the U.S. Department of Transportation regulations at 49 CFR Part 193, which adopts the seismic design provisions of the NFPA 59A (2001). NFPA 59A (2001) defines two levels of earthquake motions, the Operating Basis Earthquake (OBE) and the Safe Shutdown Earthquake (SSE). The OBE and SSE ground motions must be determined by site-specific evaluations and are defined in terms of 5 percent damped response spectra with the following probability levels:

The OBE ground motions at the site are defined as the lesser of:

1. ground motion with a 10 percent probability of exceedance within a 50-year period (475-year return period); or
2. two-thirds (2/3) of the Maximum Considered Earthquake (MCE) ground motion

In NFPA 59A (2001) the MCE is defined as future potential ground motion with a 2 percent probability of exceedance within a 50-year period (2,475-year return period) with deterministic limits.

The SSE ground motions at the site are defined as the lesser of:

1. 1 percent probability of exceedance within a 50-year period (4,975-year return period); or
2. 2 times the OBE.

These motions would be used as the basis for the earthquake-resistant design of the LNG facility, applied to the following limited specific list of critical safety-related structures, systems, and components per NFPA 59A (2001) 4.1.3:

1. LNG storage containers and their impounding systems;
2. system components required to isolate the LNG container and maintain it in a safe shutdown condition; and
3. structures and systems, including fire protection systems, the failure of which could affect the integrity of (1) or (2) above.

NFPA 59A (2001) specifies that the above-referenced structures, systems, and components must be designed to remain operable during and after an OBE, and must provide for no loss of containment capability of the primary container during and after an SSE. The facility design must also provide for the ability to isolate and maintain the LNG container during and after an SSE. After an SSE event, the container must be emptied and inspected prior to resumption of container filling operations. At a minimum, the impounding system must be designed to withstand an SSE while empty, and an OBE while holding the maximum operating volume of the LNG container. Seismic recording instrumentation is also required.

FERC Seismic Design Guidelines for LNG Facilities

There are areas where NFPA 59A (2001) does not provide specific seismic design requirements to enable a comprehensive philosophical approach to the overall seismic safety of an LNG facility. Consequently there can be a wide range of opinions by technical experts on how various requirements are to be applied. In its “*Draft Seismic Design Guidelines and Data Submittal Requirements for LNG Facilities*” (FERC Seismic Guidelines), January 2007, FERC Staff gives specific guidance to applicants on its interpretation of the requirements of NFPA 59A (2001), providing consistent design specifications throughout the United States, and a basis for uniform reviews of various LNG terminal sites, structures, components, and systems under FERC jurisdiction.

In general, the FERC Seismic Guidelines are based on existing rules and procedures found in ASCE 7-05, ASCE 4-98, API 650 Appendix E, and other current standards documents applicable to LNG facilities. The guidelines also rely on the National Seismic Hazard Maps and the 2006 International Building Code (2006 IBC) MCE Ground Motion Maps, which were developed specifically for use in the design of buildings and other structures in the United States by the USGS.

The FERC Seismic Guidelines classifies the structures, components and systems identified in NFPA 59A (2001) 4.1.3. - ((1), (2), and (3) above), as “Seismic Category I.” The remaining structures, systems and components are classified as either Seismic Category II or III.

Seismic Category II and III structures, systems and components are to be designed in accordance with the seismic design requirements of ASCE 7-05 (i.e., 2006 IBC). Category II structures, systems, and components must meet the seismic performance goals for “essential” facilities. Category II facilities are expected to survive the Design Earthquake (DE), which is two-thirds the MCE, with potential structural damage that would not be so severe as to preclude continued occupancy and function of the facility. An “Importance Factor” (“I” or “I_p”) of 1.5 is specified for design of Category II facilities.

Category III facilities are considered “non-essential.” Normal, non-essential facilities would be designed for the DE in accordance with ASCE 7-05, and are expected to sustain repairable damage when

subjected to DE ground motions, although it may not be economical to do so. An I_p of 1.0 is specified for design of Category III facilities.

The FERC Seismic Guidelines also provide guidance in determining the appropriate Site Class spectral amplification values and long-period spectra displacement cutoff transition period per ASCE 7-05, inelastic reduction factors for the SSE, minimum safety factors for tank foundation loading and settlement, minimum freeboard requirements for LNG sloshing heights, and selection and location of seismic recording devices.

Geotechnical Site Characterization

The surficial materials are primarily poorly graded dredged sands. Subsurface conditions generally consist of softer compressible soils that represent the larger historic log pond areas and surficial fills used in past site development. These soft soils mantle an upper alluvial sand unit consisting of relatively uniform, medium to fine grained, poorly graded sand ranging in depth up to 86 feet below the ground surface (bgs). This upper sand unit is in turn underlain by up to 59 feet of soft, compressible estuarine silts and clays (from approximately 85 to 135 feet bgs). This zone of silts and clays is in turn underlain by a lower (across the majority of the site) sand unit consisting of medium dense to dense sands. These materials are underlain by the weathered surface of the Columbia River Basalt bedrock at depths ranging from 113 to 181 feet across the site.

The site liquefaction potential was evaluated by URS and they determined that without soil improvement, the upper 75 to 85 feet of the loose to medium dense granular material materials below the water table would liquefy with estimated post-earthquake settlements on the order of 1 to 2 feet for the OBE and SSE events, respectively.

The measured shear velocity, V_s , of the soils profile varies non-uniformly between 220 feet per second (ft/s) at the surface to 740 ft/s at depth of 180 feet. Below a depth of 180 feet, basalt bedrock is encountered, which has a shear wave velocity that is greater than 2,500 ft/s. The average shear wave velocity in the upper 100 feet of the soil profile is about 500 ft/s. This shear wave velocity along with the observation that a significant portion of the overlying soil is susceptible to liquefaction potential characterizes the soil profile as Site Class F in accordance with the provisions of the 2006 IBC (and, by definition, 2007 Oregon State Structural Specialty Code) and ASCE 7-05.

Controlling Seismic Events

Based on deaggregation of seismic sources from the URS Probabilistic Seismic Hazard Analysis (PSHA), for earthquake return periods greater than 200 years, the controlling seismic source is the CSZ megathrust earthquake. The CSZ extends along the coasts of northern California, Oregon, Washington and southern Canada. Since the OBE, SSE, and the MCE all have return periods considerably greater than 200 years, earthquakes on the CSZ are the controlling seismic events for input design motions. The URS PSHA considered three different scenario events for the CSZ megathrust earthquake corresponding rupture distances of 63 km, 46 km and 37 km, respectively from the site. The URS PSHA has also considered three different maximum moment magnitudes (**M**), for the CSZ megathrust, of 8.5, 9.0 and 9.2 respectively, with the **M** 9.0 given the highest weighting.

Input Ground Motions

Input ground motions for the terminal site (also called Design Ground Motions) were determined based on site-specific seismic hazard analysis prepared for the project by URS. The input ground motions were developed prior to the publication of the FERC Seismic Design Guidelines and the adoption of the

2007 Oregon Structural Safety Specialty Code (2006 IBC). Conditions are provided as part of this EIS that will assure that both the FERC Seismic Guidelines (and consequently, the 2007 Oregon Structural Safety Specialty Code) are satisfied. The input ground motions for the project recommended by URS are as follows:

- The URS site-specific MCE ground motion parameters (not adjusted for site effects) are $S_s = 0.80g$ and $S_1 = 0.42g$. The site specific MCE ground motion parameters based on site response analysis are $S_{MS} = 0.817g$ and $S_{M1} = 0.611g$. The site-specific MCE peak horizontal ground acceleration (not adjusted for site effects) is $0.36g$. The site-specific horizontal ground acceleration MCE adjusted for site effects is $0.33g$.
- The site-specific DE ground motion parameters adjusted for site effects (which are two-thirds of the MCE value adjusted for site effects) are $S_{DS} = 0.54g$ and $S_{D1} = 0.41g$. The site specific DE peak horizontal ground acceleration is $0.22g$.
- The OBE was taken as the earthquake ground motion having a ground motion probability of exceedance of 10 percent in 50 years (Return Period = 475 years) at the Cascadia River Basalt bedrock level. Soil structure interaction analysis will be performed during detailed design to determine the OBE response of structures and foundations at the ground surface. The OBE design ground motion response spectra for the site at the Cascadia River Basalt bedrock level has a peak horizontal ground acceleration (i.e., zero period acceleration) of $0.20g$. The vertical OBE design ground spectra (taken as two-thirds of the horizontal spectra for the site at the Cascadia River Basalt bedrock level has peak vertical ground acceleration for the site of $0.13g$.
- The SSE was taken by URS as equal to twice as great as the OBE in accordance with NFPA59A-2001. The SSE design ground motion response spectra, therefore, has a SSE peak horizontal ground acceleration at the Cascadia River Basalt bedrock level of $0.40g$. The vertical SSE design ground motion has a peak vertical ground acceleration for the site at the Cascadia River Basalt bedrock level of $0.27g$.

Proposed Site Improvements

The LNG tanks would be supported on deep pile foundations. No site improvements are planned for under the LNG tanks. Other Category I and II structures would either be supported on deep pile foundations or would have an improved subgrade condition. The site improved subgrade condition would be a combination of removal, replacement, and compaction of the weak surface layer in combination with either vibroflotation or stone columns. The area of improvement would extend at least 10 feet beyond the edge of the foundations. Final design decisions for foundation improvements would be done during detailed engineering.

Category III structures are proposed to be supported on mat foundations. Subgrade improvement design decisions including removal, replacement, and compaction of the weak surface layer would be done during detailed engineering.

In addition, the project intends to construct a 60-feet-wide by 1,500-feet-long by 85-feet-deep vibroflotation improved zone along the terminal river bank to stabilize the site area and to prevent significant lateral spreading. The width of this zone is a preliminary estimate and the actual width would be determined during final design.

Conditions are recommended as part of this EIS that would assure that final site improvement designs would satisfy the FERC Seismic Guidelines. Therefore, the 2007 Oregon Structural Safety Specialty Code would also be satisfied.

Proposed Foundation Design

The LNG tanks would be supported on deep pile foundations. The piles would either be driven steel pipe piles, augercast piles or driven grout piles. The selection and depths of the piles would be determined following a pile test program. While not stated in the URS reports, it is expected the pile depths would be between 120 to 180 feet below the ground surface. Downdrag loads would be considered in the deep pile design.

Other Category I and II structures would either be supported on deep pile foundations or would have an improved subgrade condition. Category III structures are proposed to be supported on mat foundations founded on an improved subgrade condition.

Conditions are recommended as part of this EIS that would assure that final foundation designs would satisfy the FERC Seismic Guidelines. Therefore, the 2007 Oregon Structural Safety Specialty Code would also be satisfied.

Board of Consultants

Given the high seismic risk associated with proximity of the proposed LNG site to the CSZ, the high seismic loads and performance criteria that the facility must accommodate in the event of an SSE, the special design measures required to mitigate the liquefaction potential and potential for lateral spreading, and the need to ensure that all the critical safety-related structures, systems, and components of the facility are properly designed, seismically qualified, and implemented as anticipated, it is essential that all of the required civil and structural design measures be assessed by a qualified independent entity. Therefore, **we recommend that:**

- **Prior to construction of the LNG terminal and pipeline, NorthernStar should retain a “Board of Consultants” (Board) composed of three or more qualified independent engineering consultants experienced in the critical disciplines of geotechnical, civil, structural, and mechanical engineering, to review the final design and to perform construction quality inspections of the civil and structural aspects of the project in accordance with the specifications contained in the FERC’s Draft Seismic Design Guidelines and Data Submittal Requirements for LNG Facilities (FERC Seismic Guidelines) and other measures agreed to by NorthernStar. NorthernStar should file with the Secretary the names and qualifications of the Board members for approval by the Director of OEP.**

The Board should certify that all civil and structural detailed design calculations, analyses, and construction documents are in compliance with all applicable codes and standards, project-specific civil, structural, and mechanical design criteria, and other engineering requirements of the Order, including the FERC Seismic Guidelines. The Board should further certify, based on construction inspections by the Board that all civil and structural construction of the terminal facilities is in conformance with the project construction documents. The Board should also certify that all procured equipment has been properly seismic qualified in conformance with the project-specific seismic qualification requirements, and the FERC Seismic Guidelines, that seismic detailing of structures has been properly

implemented, and the pipeline has been designed to minimize the hazard of rupture due to ground instability. Among other things, the Board should assess the adequacy of the following:

- final geotechnical investigations necessary to support all final foundation designs in satisfying the FERC Seismic Guidelines, and final pipeline routing/mitigation measures through geologically hazardous areas;
- field tests and associated results used to verify ground improvement, pile driving, and all civil and structural construction;
- selection and implementation of the final seismic design categorization of all structures, systems, and components of the LNG terminal in satisfying the FERC Seismic Guidelines;
- proposed seismic recording instrumentation and shutdown alarms in satisfying the FERC Seismic Guidelines;
- construction procedures and progress; and
- continuous and/or periodic inspections made by the Board to ensure that the construction quality of all Seismic Category I, II, and III structures, systems, and components is acceptable.

The Board should meet as necessary to allow the timely progress of the final design approvals and construction of the project in accordance with NorthernStar's production of acceptable interim and final design data. Before each meeting, NorthernStar should file the following material with the Commission and furnish copies to members of the Board, and other appropriate federal and/or state agencies at the request of the Director of OEP:

- a statement of the specific level of review the Board is expected to provide;
- an agenda for the meeting;
- a list of the items to be discussed;
- a discussion of significant events in the design and construction that have occurred since the previous Board meeting;
- drawings of the design and construction features; and
- documentation of the details, calculations, and analyses of the design and construction features to be discussed.

NorthernStar should ensure that the Commission and the Board has sufficient time to review all pertinent materials before each meeting.

Within 30 days of each Board meeting, NorthernStar should file with the Commission copies of the Board's report and a statement of intent to comply with the Board's recommendations or a statement of a plan to resolve the issue(s).

NorthernStar must provide detailed reasons for any recommendation of the Board not implemented.

The Board's review comments should be submitted prior to or simultaneously with NorthernStar's request(s) for approval to proceed with any specific construction-related activities that may be required by the Order. The Director of OEP must approve in writing all requests to proceed with construction.

- **Prior to commissioning of the LNG terminal or commencing service through the pipeline, NorthernStar should file the Board's final report, which should contain a statement indicating the Board's opinion with respect to the construction, safety, and adequacy of the LNG terminal structures and mitigation measures employed along the pipeline route in areas subject to ground instability.**

The design of the facility is currently at the “FEED” (Front-End Engineering Design) level of completion. A feasible design has been proposed but a significant amount of detailed design work still remains to be completed before NorthernStar would be authorized to proceed with any construction activities, if the Commission approves the project. The final engineering design for the LNG terminal would incorporate detailed seismic specifications and other measures to mitigate the impacts of seismic hazards. Information pertaining to the following specific recommendations would be filed with the Secretary for review and approval by the Director of OEP either: prior to commencing final design; prior to construction; or prior to commissioning as indicated by each specific recommendation. All detailed design documents (drawings, calculations, specifications, etc.) and design submittals should satisfy the requirements of Section 4, Part II of the FERC’s draft “Seismic Design Guidelines and Data Submittal Requirements for LNG Facilities,” January 2007 (FERC Seismic Guidelines). In addition to the above-mentioned recommendation regarding construction oversight by an independent Board of Consultants, we recommend that:

- **Seismic specifications to be used in conjunction with the procuring equipment as described in section 3.10 of Part II of the FERC Seismic Guidelines should be submitted for review prior to commencing final design.**
- **Quality Control and Assurance procedures as described in section 3.11 of Part II of the FERC Seismic Guidelines that will be used for design and construction should be submitted for review prior to commencing final design of the project.**
- **A list of Seismic Category assignments for all structures, systems and components should be submitted prior to commencing final design for review as described in section 3.6 of Part II of the FERC Seismic Guidelines.**
- **Seismic Design Criteria should be provided for all Seismic Design Category I, II, and III structures, systems, and components as described in section 3.7 of Part II of the FERC Seismic Guidelines prior to commencing final design. The Seismic Design Criteria should satisfy Part I of the FERC Seismic Guidelines.**
- **LNG Tank (including outer containment tank) and Foundation Preliminary Design should comply with Part I of the FERC Seismic Guidelines. In particular, site response analysis and soil structure interaction analysis should comply with section 6 of Part I and section 3.5.1 (10) and (11) of Part II of the FERC Seismic Guidelines. LNG tank preliminary design drawings and structural calculations as requested in Section 3.9 of Part II of FERC Seismic Guidelines should be submitted for review**

prior to commencing final design. Final LNG Tank (including outer tank) and foundation detailed design drawings and structural calculations that demonstrate compliance with Part I of FERC Seismic Guidelines should be submitted for review **prior to construction.**

- MCE and DE seismic design ground motions should satisfy section 5 of Part I of the FERC Seismic Guidelines. Submittals that demonstrate compliance should be provided **prior to commencing final design.**
- SSE and OBE seismic design ground motions should satisfy section 5 of Part I of the FERC Seismic Guidelines. Submittals that demonstrate compliance should be provided **prior to commencing final design.**
- Details of the liquefaction mitigation method(s), procedures, plan extent, and verification methods proposed to verify mitigation of liquefaction potential should be provided **prior to commencing final design.**
- Detailed calculations of seismic slope stability and lateral movements anticipated after the liquefaction mitigation is implemented should be provided **prior to commencing final design** to verify the stability of critical structures for the project design earthquake motions.
- Details of the types of piles finally selected for supporting the LNG tanks and results of indicator pile program, including load tests, should be submitted for review and approval **prior to construction/pile installation.**
- Final foundation design recommendations including pile foundation design and/or liquefaction mitigation measures for all other structures should be submitted for review and approval **prior to construction.** The foundation design and/or liquefaction measures should satisfy the FERC Seismic Guidelines.
- All other items identified in the submitted geotechnical/seismic reports which were proposed to be addressed during the detailed design should be submitted for review and approval **prior to construction.**
- A seismic instrumentation plan as described in section 3.12 of Part II of the FERC Seismic Guidelines should be provided **prior to commissioning.**
- The results of the hydrostatic load tests on the LNG storage tanks, including settlement data as described in section 7.4.1 should be provided **prior to commissioning.**

Volcanism and Lahars

The Cascade Range contains 13 volcanoes, of which Mount St. Helens, Mount Hood, and Mount Rainier are the closest in proximity to the proposed Bradwood Landing Project. Given their distance from the project facilities, direct impacts are not likely from the eruption of any of these volcanoes, should one occur. However, a secondary phenomenon that is commonly triggered by volcanic eruptions in the Cascade Range is the creation of massive mudflows, known as lahars, which pose a geologic hazard.

While active volcanoes are located within approximately 70 miles of Bradwood, blast zones, lahars, lava flows, or pyroclastic flows would not be likely to reach the proposed LNG terminal site. It is possible that volcanic ash outfall would present minor health hazards. However, due to predominantly westerly winds, ash outfall at the LNG terminal would be unlikely. Particles larger than ash (tephra) could potentially reach the LNG terminal; however, given the distance, the particle size would be relatively small and the chances of such tephra deposition occurring during the lifetime of the project is small. Accordingly, volcanism is not considered a significant geologic hazard that could adversely affect the proposed Bradwood Landing LNG terminal.

Flooding, Tsunamis, Seiches, and Landslide-induced Waves

Flooding, tsunamis, and seiches can cause surface waters to inundate land adjoining them. Tsunamis are caused by large-scale disturbances of the sea floor, typically from subduction zone earthquakes, or large subsea landslides, which can originate thousands of miles away from the tsunami runup area (Priest, 1995a). A seiche is a water wave that occurs in a closed or partially closed body of water, such as a lake or harbor, and is caused by vibratory motion of the ground beneath the water.

The DOGAMI has prepared tsunami hazard maps for the shoreline of the Columbia River up through the Knappa Quadrangle (Priest, 1995b). These maps indicate that tsunami runup elevations would reach approximately 8 feet above msl in the Knappa Quadrangle, and nominal inundation would occur due to a tsunami at a point approximately 4 miles downstream of the proposed Bradwood Landing LNG terminal as a result of a magnitude 8.8 to 8.9 undersea earthquake. The corresponding wave height at the site has been estimated to be less than 1 foot (URS, 2006a). Accordingly, the risk of damage to the proposed Bradwood Landing LNG terminal from a tsunami is considered negligible.

NorthernStar reviewed project-specific and USGS/Puget Sound Consortium Lidar to determine whether existing topography indicates the presence of potential source landslides capable of inducing a wave large enough to inundate the proposed LNG facility following failure into the Columbia River. Generation of a wave large enough to exceed the height of the site perimeter berm (minimum 25 feet NAVD) would require a moderate to large size, fast-moving landslide impacting the river near the terminal with few or no intervening energy dissipaters (islands, river bends, etc.) between the impact site and the facility. The Lidar images indicate local morphology consistent with small-sized, shallow landslides and earthflows. Thus, the likelihood of such small scale slope failures impacting the proposed LNG facility via tsunamis or seiches is believed to be extremely low. However, should one occur, the raised elevation of the site and the earthen berm surrounding the LNG facilities would provide protection against inundation.

Seiches can occur in lakes, rivers and bays, resulting in a larger-than normal wave height. Small seiches have been generated in these types of bounded waters in the Pacific Northwest during distant great magnitude earthquakes (e.g., the 1964 magnitude 9.2 Alaska Earthquake, 1949 magnitude 8.0 Queen Charlotte Islands, Canada Earthquake, and 2002 magnitude 7.9 Denali, Alaska Earthquake). However, no seiche was observed in the Columbia River downstream from the river's dams as a result of these events. Thus, given this history and the fact that the Columbia River is not effectively bounded in the site vicinity, the seiche hazard at the proposed LNG terminal site is negligible.

Federal Emergency Management Agency (FEMA) (1995) insurance rate maps indicate that approximately 70 percent of the Bradwood Landing LNG terminal is susceptible to a 100-year flood event. An additional 10 percent of the site is susceptible to a 500-year flood event. Several feet of dredged fill material has been placed on the site since this FEMA evaluation. NorthernStar proposes to deposit at the terminal up to 400,000 cubic yards of dredge material from the maneuvering area in the Columbia River and raise the final graded elevation of the site to 20 feet NAVD 88, higher than the 100-

year flood level of 13.2 feet. In addition, the LNG storage tanks and related process area would be enclosed by a tertiary earthen berm that would be 5 feet higher. Therefore, the LNG terminal would be protected from adverse effects resulting due to flooding.

URS obtained information from the ODWR on inundation studies performed by the COE for dam failure scenarios (i.e., “Lower Columbia River Inundation Mapping Studies - McNary, John Day, the Dalles and Bonneville Projects,” NPDEN-WM HES September 1982.). The project was carried out in accordance with Hydrologic Engineering Center guidelines for flood emergency planning developed by the COE dated June 1980. The Columbia River stage elevation was compared for a design spillway flood (large peak flow event) versus peak associated and non-peak associated breaches of the dam. The results indicate no effect at CRMs 17.4 and 23.4. At CRM 41.6 there is a 0.1-foot difference in stage elevation between a rainy day design flood plus dam failure event and peak flow from a flood event alone. CRM 41.6 is approximately the location of Wauna on the Oregon side and Cathlamet on the Washington side. Bradwood is between CRMs 41.6 and 23.4 at CRM 38. Therefore, a dam break would not be a threat to Bradwood Landing.

Slope Stability and Load-Bearing Capacity

Finished slopes in the ship berth and maneuvering area at the proposed LNG terminal would be constructed with a 3 (horizontal) to 1 (vertical) ratio for stability. According to the COE (Proudfit, 2008), this is an acceptable slope for sediments in the area of the LNG terminal.

The geotechnical study conducted by URS (2005) indicated that settlement was anticipated within the surficial fills and soft, estuarine sediment layer between 85 and 135 feet below the ground surface at the site, resulting from pseudo-elastic processes, consolidation, and secondary consolidation. Therefore, soil improvements and engineering designs must be implemented to ensure the stability of the LNG tanks, process structures, and equipment associated with the facility. Mitigation measures recommended for the site include ground improvement such as vibroflotation of the liquefiable soils and replacement of the soft surficial soils with compacted engineered fills, and deep foundation support. In addition, the dredged materials proposed to be added to raise the site to the finished design grade would be vibrocompacted to ensure a stable base.

Shoreline Erosion

The shoreline at the proposed LNG terminal site consists of fill materials placed at the site more than 50 years ago and dredged material placed at the site between 1966 and 2002. The riverbank between mean low water and mean high water (MHW) primarily consists of older fill material and construction debris. Some small trees and shrubs have colonized portions of the riverbank. The riverbank appears to be moderately resistant to erosion.

The primary erosive forces affecting the shoreline at the site are produced by high river flows and the wakes of passing ships. During operation of the facility, erosive forces would likely be less than those currently experienced, because LNG carriers moored at the LNG terminal would protect the shoreline from waves generated by passing vessels about one-third of the time. Although the shoreline would be affected by waves generated by the LNG carriers, the ships would be moving very slowly in the vicinity of the LNG terminal and would consequently produce only small waves.

The berthing and unberthing of LNG tankers would be accomplished using tugboats. Conservatively, erosion of the shoreline during this process could be caused by waves generated by the vessels or from the high velocity field created by the tugboats. The potential for bank erosion from ship generated waves was investigated by evaluating the speed required to produce a wave height capable of

removing material from the shoreline, which was conservatively assumed to range between 3 and 6 inches. At present, wind generated waves greater than 6 inches typically occur at the proposed site. The proposed dock would be located about 330 feet away from the shoreline. Based on wave height modeling and the 330-foot distance from the dock to the shoreline, the ship would have to be traveling at 4.65 knots (7.9 feet per second (ft/s)) to generate a wave height of 3 inches at the shoreline from this distance, and 6.1 knots (10.2 ft/s) to generate a wave height of 6 inches at the shoreline from this distance. These speeds are more than twice the expected speed of the ship (less than 2 knots) during the berthing and unberthing processes (West Consultants (WEST), 2006). Thus, waves generated from the vessel would be minimal and the potential for erosion of the shoreline from vessel-generated waves would be low.

The potential for bank erosion from high velocity fields created by tugboats was investigated by evaluating the characteristics of a typical tugboat on the Columbia River. In general, tugboats would be operating within the proposed turning basin with their sterns directed away from the nearshore banks. Assuming the tugboat is operating parallel to the proposed dock, the wake velocities created from a tugboat near the shoreline would be less than 1 ft/s since the dock would be located about 330 feet from the shoreline. Compared to the results of hydrodynamic modeling, this value is significantly less than typical flow velocities along the present shore. This analysis is based on an assumption that berthing operations would occur at MLLW tide levels. However, it is most likely that berthing would occur only at MHW levels. Ship maneuvering operations at MHW conditions would further reduce the estimated tugboat wake velocities.

The maximum surface velocities created from a tugboat pointed directly at the various shoreline areas within the vicinity of the project site were also modeled. The results indicate that the potential for bank erosion due to the high velocity field created by a tugboat would be low for the shoreline along Puget and Tenasillahe Islands, but there is a high potential for bank erosion to occur along the shoreline of the project site under the following conditions:

- the tugboat is located within 1,000 feet of the shoreline;
- the propellers are pointing directly at the shoreline; and
- no object is present between the tugboat and the shoreline.

However, NorthernStar has indicated that it is unlikely these conditions would exist during the berthing and unberthing of a ship because the tugboats would be located along the side of the ship opposite the shoreline of the project site and the large draft of the ship (38 feet) would re-direct the high velocity field created by the tugs towards the invert of the turning basin and away from the shoreline at the terminal site.

Because NorthernStar anticipates erosive forces at the site with the proposed project in place would be no greater and probably less than those currently experienced, no shoreline protection or bank stabilization is proposed. The existing riverbank would be disturbed as little as possible. Some planting would occur between mean low water and MHW and would be extended upward from MHW where circumstances allow. Plantings would consist of low-growing species. Some grading may occur above MHW to facilitate plantings. No wetlands or waters of the United States would be filled along the shoreline, with the exception of the channel connecting the log pond to the Columbia River.

As a condition to the Clatsop County Conditional Use Permit, NorthernStar prepared a *Shoreline Monitoring Plan* for the LNG terminal. The purpose of the monitoring plan is to address the County's concern that dredging of the berth and turning basin could potentially result in changes to the Columbia River hydraulics, which in turn could potentially result in shoreline erosion. The plan identifies criteria for selecting specific monitoring sites, monitoring techniques, and approximate monitoring locations.

The plan also stipulates reporting requirements, which include the monitoring results and proposed measures to reduce erosion of downstream banks should such erosion increase as a result of the project.

Although modeling has indicated that significant shoreline erosion would not occur as a result of LNG carrier wakes and tugboat propeller wash, Puget Island with its residences is particularly sensitive to such impacts. Therefore **we recommend that:**

- **NorthernStar should prepare a Shoreline Monitoring Plan for the west end of Puget Island that is similar in scope to the monitoring plan prepared for the Clatsop County Conditional Use Permit. The plan should be filed with the Secretary for the review and written approval of the Director of OEP prior to operation of the LNG terminal.**

Subsidence

Regional subsidence is typically caused by significant groundwater usage, coal mine collapse, and petroleum mining. However, subsidence through settlement of soils can also occur, and is a potential geologic hazard for the proposed project.

The proposed LNG terminal site is underlain by an estimated 100 feet of normally consolidated sand, silt, and clay alluvium. Upon being subjected to large surface loads, this soil layer is susceptible to land surface subsidence in the form of consolidation of the clayey soils or elastic compression of the sandy soils. Consolidation manifests at the ground surface as settlement and occurs as a function of time proportional to the dissipation of pore water pressures in the normally consolidated clays and silts. Elastic compression occurs nearly instantaneously during loading. The project would not likely result in land surface subsidence and settlement because the large surface loads (i.e., the LNG storage tanks) would be supported by deep foundations that extend below the surficial alluvial deposits and bear into the deeper dense alluvial sands. Mitigation measures such as piling, ground improvements, or specialty foundations may be required depending on the anticipated loads of the structures. The specific mitigation measures to be employed would be developed as the foundation loading requirements of the LNG terminal facilities are developed.

The proposed on-site water well would not withdraw large volumes of water and the existing on-site quarry would be decommissioned and reclaimed in accordance with DOGAMI regulations by filling the below-grade quarry excavations to site grade before operation of the proposed LNG terminal. Therefore, subsidence is not likely to be caused by either of these activities.

Karst

Karst features are created through dissolution of limestone, dolomite, or other rock types from groundwater, creating sink holes, caves, and underground channels that are susceptible to collapse at the surface. The rock types typically associated with karst features are not present in the project area, and no karst conditions are documented at or in the vicinity of the proposed LNG terminal site. Therefore, karst is not a geologic hazard for this project.

Corrosion

Eight soil samples collected from the upper 15 feet at the LNG terminal site were analyzed to assess corrosivity potential for underground utilities and concrete foundations (URS, 2005). The soils were determined to be mildly corrosive to ferrous metals and to have negligible potential to adversely impact concrete. Mitigation measures for corrosion would not be required for the site.

Power Line

Significant geological hazards are unlikely to be present in the vicinity of the proposed electric power line tower sites. Seismic risks to the transmission towers with respect to ground shaking are anticipated to be similar to those present at the LNG terminal site (URS, 2006a). Final tower siting and design before construction would consider geological hazards and would seek to mitigate them through hazard avoidance. In addition, site-specific geotechnical foundation engineering analyses would be conducted as part of the preliminary or final project design.

4.1.3.4 Blasting

Blasting would be necessary during the widening of Clifton Road. Blasting at the existing on-site rock quarry may also be used to generate rock to be crushed for aggregate and sand to produce concrete and foundation bedding. Blasting would be conducted in accordance with all applicable federal, state, and local regulations. These regulations include *State of Oregon 2004 Fire Code Amendments; Explosives, Oregon's Revised Statutes, November 10, 2004*; and the Safe Explosives Act (27 CFR 555) or other more current regulations.

Blasting would not significantly disrupt or impact adjacent properties as no residential properties are located close to areas where blasting may be required. Furthermore, NorthernStar would employ mitigation measures, as necessary, to minimize potential fly rock (i.e., using blasting nets/curtains) and to minimize vibration, noise, and safety impacts (i.e., coordinating with land/property owners in the project area). These mitigation measures would be detailed in a Blasting Management Plan, which NorthernStar would develop prior to beginning construction.

4.1.3.5 Paleontological Resources

We are not aware of any fossil concentrations that would be affected by construction of the Bradwood Landing LNG terminal. Furthermore, available geologic data indicate that fossils have not been observed in the immediate vicinity of the site (Beaulieu, 1973; Steere, 1977; Warren et al., 1945).

4.1.4 Pipeline Facilities

4.1.4.1 Stratigraphy

The proposed Bradwood Landing pipeline would traverse the northern boundary of Oregon's Coast Range physiographic province from the proposed LNG terminal facility at Bradwood, Oregon to the point at which it crosses the Columbia River at Port Westward, Oregon. The pipeline would then extend to the west through the southern portion of Washington's Willapa Hills physiographic province to the pipeline terminus located north of Kelso, Washington. The proposed pipeline route also crosses alluvial lowlands from Wauna, Oregon to Port Westward, Oregon. These lowlands are nearly flat and consist primarily of unconsolidated alluvium from the Columbia River and dredged material.

The stratigraphic units in the area of the pipeline route include those described above in section 4.1.3.1 for the LNG terminal location, as well as the following:

Landslide Debris. Landslide debris is prominent in portions of Clatsop County, Oregon and Cowlitz County, Washington, occurring in areas along the proposed pipeline corridor. The most prominent landslide debris in Clatsop County is located in the vicinity of the community of Wauna between MPs 1.4 and 4.0. This landslide debris has been observed to depths of 156 feet and contains interbeds of alluvium, which suggests repeated movement events in the past (Beaulieu, 1973). The

landslide activity is believed to have occurred during times of lower sea level when the Columbia River was more deeply incised. This geological unit is comprised primarily of randomly oriented weathered mudstone clasts with occasional clasts of basalt and sandstone supported in a mudstone matrix. Hummocky topography, slumps, and slack water ponds are common within these landslide deposits.

Cowlitz Formation. The Cowlitz Formation can be found near the eastern portion of the proposed pipeline route north of Longview. This formation is comprised of upper Eocene thickly-bedded, micaceous, arkosic sandstone with interbeds of siltstone. Localized areas contain cross-bedded, hummocky, or laminated sediments with limited amounts of sub-bituminous coal strata (Walsh, 1987; Newton and Van Atta, 1976).

Steep slopes and thick beds of unconsolidated sediments, comprised of colluvium and alluvium of the Columbia River and its tributaries, form the predominant landforms along the proposed pipeline route. Large basalt cliffs are present southeast of the proposed Bradwood Landing LNG terminal, west of the community of Wauna, west of Abernathy Point, and along Abernathy Creek. The small tributaries of the Columbia and Cowlitz Rivers have carved numerous steep slopes in the tertiary sedimentary and igneous rocks located between Bradwood and Wauna, and between Abernathy Point and the eastern extent of the proposed alignment near Interstate Highway 5. A large Quaternary alluvial plain extends from Wauna to Port Westward. The alluvium consists primarily of unconsolidated silt and fine sand with minor constituents of clay, gravel, cobbles, and boulders.

Table 4.1.4-1 indicates the surface geologic formations crossed by the proposed pipeline by milepost.

TABLE 4.1.4-1			
Geologic Units Crossed by Proposed Pipeline			
MP	Stratigraphic Unit	Age	Lithology
0.0 - 1.4	CRBG	Middle Miocene	Sub-aerial, fine to medium basalt flows layered with Gnat Creek Formation (massive, fine-to coarse-grained, arkosic sandstone and siltstone).
1.4 - 4.0	Wauna Landslide Debris	Quaternary	Ancient landslide deposits of mass wasting processes ranging from surface creep to slump blocks; overlain by Columbia River alluvial deposits.
4.0 – 19.0	Alluvium	Quaternary	Unconsolidated river and estuary deposits of sand, silt, and clay.
19.0 – 19.5	Columbia River	Not applicable	Not applicable
19.5 – 21.6	Grande Ronde Basalt	Middle Miocene	Aphanitic to fine-grained, basaltic andesite flows with associated flow breccia.
19.7 – 23.0	Grande Ronde Basalt, Basalt Gravels and Conglomerates	Middle Miocene	Aphanitic to fine-grained, basaltic andesite flows with associated flow breccia with previously unmapped basalt-clast gravels and conglomerate infilling river channel.
23.0 – 27.0	Grande Ronde Basalt	Middle Miocene	Aphanitic to fine-grained, basaltic andesite flows with associated flow breccia.
27.0 – 31.3	Cowlitz Formation	Upper to Middle Eocene	Massive to thin-bedded, fine to coarse-grained, feldspathic sandstone and carbonaceous siltstone.
31.3 – 32.5	Grande Ronde Basalt	Middle Miocene	Aphanitic to fine-grained, basaltic andesite flows with associated flow breccia.
32.5 – 34.2	Cowlitz Formation	Upper to Middle Eocene	Massive to thin-bedded, fine to coarse-grained, feldspathic sandstone and carbonaceous siltstone.
34.2 – 34.7	Alluvium	Quaternary	Unconsolidated sand, silt, and clay deposited by the Cowlitz River as fluvial and overbank deposits.
34.7 – 36.3	Cowlitz Formation	Upper to Middle Eocene	Massive to thin-bedded, fine to coarse-grained, feldspathic sandstone and carbonaceous siltstone.

4.1.4.2 Mineral Resources

Data on file with the DOGAMI (2005) and WDNr (2005) indicate the only permitted rock quarry within the proposed pipeline right-of-way is the one located at the proposed LNG terminal site. Other mined resources located within 1,500 feet of the pipeline, as identified by USGS topographic maps and discussions with state and federal geologic survey personnel, are listed in table 4.1.4-2.

TABLE 4.1.4-2			
Mines Located within 1,500 feet of the Proposed Bradwood Landing Pipeline			
Facility	MP	Mining Operation	Approximate Distance and Direction from Pipeline
Bradwood Quarry	0.0	Basalt	intersects
Wauna Pit 2	3.2	Basalt	1,500 feet southwest
Weyerhaeuser	24.5	Rock	800 feet south
Westside Quarry	33.5	Rock	1,300 feet north
Fiorito	34.5	Sand and gravel	500 feet north

In addition to the mines listed above, URS (2007b) identified an active basalt quarry located 1,000 to 2,000 feet south of the proposed pipeline route between MPs 32.4 and 33.1. NorthernStar has discussed all mine locations with the corresponding landowners and determined that no hazards associated with past, current, or future mining activities, including subsidence, blasting, slumping, or other ground failure would impact the pipeline. Furthermore, pipeline construction is unlikely to have any significant impacts on current or future mining operations.

Coal mine hazard maps (Culver, 1919; Beikman et al., 1961) indicate that coal deposits exist near Kelso and Castle Rock, Washington. The coal beds are located in the Cowlitz and Toutle Formations and are late Eocene and late Eocene/Oligocene in age, respectively. However, because these coal deposits are limited in extent (Culver, 1919) and are poor in quality (Beikman et al., 1961), we do not anticipate future mining of these coal beds near the proposed pipeline route.

4.1.4.3 Geologic Hazards

Geologic hazards along the proposed pipeline route are described in detail in *Geohazards Report, Proposed Northern Star Natural Gas Pipeline, Bradwood, Oregon to Kelso, Washington*, (URS, 2007a). A second report titled, *Supplemental Geohazards Assessment for Cowlitz County* (URS, 2007b) addresses requirements of the county's Critical Areas Ordinance. These reports are summarized below and are included as part of the public record for the Bradwood Landing Project.³

Resources used to assess the geologic hazards along the pipeline route included published literature, aerial photographs, Light Detection and Ranging (LiDAR) imaging, data from the HDD feasibility assessment (URS, 2006b), and field mapping.

Soil Mass Wasting and Rock Slope Failure

In Oregon, the only portions of the proposed pipeline that would be on or near slopes are within the first 4 miles of the route. The pipeline would be installed using the HDD method between MPs 0.1 and 1.3, thus avoiding potential hazards related to slopes in this area. The Wauna Landslide occurs

³ NorthernStar filed with the FERC its *Geohazards Report for the Proposed Bradwood Landing Pipeline* on March 2, 2007, and filed a *Supplemental Geohazards Assessment for Cowlitz County* on March 22, 2007. These reports are available to the public through the FERC's Internet website at www.ferc.gov. Using the "eLibrary" link, select "General Search," enter the docket number, excluding the last three digits in the field (i.e., CP06-365 and CP06-366), and put in the appropriate date range.

between MPs 1.4 and 4.0. NorthernStar indicated it would install automated vibrating wire strain meters on the pipeline between MPs 1.5 and 4.0 to monitor the landslide debris for movement, which it believes would be the most effective form of mitigation for this landslide area, given its size, age, and lack of recent activity. Maintenance could be performed on the pipeline if strain is detected.

The primary areas for concern relative to slope failure for the proposed pipeline are along the Washington portion of the route (i.e., between MPs 19.6 and 36.3). To evaluate these areas, URS first reviewed landslide data compiled by Cowlitz County for its Critical Areas Ordinance, examined stereo aerial photographs, and then obtained high density LiDAR coverage of a 2-mile-wide corridor centered over the pipeline. The advantage of LiDAR is that it provides a highly detailed digital image of surface topography without the forest canopy. The LiDAR data was also used to run the WDNR Slope Morphology Model, which delineates areas that may be susceptible to slope failure.

NorthernStar identified 110 potential landslide areas in table 4-1 of NorthernStar's Geohazards Report, and ranked each feature by the confidence level that it may be a significant area of unstable slopes. The proposed pipeline would cross 31 potential landslide areas; however, some of these are considered lower confidence features that may require no mitigation following field confirmation. The remaining areas would require mitigation, which may include: relocation of the pipeline route; HDD crossing of the feature to place the pipeline below potential failure surfaces; and instrumentation of the pipe and/or the surrounding rock or soil to monitor strain in the pipe and movement of the surrounding ground. Table 4.1.4-3 summarizes the potential landslide areas crossed by the proposed pipeline route along with preliminary mitigation recommendations. Before final design and construction of the pipeline, additional field mapping and subsurface investigations would be necessary to refine these results and provide data for a final pipeline design geotechnical report. Results of the additional geotechnical studies and proposed mitigation measures would be subject to review by the Board of Consultants prior to construction, as previously recommended.

Seismic-Related Hazards

According to the USGS (2006), the nearest active fault to the proposed pipeline facilities would be the Willapa Bay fault zone, located approximately 27 to 40 miles northwest of the beginning of the pipeline route at Bradwood and the Gales Creek fault zone 25 miles and greater to the south (see figure 4.1.3-1). URS (2006a) also reports the Doty fault, located approximately 25 miles to the north (see figure 4.1.3-1). Other active faults include the Nehalem Bank fault and the Cascadia fold and thrust belt to the west. URS (2006a) reviewed aerial photographs from 1948, 1957, 1966, 1983, and 2001 for indications of possible surface faults in the vicinity of the proposed pipeline route but did not observe any such features.

The pipeline would cross four bedrock faults in Cowlitz County between MPs 22.3 and 24.6; however, these faults are not thought to be active (URS, 2007a). As mapped, these faults are not large enough to produce earthquakes of surface rupture offsets greater than several inches to a few feet. If these faults, or additionally identified faults are found to be potentially active based on future field investigation, the pipeline can be designed to accommodate these small to moderate differential movements across the faults using such mitigation methods as: 1) deformable trench backfill; 2) large diameter, sacrificial carrier pipe; and 3) altering the angle of the pipeline/fault intersection to minimize compressional forces acting on the pipeline.

TABLE 4.1.4-3

Potential Landslide Areas Crossed by the Proposed Bradwood Landing Pipeline in Washington			
Landslide No(s).	MPs	Confidence Level ^a	Proposed Mitigation
4	19.8 – 20.1	high	One or more of the following: (1) reroute to the west to stay on ridge; (2) extend the Columbia River HDD crossing by about 0.5 mile to MP 20.3; or (3) install the pipe by the HDD method between MPs 19.8 and 20.3.
12	20.6 – 20.8	low	The landslide is entirely spanned by the HDD crossing for Cameron Creek. Adjust the depth of the HDD borehole if necessary to assure that the landslide is avoided.
13	20.8 – 20.9	high	The landslide is almost entirely spanned by the HDD crossing for Abernathy Creek. Add 0.2 mile to the southwest end and adjust the depth, if necessary.
24, 34, 35	21.3 -22.1	medium – high	Reroute the pipeline between MPs 21.3 and 21.7 to avoid the toe of Landslide 34. Install automated vibrating wire strain meters on the pipeline between MPs 21.5 and 22.1 to monitor the landslides for movement, and maintain the pipeline if strain is detected.
25B	22.2 – 22.4	medium	About half of the landslide is spanned by the HDD crossing for Germany Creek. Extend the Germany Creek HDD borehole approximately 0.15 mile west and adjust the depth, if necessary.
29, 30	22.5 – 22.7	low – medium	Install automated vibrating wire strain meters on the pipeline between MPs 22.5 and 22.6 to monitor the landslides for movement, and maintain the pipeline if strain is detected. Possibly reroute the portion of the pipeline between 22. 6 and 22.7 to avoid Landslide 30.
43	23.4 – 23.9	high	Install automated vibrating wire strain meters on the pipeline between MPs 23.4 and 23.9 to monitor the landslides for movement, and maintain the pipeline if strain is detected; or install using the HDD method.
53, 54, 56, 57	24.6 – 25.3	low – medium	Install automated vibrating wire strain meters on the pipeline between MPs 24.7 and 24.9 to monitor Landslides 53 and 54 for movement, and maintain the pipeline if strain is detected. Reroute the pipeline to the north between MPs 24.9 and 25.6 to minimize exposure to Landslide 56 and avoid Landslide 57. Install automated vibrating wire strain meters on the pipeline along the portion that crosses Landslide 56.
62	26.5 – 26.7	low	If confirmed in field, install automated vibrating wire strain meters on the pipeline along the portion that crosses the landslide.
67	26.9 – 27.5	high	Conduct additional subsurface investigations to determine the depth of the slide mass. Install the pipeline using the HDD method between MPs 26.9 and 27.5.
71	27.5 – 27.7	low	If confirmed in field, install automated vibrating wire strain meters on the pipeline between MPs 27.5 and 27.7.
73, 74	28.0 – 28.3	low – medium	If confirmed in field, install automated vibrating wire strain meters on the pipeline between MPs 28.0 and 28.3 to monitor Landslides 73 and 74 for movement, and maintain the pipeline if strain is detected.
77	28.6 – 28.7	low	If confirmed in field, install automated vibrating wire strain meters on the pipeline between MPs 28.6 and 28.7.
78	28.9 – 29.2	medium – high	The pipeline has been routed to avoid this landslide but crosses a corner of the feature. If the area of concern is confirmed in field, reroute to avoid.
84, 85	29.8 – 30.4	high	Install the pipeline using the HDD method between MPs 29.8 and 30.4.
86	30.7 – 30.8	Low	If confirmed in field, reroute the pipeline or install automated vibrating wire strain meters on the pipeline between MPs 30.7 and 30.8.
89, 91, 104, 104B	32.0 – 33.2	medium – high	One or more of the following: 1) reroute to avoid portions of the more recently active slides; 2) install with the HDD method; and 3) install automated vibrating wire strain meters on the pipeline to monitor the landslides for movement, and maintain the pipeline if strain is detected.
94	33.9 – 34.0	medium	Install automated vibrating wire strain meters on the pipeline to monitor the landslide for movement, and maintain the pipeline if strain is detected.
103	35.3 – 35.6	medium	If confirmed in the field, one or both of the following: 1) install automated vibrating wire strain meters on the pipeline to monitor the landslide for movement, and maintain the pipeline if strain is detected; and 2) extend the HDD borehole for Interstate Highway 5 to span Landslide 103.
99	35.6 – 35.8	medium	Reroute the pipeline between MPs 35.6 and 35.8 to avoid the landslide.

^a A measure of how certain the investigators are that the feature is an actual landslide, based on the quality of the data.

Empirical reviews of historical earthquakes demonstrate that pipelines are not prone to failure due to earthquakes. A 1996 study of earthquake performance data for steel transmission lines and distribution supply lines operated by SoCal over a 61-year period found that post-1945 arc-welded transmission pipelines in good repair have never experienced a break or leak during a southern California earthquake and are the most resistant type of piping, vulnerable only to very large and abrupt ground displacement (e.g., severe landslides), and are generally highly resistant to traveling ground wave effects and moderate amounts of permanent deformation (O'Rourke and Palmer, 1994). Given that the proposed pipeline route does not cross any known active faults, earthquakes and associated seismic risk are not anticipated to have a significant impact on the proposed pipeline.

The potential for liquefaction along the proposed pipeline route was initially evaluated using liquefaction hazard maps for Cowlitz County, Washington (Palmer et al., 2004) and geologic maps for Clatsop and Columbia County in Oregon (Newton and Van Atta, 1976; Walsh, 1987). Based on these sources, soils with liquefaction potential would be crossed by the pipeline between MPs 0.0 and 19.1, 22.4 and 22.6, 27.9 and 28.0, and 34.1 and 35.5; and at MP 36.2. Geotechnical borings for the HDD feasibility assessment (URS, 2006b) confirmed a high potential for liquefaction exists in the sands and silts of the alluvial deposits south of the Columbia River and in the alluvial deposits on both banks of the Cowlitz River. Furthermore, a Cowlitz County map titled, *Seismic Hazards, Cowlitz County, WA*, indicates the proposed pipeline would cross a seismic hazard area between MPs 34.0 and 35.0, which is the Cowlitz River valley. This area is likely delineated as a seismic hazard area based on the potential for liquefaction of soils within the floodplain.

Because of the horizontal displacement involved, lateral spreading associated with liquefaction can be destructive to linear features such as pipelines. In recent history, no accounts of damage to any existing pipelines have been documented in the project area. Along the proposed pipeline route, potential liquefaction-induced lateral spreading would be largely confined to areas adjacent to the banks of rivers and streams, as soil moves toward the waterbody channels (URS, 2007a). URS conducted a lateral spread analysis at several of the proposed HDD waterbody crossings as part of the HDD feasibility assessment (URS, 2006b) and determined that lateral spreading would be greatest along the banks of the Columbia River during maximum probable earthquake shaking. The stresses and strains on the pipeline resulting from such an event would be less than recommended limiting strains using established pipeline design methodology. Therefore, further mitigation would not be required (URS, 2007a).

Buoyancy induced by liquefaction is generally not a concern for pipelines due to their flexibility but would be addressed if required by placing additional confining weights along the pipeline. Likewise, liquefaction-induced settlement would not impose significant stresses on the pipeline.

Volcanism and Lahars

Historic eruptions of Mount St. Helens produced lahars that traveled to the Columbia River, approximately 20 miles upriver from the proposed LNG terminal site, but did not produce appreciable changes in river elevation. Lava flows and pyroclastic flows terminated within 5 miles of the eruption source. During the 1980 eruption of Mount St. Helens, lahars inundated the Toutle and Cowlitz Rivers. The recurrence interval of a similar lahar or lahar related mudflows is estimated to be approximately 100 years. Sediment profiles in the lower Cowlitz River indicate previous lahar related mudflows were nearly 4.3 feet thick with an estimated over-bank flow thickness of 10.5 feet (Scott, 1989), although geologic maps of the pipeline route area do not depict lahar deposits (Phillips, 1987).

The western portion of the planned pipeline alignment, in the vicinity of the Cowlitz River is mapped as flow hazard Zone 3 (Wolfe and Pierson, 1995). Cowlitz County classifies volcanic hazard areas as coincident with the 500-year floodplain of the Cowlitz River. The scenario with the greatest

potential to impact the area of the proposed Bradwood Landing pipeline would be if a lahar inundated Castle Lake, increasing the water level and resulting in a failure of the natural dam at Castle Lake (Wolfe and Pierson, 1995). The pipeline may potentially be exposed to lahar hazards at river crossings of the Columbia and Cowlitz Rivers. At the Cowlitz River location, the pipeline would be installed at a depth sufficient to be unaffected by scour due to lahars. From the Columbia River crossing and beyond, lahars would be primarily depositional in nature. Sediment deposition would not significantly affect pipeline operations.

Ash was also deposited in the area of the proposed Bradwood Landing pipeline route during the 1980 eruption of Mount St. Helens. Ash and tephra deposition is not anticipated to be a significant geologic hazard for the pipeline due to its underground installation. Furthermore, according to Hoblitt et al. (1998), the annual probability of deposition of 0.4 inch or more of ash is 0.01 percent.

Flooding, Tsunamis, and Seiches

Flooding is possible along the proposed pipeline route between MPs 0.0 and 19.1; at MP 21.1; and between MPs 22.4 and 22.6, 27.9 and 28.0, and 34.1 and 35.0. Because the pipeline would be buried at a depth below expected levels of scour, the only potential impact of flooding would be a tendency for the pipeline to float. In these areas, weighting methods would be used, such as coating the pipe with concrete, to overcome buoyancy hazards during periods of flooding.

According to the DOGAMI (Priest, 1995a), the majority of the proposed pipeline would not be located within the tsunami risk zone. Landslide-induced waves have occurred in the vicinity of the proposed pipeline route, such as the poorly documented 1890 event and the 1965 event at Puget Island. Standardized methods for predicting the occurrence and magnitude of landslide-induced tsunamis do not exist. However, portions of the pipeline located immediately adjacent to the Columbia and Cowlitz Rivers at elevations within a few feet of the river elevation are only at a slight risk of being inundated by a landslide-induced tsunami.

Similar to the LNG terminal, the pipeline segment in the area of the proposed LNG terminal would experience an estimated tsunami wave height of less than 1 foot (URS, 2006a). Other areas that are adjacent to the Columbia River are fairly well protected by Puget, Welch, Tenasillahe, and other islands that would disrupt and disperse the energy of a tsunami or seiche. Therefore, tsunamis and seiches represent a low hazard risk to the pipeline.

Slope Stability

Side slopes during trenching for the pipeline would be maintained in accordance with established engineering and Occupational Safety & Health Administration (OSHA) guidelines, with the steepness of slope at a given location based on the soil type. Soil improvement is not necessary for pipelines due to their linear configuration, strength, and ductility.

Shoreline Erosion

Areas along the Columbia and Cowlitz Rivers are continuously modified by depositional and erosional stream processes. Bank erosion can adversely affect the stability of the pipeline and any associated structures. The risk of shoreline erosion varies from low to high long the proposed pipeline route, depending on the pipeline location relative to the intersection streams. See table 4.3.2-5 for an assessment of the erosion potential at waterbody crossings along the proposed pipeline route. Shoreline erosion would be mitigated through the use of the HDD or conventional bore construction method at waterbody crossings and through revegetation of affected areas.

Subsidence

Because there are no significant aquifers beneath the proposed pipeline route and no petroleum production, risk of subsidence caused by these factors appears negligible. NorthernStar reviewed Beikman et al. (1961), Culver (1919), and Landes (1901, 1902), for possible abandoned coal mines and shafts beneath the proposed pipeline route. No coal mines and/or shafts were identified near the proposed alignment, and the risk of subsidence due to the collapse of coal mine workings would be negligible.

Karst

As indicated in section 4.1.3.3, the rock types typically associated with karst features are not present in the project area. No karst conditions are documented in the area crossed by the pipeline route. Therefore, karst is not a geologic hazard for this project.

Corrosion

NorthernStar would follow the DOT Minimum Federal Safety Standards in 49 CFR 192, which include protection of the pipeline from internal, external, and atmospheric corrosion. The use of both an external protective coating and a cathodic protection system has been required on all pipelines installed after July 1971. The interior of the pipe would be periodically monitored for corrosion using internal corrosion probes and/or in-line pigging tools.

Cowlitz County's Critical Areas Ordinance Considerations

Cowlitz County's Critical Areas Ordinance contains development standards for landslide hazard areas and erosion hazard areas. The standards applicable to the Bradwood Landing Project pertain to grading, erosion control, and buffers. NorthernStar would implement measures designed to meet these development standards. For example, all trenched pipeline installation in geologic hazard areas would be conducted during the dry summer season to minimize short-term erosion issues caused by precipitation runoff and wet ground conditions. Clearing and grading would be done so as to disturb the minimum possible corridor width necessary. Disturbance of trees and vegetation would be restricted to the pipeline construction corridor and access routes into the corridor. Vegetation (slash) would be removed from the construction corridor prior to trench excavation and would not be placed as backfill in any of the pipeline trench excavations.

The trench backfill would consist of native excavated materials except where alternative imported backfill materials are specified in the final pipeline geotechnical report. The trench spoils would be segregated to allow topsoil and organic-rich horizons to be placed in the upper portion of the backfill sequence. Vegetative or engineered ground cover would be placed following completion of pipeline installation in all areas disturbed by the construction activities.

Over 14,000 feet of pipeline along the Cowlitz County portion would be installed using HDD methods. This construction technique would allow construction activities to avoid disturbing areas between ordinary high water and bank tops at waterbody crossings, thus minimizing the potential for erosion.

The development standards in Cowlitz County's Critical Areas Ordinance require an undisturbed 50-foot buffer, as measured on the surface, from the top, toe, and along all sides of any existing landslide or erosion hazard, within a critical area. This buffer may be increased or decreased based on the results of a geotechnical assessment. Construction of the proposed pipeline would require disturbance within the 50-foot buffer surrounding several areas of known landslide or erosion hazard areas. Each of these areas

would be identified, and any necessary remediation or special construction provision would be provided in the final pipeline geotechnical report.

The Critical Areas Ordinance defines actions designed to mitigate project-induced impacts, including avoidance, minimization, restoration, and long-term maintenance. The currently proposed HDD installations are intended primarily for crossing wetlands, waterbodies, and infrastructure; but they also serve to avoid or minimize impacts in erosion hazard and landslide areas. NorthernStar would likely use additional or extended HDD installations to avoid some of the other identified landslide hazard areas (see table 4.1.4-3). Where the pipeline is proposed to traverse steep slopes using trenching installation methods, the alignment has been oriented as close to the fall line of the slope as possible to reduce exposure of the pipeline to lateral strain due to slope creep and to shorten the total slope distance that the pipeline would cross.

All construction and access rights-of-way, including in erosion hazard and landslide areas, would be rehabilitated following completion of construction. The permanent pipeline right-of-way would be maintained as a utility easement for the lifetime of the facility. Temporary easement areas would be rehabilitated to a state that matches or improves the preconstruction conditions. The pipeline would be inspected routinely both on the ground along the alignment and on the interior of the pipe, and maintenance would be performed as needed.

4.1.4.4 Blasting

Shallow bedrock may be encountered along several portions of the proposed pipeline route. However, the near-surface rock is generally weathered and highly jointed. Therefore, the pipeline could likely be installed using conventional trenching and ripping methods. NorthernStar does not anticipate blasting would be required. However, if blasting becomes necessary, it would be conducted in the same manner described for the LNG terminal above.

4.1.4.5 Paleontological Resources

William Orr, Ph.D., Curator of the Condon Museum at the University of Oregon indicated it is likely that significant fossils of vertebrates could be found during excavation of the pipeline. Should paleontological resources be encountered during the project, NorthernStar would implement mitigation procedures based on the recommendations of Dr. Orr and other appropriate authorities, including but not limited to field data recovery.

4.2 SOILS AND SEDIMENTS

4.2.1 Waterway for LNG Marine Traffic

4.2.1.1 Soil Resources

Other than the potential for shoreline erosion, which is addressed in section 4.1.2.3, LNG marine traffic would not have a significant impact on soils along the waterway from the territorial seas to the LNG terminal site. Furthermore, a release of LNG from an LNG carrier as a result of an accident or intentional breach would not have an impact on soil resources.

4.2.1.2 Sediments

The existing sediment conditions and impacts of the proposed project on sediments within the waterway at and in the vicinity of the LNG terminal site are discussed in section 4.2.2.2. Because the LNG carriers would be operating within an existing dredged navigation channel along with other ship traffic, LNG marine traffic would not be likely to have a significant impact on sediments within the remainder of the waterway. Furthermore, a release of LNG from an LNG carrier as a result of an accident or intentional breach would not have an impact on sediments because it is not soluble in water and would float on the water surface before vaporizing.

4.2.2 LNG Terminal

4.2.2.1 Soil Resources

Information regarding soils in the proposed LNG terminal area is based on the Soil Survey of Clatsop County, Oregon (U.S. Department of Agriculture - Soil Conservation Survey (USDA-SCS), 1988) and the Soil Survey Geographic Database (SSURGO) (USDA-Natural Resources Conservation Service (NRCS), 2003). Additional information about the soils was obtained from Official Soil Series Descriptions (USDA-NRCS, 2004).

Existing Soil Resources

The proposed LNG terminal would be located in the Northern Pacific Coast Range, Foothills, and Valleys Major Land Resource Area (MLRA). The dominant soils in this MLRA are Umbrepts and Ochrepts. These well drained, gently sloping to very steep soils have a mesic temperature regime and mixed mineralogy.

The proposed LNG terminal would be located within a 411-acre parcel which contains Braun, Harslow, Kilchis, Locoda, Scaponia, and Udipsamment soils. Approximately 70 acres would be disturbed by construction of the LNG terminal and associated elements, including the parking lot and power line. The dominant soil type at the LNG terminal is Udipsamments, covering about 86 percent of the construction work area. Other soils at the terminal include Locoda silt loams, Harslow-Kilchis very gravelly loams, and Scaponia-Braun silt loams. Following construction, about 31.2 acres of Udipsamments, 4.5 acres of Locoda silt loams, and 0.01 acre of Scaponia-Braun silt loams would be encompassed within the footprint of the facility components (e.g., marine facilities, structures, process areas, roads, etc.).

A parking lot would be provided for construction workers southeast of the Taylorville interchange at Highway 30. This location for the construction worker parking lot has been changed from the original location proposed by NorthernStar and no information has been provided about the new site

regarding soils or other resources. In addition, modifications are now being proposed to Bradwood Road and Clifton Road that would disturb areas outside the current footprint. Therefore **we recommend that:**

- **Prior to construction of the LNG terminal, NorthernStar should file with the Secretary the following information regarding the new proposed construction worker parking lot, Bradwood Road, and Clifton Road: map of disturbed area; soils; impacts on upland vegetation, waterbodies and wetlands, and wildlife habitat; occurrence of state- or federally listed species; land use and zoning; cultural resources, and restoration plans. NorthernStar should include status and copies of agency clearances for wetlands, threatened and endangered species, and cultural resources, as applicable.**

Non-jurisdictional facilities associated with the proposed LNG terminal include a 1.5-mile-long power line and three lateral pipelines. As discussed in section 2.2.2, the lateral pipelines would be constructed by entities other than NorthernStar and are tentative at this time. The power line would require a 100-foot-wide right-of-way for construction and operation. Approximately 0.3 mile of the power line would be located with the terminal site discussed above. Soils within the remainder of the power line corridor consist of 8.3 acres of Braun-Scaponia silt loams, 5.8 acres of Scaponia-Braun silt loams, 1.2 acres of Harslow-Kilchis very gravelly loams, and less than 0.1 acre of Udipsamments.

According to the soil survey of Clatsop County, Oregon (USDA-SCS, 1988), the Udipsamments consist of sandy soils that formed in stratified dredged materials along the Columbia River. Udipsamments are very deep, excessively drained soils with slopes ranging from 0 to 15 percent. The Locoda soils are finer textured soils formed in mixed alluvium located on tidally influenced flood plains. These are very deep, very poorly drained soils with slopes ranging from 0 to 3 percent. The Harslow and Kilchis soils consist of very gravelly loams formed in mixed colluvium along mountainsides. These are shallow to moderately deep, well drained soils with slopes ranging from 60 to 90 percent. The Braun and Scaponia soils consist of silt loams formed in colluvium weathered from siltstone. These are moderately deep, well drained soils with slopes ranging from 3 to 60 percent. The Alstony soils consist of gravelly loams formed in colluvium weathered from igneous rock. These are deep, well drained soils with slopes ranging from 30 to 60 percent. The Anunde soils consist of silt loams formed in colluvium weathered for siltstone. These soils are very deep and well drained with slopes ranging from 3 to 30 percent.

Contaminated Soils

In August 2005, AMEC Earth and Environmental, Inc. (AMEC) prepared a revised Phase I Environmental Site Assessment for the proposed terminal site. The Environmental Site Assessment included a review of regulatory databases and a site inspection to identify known contaminated sites on or near the proposed LNG terminal. No contaminated sites were identified within 0.25 mile of the proposed LNG terminal site. However, the Environmental Site Assessment did identify several Recognized Environmental Concerns (REC) on the property, including two gasoline underground storage tanks (UST), an area where a former train/maintenance shop building was located, asbestos containing cement board, solid waste disposal and burn areas, and the potential presence of polychlorinated biphenyls (PCB) and dioxins in dredged sand deposited at the site. The power line corridor was not examined in the Environmental Site Assessment; however, the search radius used for the review of regulatory databases included portions of the proposed power line route. In addition, surveys of the corridor and construction parking area did not identify any features that would constitute RECs.

Based on historical site activities, the potential exists that contaminated soils are present at the LNG terminal site. Improper handling of contaminated materials encountered during construction could spread contaminants to surface and groundwater and other sensitive resources, as well as represent a

health risk to workers. NorthernStar does not anticipate encountering potentially contaminated material during the construction of the terminal. If final design results in the need to advance deep excavations within the footprint of particular RECs, NorthernStar would prepare a *Contaminated Materials Management Plan* (CMMP) that would specify the procedures to identify, characterize, and properly manage potentially contaminated materials. The CMMP would be submitted to the appropriate agencies for approval before construction. To ensure that personnel working on the project are prepared to appropriately handle an unanticipated encounter with contaminated soils, a CMMP should be prepared regardless of whether or not the final design includes deep excavations. Therefore, **we recommend that:**

- **NorthernStar should prepare its CMMP to address the discovery and management of contaminated soils and groundwater. This plan should comply with applicable state and federal regulations and should include procedures for the identification and management of unknown contaminants if any are encountered during construction of the proposed LNG terminal and pipeline facilities. The plan should be filed with the Secretary for the review and written approval of the Director of OEP prior to construction.**

Impacts and Mitigation

Construction activities such as clearing, grading, and the movement of construction equipment over work areas may affect soil resources. Clearing removes protective cover and exposes the soil to the effects of wind, sun, and precipitation, which may increase the potential for soil erosion and the movement of sediments to sensitive areas. Grading and equipment traffic may compact soil, reducing porosity and percolation rates, which would result in increased runoff potential. Contamination from spills or leaks of fuels, lubricants, and coolants from construction equipment could also impact soils.

Operation of the LNG terminal would permanently convert 35.7 acres of soil to a commercial/industrial use. Project-related impacts on soils would be minor. There are no prime farmland soils at the LNG terminal. The majority (98 percent) of the soils within the proposed LNG terminal site are not considered to be highly erodible land (HEL) or potentially highly erodible land (PHEL) and are therefore not susceptible to erosion by water. However, the Udipsamments have a wind erodibility group (WEG) classification of 2 and are considered to be susceptible to wind erosion.

Maintenance of the 100-foot-wide power line corridor would permanently convert approximately 15 acres of soil outside the terminal site to commercial/industrial uses. None of the soils within the corridor that would potentially be affected are considered prime farmland. Less than 1 percent of the soils within the corridor are considered to be susceptible to wind erosion. However, essentially all (greater than 99 percent) of the soils within the power line corridor are considered HEL and susceptible to water erosion.

NorthernStar would mitigate impacts on soils at the proposed terminal and associated work areas by implementing the measures specified in its terminal ESC Plan. NorthernStar's terminal ESC Plan includes measures to control erosion and sedimentation during construction, ensure revegetation to prevent erosion following construction, and prevent and control spills.

4.2.2.2 Sediments

As discussed in sections 2.1.3.1 and 2.4.1.2, the construction and operation of the proposed LNG terminal would require dredging of subsurface sediments in the Columbia River adjacent to the facility to safely navigate vessels from the river channel to the berth at the terminal. Current water depths within the proposed dredge footprint range from -21 to -51 feet CRD. The proposed design depth is -42 foot CRD

with a 1-foot overdredge allowance, for a total project depth of -43 feet CRD. NorthernStar anticipates that up to 700,000 cubic yards of sediment would be dredged to obtain the proposed design depth and overdredge allowance.

In accordance with the Lower Columbia River Management Area Dredged Material Evaluation Framework (DMEF) developed by the Regional Management Team (RMT), an inter-agency task force⁴ that studies dredging on the Columbia River, NorthernStar conducted a Tier I evaluation of the project area. Because the Tier I evaluation indicated the presence of generally low levels of some chemicals of concern, a DMEF Tier IIB analysis (physical and chemical analyses) was selected as the most appropriate level of evaluation for the proposed dredged materials.

Sediment Sampling

Sampling and Analysis Plan

NorthernStar developed a *Sampling and Analysis Plan* (SAP) (AMEC, 2006) that details the sediment collection and testing program conducted on the proposed dredged material. The SAP was developed based on procedures outlined in the Lower Columbia River Management Area DMEF (COE et al., 1998). The sediment sampling and analysis program followed the DMEF Tier IIB approach (physical and chemical analysis) for evaluation of the proposed dredged material. The SAP received conditional approval from the RMT in early February 2006 (AMEC, 2006).

Seven horizontally delineated areas were selected within the proposed dredging footprint to characterize the nearshore and offshore sediments (see figure 4.2.2-1). Areas 1 through 3 were closest to the shoreline, whereas areas 4 through 7 were offshore parallel to the navigation channel. Generally, five core locations were designated within each area in locations with the thickest deposits of proposed dredged materials (dredge prism). The exception was area 7, with only a single core location. Area 7, a small triangular area at the northeast corner of the proposed dredging area, was added before the last SAP revision at the suggestion of the local river pilots. This sample point was intended to provide additional data for an area to be dredged to provide better navigational maneuvering for carriers approaching the turning basin from the main channel.

Dredged Material Management Units (DMMU) were designated based on the DMEF ranking protocol, although different rankings were established for different areas of the dredge prism because sediments are believed to be heterogeneous across the site. Top, middle, and bottom strata DMMUs were designated for each horizontal area, where sediments were sufficiently thick. For all areas, the top 4 feet was considered the top stratum, the core segment from 4 to 10 feet was considered the middle stratum, and material below 10 feet to the project depth (including overdredge) was designated the bottom stratum. The leave surface horizon (1 foot below the maximum overdredge depth—termed the “Z” stratum) was also to be sampled. Sediments from the top, middle, and bottom DMMUs were to be composited by sample area yielding a total of 18 sediment samples for analysis from the proposed dredge prism. Samples from the leave surface were not to be composited. Two additional samples from designated reference cores were also to be analyzed.

⁴ Included in the RMT are representatives of the COE, EPA, ODEQ, WDE, and WDNR.

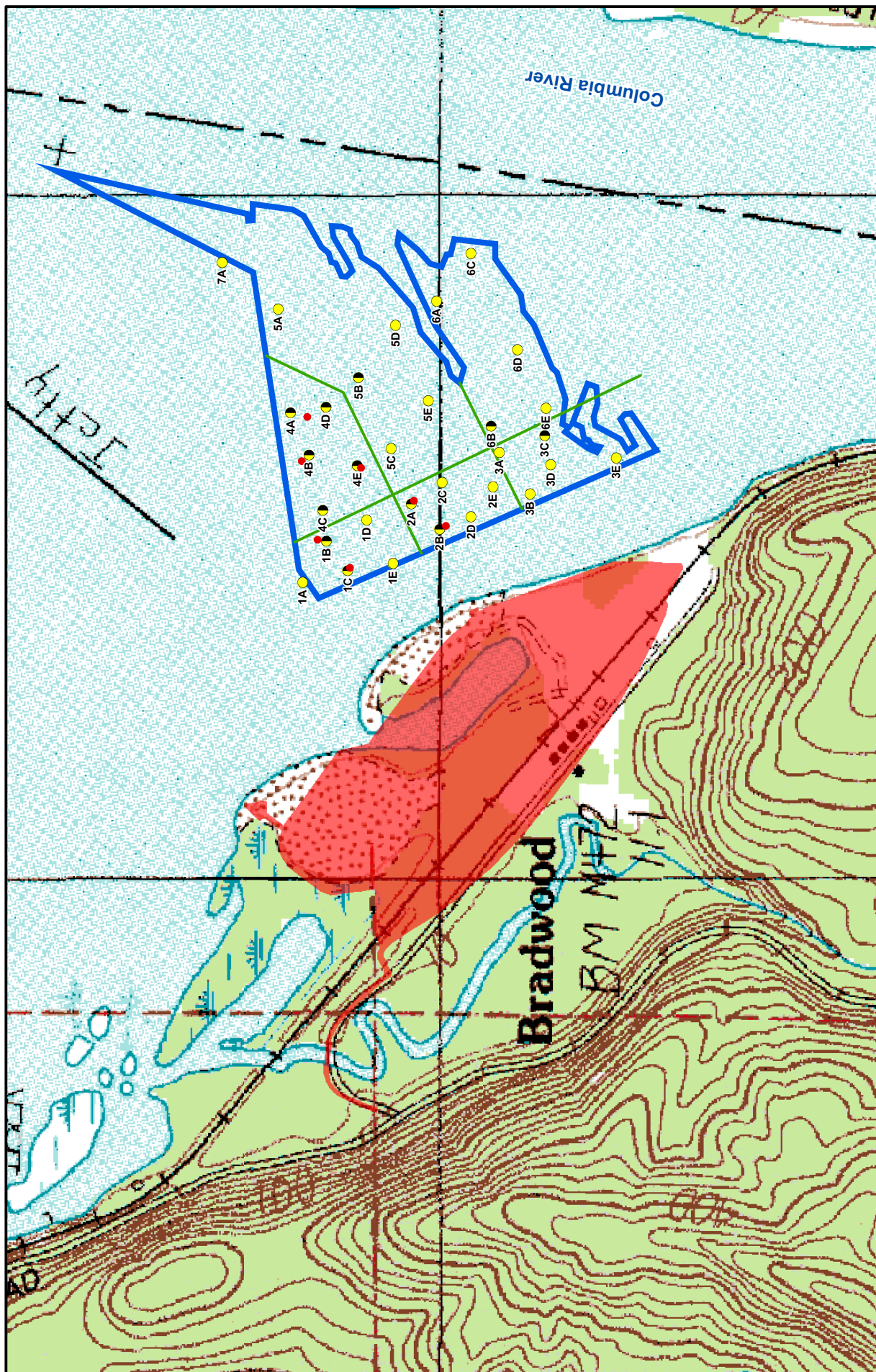


Figure 4.2.2-1
Bradwood Landing Project
 Dredging Footprint and Sediment Sampling Locations

February 2007
 Rotary Drill Location
 DMMU Boundaries
 Dredge Footprint

2006 Vibracore
 Sampling Location
 Full Target Depth
 Partial Target Depth

February 2006 Sampling Event

Between February 9 and February 26, 2006, vibracore samples were collected at all 33 locations specified in the revised SAP, including 31 cores in the dredge prism and 2 reference site cores. Sample processing was conducted onboard an SWCA Environmental Consultants (SWCA) research vessel moored alongside the sampling vessel. Collected samples were stored in iced coolers, or kept in a secured refrigeration unit at 39.2 °F. Methods and materials used for each physical and chemical analysis performed at the lab are detailed in *Sediment Characterization Report*, dated May 24, 2006 (SWCA, 2006). Deviations from the SAP are described below.

Core sediments collected for DMMU composite samples were not mixed together in the field using a drill operated stainless steel impeller as specified in the SAP. Under field conditions, the use of an electric drill was determined to pose an unacceptable potential for external contamination as a result of wear from the drill's copper bushings. Mixing of the composite samples was conducted in the analytical laboratory, where controlled conditions minimized the potential for contamination. Equal amounts of material from specific strata within the DMMU were stored in a sealed composite sample jar with instructions for the laboratory staff to mix well before running analyses. NorthernStar does not believe the analytical results were affected by this deviation from the SAP.

Full penetration to target depth was achieved at 19 core locations. Partial cores were collected at 12 locations (see figure 4.2.2-1). The vibracore sampler was not able to penetrate the substrate to the target depth specified in the SAP at these 12 sites. Refusal was declared if core advancement stopped at the same depth on subsequent attempts, repeatedly showed similar obstructing bottom material, and/or equipment showed damage from attempting to core into impenetrable materials. Apparent reasons for these refusals included dense gravel layers, wood, and densely packed sands (SWCA, 2006). An acoustic survey conducted in June 2005 found a distinct sub-bottom layer of "consolidated sediments." This consolidated layer slopes upwards in the northwestern portion of the dredge area, where most of the partial core penetrations occurred.

Partial refusals resulted in a change in the compositing scheme for some bottom (B) DMMU composites (see table 4.2.2-1). As a result, the number of constituent core locations for a composite was reduced if one or more cores within a sampling area was not attained due to refusal. In DMMU 2, for example, only core locations 2A and 2B were targeted constituents of the bottom composite. However, at core location 2B the bottom stratum was not obtained and thus, the "composite" consists only of material from core location 2A. Similarly, in area 4 the targeted B strata was not attained at core locations 4A, 4B, 4D, and 4E, leaving only core 4C to fill the DMMU composite for the B strata. All B strata constituents were obtained for the targeted DMMU composites from sites 3, 5, and 6. Top (T) and middle (M) DMUU strata were collected at all core locations in keeping with the SAP. Samples from the "leave surface" collected during this sampling event were placed in archival storage at the analytical laboratory pending agency responses to the submitted results.

NorthernStar indicated that tributyl tin analysis of pore water was not feasible because the highly sandy nature of the sediment resulted in very limited pore water recovery. As discussed in the SAP, bulk sediment analysis for tributyl tin was performed on DMMU composite samples.

May 2006 Sampling Event

On May 24-25, 2006, a truck-mounted rotary mud drill rig was deployed from a barge to obtain samples at 7 of the 12 sites where partial refusal during the original sampling effort prevented sampling of the bottom and/or leave surface. These sampling sites were chosen in consultation with NMFS (SWCA, 2007). All 12 samples from these 7 cores were placed in archival storage at the analytical laboratory pending analysis instructions.

TABLE 4.2.2-1		
Estimated and Actual Compositing of DMMUs Sampled for the Bradwood Landing Project		
DMMU	Target Core Segments to be Composited	Actual Core Segments Composited
1T	5	5
1M	5	5
1B	4	3
2T	5	5
2M	5	5
2B	2	1
3T	5	5
3M	5	5
4T	5	5
4M	5	5
4B	5	1
5T	5	5
5M	5	5
5B	1	1
6T	5	5
6M	5	5
7T	1	1
7M	1	1
Reference 1	1	1
Reference 2	1	1

February 2007 Sampling Event

In a letter dated June 30, 2006 NMFS staff requested retene analysis for the 10 DMMUs in areas 4 through 7, full analysis of May 2006 samples, and full analysis of individual leave surface samples. In a memorandum dated October 3, 2006, NMFS staff reiterated their previous request and further specified mercury, VOCs, and DMEF Tier IIA analysis be performed. When NorthernStar requested additional laboratory analysis of the May 2006 samples placed on hold at the analytical laboratory, it learned that the samples had been inadvertently discarded by laboratory staff. Therefore, on February 6-7, 2007, replacement samples were collected by mud rotary drilling techniques at the same seven core locations.

Sampling generally followed the SAP except as described for the February 2006 sampling event relative to composite sample mixing and number of fractions. Because of poor sample recovery, composite samples 1B and 2B each consisted of only one fraction rather than the four and two fractions, respectively, specified in the SAP. Composite sample 4B consisted of three fractions compared to the five intended in the SAP. Additionally the sampling deviated from the SAP in that the sampling depth for bottom and leave surface strata were modified to reflect new potential maximum dredging depths. Bottom strata were extended downward 2 feet and Z strata were shifted 2 feet lower than specified in the SAP.

Physical and Chemical Analyses

Grain size analysis was performed on 18 DMMU composite samples and 2 reference samples following agency approved methods. The sediment sampled from the proposed dredge prism contained very small quantities of fines. Fines are sediments that are smaller than 0.65 mm, equivalent to material that passes through a standard series 230 sieve. Fines are important due to the tendency of contaminants to adhere to fine grained particles. Composite cores from each DMMU contained over 93 percent

material retained on a 230 sieve, and 15 of the 18 samples contained over 97 percent material retained on a 230 sieve. The results of the grain size analyses indicated that the sediments in the proposed dredging area generally consist of sands.

Sediment samples were chemically analyzed according to agency approved methods for the constituents listed in the DMEF. Additional analyses included guaiacols, resins, and phytosterols. These analytes were included due to concerns expressed by NMFS staff resulting from the site's former use as a lumber mill.

Details of the chemical analyses are available in SWCA (2006, 2007). The results of the chemical analyses presented below are summary discussions by contaminant class. The laboratory results summarized below are reported to method reporting limits (MRL). A not detected result for a given compound was defined by the laboratory as "analyzed for, but not detected at or above the MRL."

The NOAA Squirt (Screening Quick Reference Tables) tables provide a listing of chemical concentrations for inorganic and organic contaminants in various environmental media. The tables can be used to initially identify substances that may threaten aquatic resources of concern to NOAA. The results of chemical tests conducted for proposed projects may be compared to values listed in the Squirt tables to provide initial screening for potential contaminants of concern. The tables are intended for preliminary screening purposes only, and do not represent criteria or clean-up levels.

Total Organic Carbon

In the dredge prism samples, total organic carbon (TOC) ranged from not detected (in eight DMMUs) to 0.78 percent at DMMU 1M. TOC in the leave surface samples ranged from 0.14 to 1.79 percent. Reference sites ranged from not detected to 0.05 percent. These values are consistent with the highly sandy nature of the sediments.

Total Volatile Solids

Total volatile solids in the dredge prism ranged from 0.56 percent in DMMU 5T to 1.61 percent in DMMU 6T and the reference sites had 0.7 and 0.8 percent total volatile solids. Total volatile solids in the leave surface samples ranged from 0.67 to 2.11 percent. As with TOC, the percentage of volatile solids is consistent with the highly sandy nature of the proposed dredged sediments.

Metals

The sediment samples were analyzed for 10 heavy metals. The results are summarized in table 4.2.2-2 along with several screening, threshold effects, and background levels for comparison.

Arsenic, chromium, copper, lead, nickel, and zinc were detected in all samples. Mercury and selenium were each detected in only one dredge prism sample and no leave surface samples. The concentrations detected were all below the Lower Columbia River Management Area DMEF screening levels, the draft Sediment Evaluation Framework (SEF) SL1 levels, and the lowest NOAA Squirt table Threshold Effects Level (TEL). The concentrations were also either below or very near the highest NOAA Squirt table "background" levels. Some of the chromium concentrations in both dredge prism samples and leave surface samples exceeded typical background levels near the site in the Columbia River, but the concentrations of all other metals were less than or within the range of nearby background levels.

TABLE 4.2.2-2

Summary of Results for Heavy Metals in Sediments

Metal	Dredge Prism	Leave Surface	Reference Site 1	Reference Site 2	DMEF Screen ^a	SEF SL1 ^b	Squirt Back-ground ^c	TEL ^d	SEDQUAL Levels ^e
Arsenic	1.1 – 1.9	1.2 – 1.7	1.3	1.4	57	20	1.1	5.900	1.4 – 2.5
Cadmium	ND – 0.14	ND – 0.19	0.07	0.07	5.1	1.1	0.30	0.583	0.8 – 5.5
Chromium	3.1 – 13.3	3.4 – 16.8	5.7	7.6	NA	95	13.0	36.286	6 – 8
Copper	5.0 – 9.5	5.6 – 8.3	5.8	6.0	390	80	25.0	28.012	6 – 30
Lead	1.26 – 2.98	1.15 – 2.67	2.08	2.40	450	340	7.0	37.000	2 – 14.8
Mercury	ND – 0.09	ND	ND	ND	0.41	0.28	0.051	NA	NA
Nickel	5.9 – 11.9	6.3 – 12.5	8.1	9.3	140	60	9.9	19.514	10 – 17
Selenium	ND – 1.1	ND	ND	ND	NA	NA	0.29	NA	NA
Silver	ND – 0.15	ND – 0.13	ND	ND	6.1	2.0	<0.50	NA	NA
Zinc	15.4 – 32.4	15.2 – 34.8	24.4	28.5	410	130	38.0	98.000	36 – 130
Notes: All concentrations in parts per million. Results for dredge prism and leave surface samples reflect the range of concentrations measured in the samples.									
^a	Lower Columbia River Management Area DMEF (COE et al., 1998) screening level.								
^b	Draft SEF (COE et al., 2005) SL1 level.								
^c	Highest NOAA Squirt "background" level.								
^d	NOAA Squirt TEL (Buchman, 1999).								
^e	Typical Columbia River concentrations (upstream and downstream in vicinity of site) from Sediment Quality Information System (SEDQUAL) Release 5 (WDE, 2004).								
NA	Not Applicable								
ND	Not Detected								

Butyl tins are organometallic compounds associated with marine vessel maintenance and construction activities or sources. Tributyl tin was not detected in any of the dredged prism samples or the reference samples but was detected in four leave surface samples at concentrations ranging from 1.6 parts per million (ppm) to 5.4 ppm. These concentrations are below the draft SEF SL1 (dry weight) level of 75 ppm.

Organic Compounds

NorthernStar analyzed the proposed dredge sediments for a suite of standard volatile and semi-volatile organic compounds. None of the eight volatile organics analyzed for were identified at or above the MRL in the samples from the dredge prism, leave surface, or the reference sites. Of the 39 semi-volatile organic compounds for which the samples were analyzed, only 4 polycyclic aromatic hydrocarbons (PAH) and 2 phthalates were detected above the MRLs. During the February 2006 sampling event, the PAHs fluoranthene and pyrene were identified at 13 and 15 parts per billion (ppb), respectively, in one DMMU (3M); and acenaphthene, phenanthrene, and pyrene were detected at similar concentrations in one leave surface sample (3DZ). The concentrations of these compounds were at one to two orders of magnitude below their respective DMEF screening levels and SEF SL1s. The concentrations were also below the applicable lowest NOAA Squirt table TELs. These PAHs are recognized byproducts of petroleum combustion and the low levels identified in isolated samples may represent contamination from sampling vessel diesel exhaust.

Bis(2-ethylhexyl)phthalate was detected in leave surface sample 4BZ at a concentration of 110 ppb, which compares to the DMEF screening level of 8,300 ppb and the SEF SL1 level of 220 ppb. Diethyl phthalate was detected only in the Reference Site 2 sample. The concentration of 18 ppb was

below the DMEF screening level of 1,200 ppb. No NOAA Squirt table guidelines or other SEF screening levels have been established for these compounds.

Pesticides

None of the 21 pesticides analyzed for were identified at or above their respective MRLs in samples from the proposed dredged materials or the reference site samples. Methoxychlor was detected in leave surface samples 3BZ (1.1 ppb) and 7AZ (8.0 ppb). Neither sediment screening levels nor TELs are established for this pesticide in current versions of the DMEF, SEF, or NOAA Squirt tables.

Polychlorinated Biphenyls

NorthernStar analyzed the sediments for seven individual PCBs. None of the PCBs were detected at or above the MRL in any of the samples.

Dioxin and Furans

Samples from each DMMU and the reference sites were analyzed for 7 dioxins and 10 furans. In addition, samples were analyzed for total tetra-dioxins, penta-dioxins, hexa-dioxins, hepta-dioxins, tetra-furans, penta-furans, hexa-furans, and hepta-furans. Results for the parameters that were detected above the MRL in at least one sample are summarized in table 4.2.2-3.

TABLE 4.2.2-3					
Summary of Results for Dioxins and Furans in Sediments					
Parameter	Dredge Prism	Leave Surface	Reference Site 1	Reference Site 2	UET ^a
2,3,6,7,8-HxCDD	ND – 0.883	ND – 0.257	ND	ND	--
1,2,3,7,8,9-HxCDD	ND – 0.171	ND – 0.112	ND	ND	--
1,2,3,4,6,7,8-HpCDD	ND – 15.362	ND – 10.828	ND	ND	--
OCDD	ND – 85.845	0.899 – 157.794	ND	ND	--
1,2,3,7,8-PeCDF	ND – 0.122	ND	ND	ND	--
2,3,4,7,8-PeCDF	ND – 0.090	ND	ND	ND	--
1,2,3,4,7,8-HxCDF	ND – 0.266	ND – 0.150	ND	ND	--
1,2,3,6,7,8-HxCDF	ND – 0.127	ND – 0.056	ND	ND	--
2,3,4,6,7,8-HxCDF	ND – 0.173	ND	ND	ND	--
1,2,3,4,6,7,8-HpCDF	ND – 1.788	ND – 0.788	ND	ND	--
1,2,3,4,7,8,9-HpCDF	ND – 0.307	ND	ND	ND	--
OCDF	ND – 72.678	ND – 6.962	ND	ND	--
Total Tetra-Dioxins	ND	ND – 0.200	ND	3.758	--
Total Penta-Dioxins	ND – 0.069	ND	ND	ND	--
Total Hexa-Dioxins	ND – 2.568	ND – 1.081	ND	ND	--
Total Hepta-Dioxins	ND – 25.449	ND – 15.842	ND	ND	--
Total Penta-Furans	ND – 0.673	ND	ND	ND	--
Total Hexa-Furans	ND – 3.864	ND – 0.519	ND	ND	--
Total Hepta-Furans	ND – 8.125	ND – 3.213	ND	ND	--
2,3,7,8-TCDD	0 – 0.397	0.0001 – 0.173	0	0	8.8
Equivalent Total ^b					
Notes: All concentrations in parts per trillion.					
Results for dredge prism and leave surface samples reflect the range of concentrations measured in the samples.					
^a	NOAA Squirt table Upper Effects Threshold (UET) for 2,3,7,8-TCDD.				
^b	World Health Organization toxic equivalency factor totals.				

Totals for 2,3,7,8-TCDD equivalents, calculated using World Health Organization toxic equivalency factors, ranged from zero to 0.173 parts per trillion. These 2,3,7,8-TCDD equivalent totals are well below the NOAA Squirt table upper effects threshold (UET) for 2,3,7,8-TCDD of 8.8 parts per trillion.

Sulfide and Ammonia

Total sulfide was detected at only one DMMU (1AM at 0.7 percent); it was not detected in the reference samples. None of the leave surface samples were analyzed for total sulfide. Ammonia as nitrogen ranged from 0.5 to 17.2 ppm in the dredge prism samples and from 8.0 to 18.0 ppm in the leave surface samples. Reference sample results for ammonia were 7.9 and 3.3 ppm at sites 1 and 2, respectively.

Guaiacols and Resins

Analysis for guaiacols, retene, and resin acids was requested by the NMFS due to concerns related to the site's history as a lumber mill. The following compounds were tested for, but not detected at or above the MRL in any of the dredge prism or leave surface samples: pimaric acid; 3,4,5-trichloroguaiacol; tetrachloroguaiacol; 9,10-dichlorostearic acid; 12-chlorodehydroabietic acid; 14-chlorodehydroabietic acid; and dichlorodehydroabietic acid. The reference site samples were not analyzed for these compounds. Table 4.2.2-4 summarizes the results for the remaining compounds.

TABLE 4.2.2-4		
Summary of Results for Guaiacols, Retene, and Resin Acids in Sediments		
Compound	Dredge Prism	Leave Surface
Linoleic Acid	ND – 0.13	ND – 0.043
Oleic Acid/Linolenic Acid	ND – 0.16	ND – 0.18
Retene	ND – 0.55	ND – 3.2
Isopimaric Acid	ND – 0.077	ND – 0.061
Dehydroabietic Acid	ND – 0.16	ND – 0.034
Abietic Acid	ND – 0.041	ND – 0.057
Notes:	All concentrations in ppm. Results for dredge prism and leave surface samples reflect the range of concentrations measured in the samples.	
NA	Not Analyzed	

Neither sediment screening levels nor TELs are established for these compounds in current versions of the DMEF, SEF, or NOAA Squirt tables. However, in a memo to the Commission dated June 30, 2006, NMFS staff indicated that the agency has used an estimated sediment toxicity benchmark for retene of 1.1 milligrams of retene per gram of TOC (mg/g). Using this benchmark, TOC-adjusted retene concentrations in the four dredge prism samples where the compound was identified and TOC was analyzed are 0.012 mg/g, 0.018 mg/g, 0.38 mg/g, and 0.61 mg/g. TOC data was available for only two of the five leave surface samples in which retene was detected: in sample 2AZ, which also had the highest retene concentration, and in sample 1BZ. The TOC-adjusted retene concentrations in these samples are 0.58 mg/g and 0.084 (mg/g), respectively.

Phytosterols

Phytosterols, also known as plant sterols, are a naturally occurring class of compounds found in the cells and membranes of plants. There are approximately 250 different sterols and related compounds

in plant and marine materials with the most common ones being beta-sitosterol, stigmasterol, and campesterol (Forbes Medi-Tech, 2006). In fish, they may have reproductive effects and could be responsible for some types of reproductive dysfunction observed in fish exposed to pulp mill effluents (Tana et al., 1994 as cited in NMFS, 2004a). Sediment concentrations of phytosterols vary widely. Phytosterol concentrations in sediments from sites that are not specifically associated with pulp mills range from less than 1 to approximately 30 micrograms per gram ($\mu\text{g/g}$) dry weight (Hasset and Lee, 1977; Mudge et al., 1999 as cited in NMFS, 2004a). Data regarding phytosterol concentrations in sediments associated with pulp mills are limited. Leeming and Nichols (1998) reported total sterol concentrations from the Upper Derwent Estuary in Tasmania in the 30-110 $\mu\text{g/g}$ dry weight range in sediments that were closest to pulp mill discharges, and from 0.6 to 8.1 $\mu\text{g/g}$ dry weight at sites farther from mill sites (NMFS, 2004a). Phytosterols were analyzed in the proposed dredge sediments for the Bradwood Landing Project because of the site's history as a former lumber mill.

Dredge prism and leave surface samples were analyzed for four phytosterols and each was detected in at least several samples. The results are summarized in table 4.2.2-5. As might be expected, phytosterol concentrations were highest in both DMMU and leave surface samples nearest shore. Beta-sitosterol was the most commonly identified compound, occurring in 19 of the 26 leave surface samples and 13 of the 15 DMMU samples collected in 2007. Stigmastanol was identified in about 30 percent of the DMMU and leave surface samples. Campesterol was found in 19 percent of the leave surface samples and 13 percent of the DMMUs. Stigmasterol was identified in only two samples from the leave surface. Phytosterol contents of the sediments in the proposed dredging footprint were within the range of concentrations reported for sediments not specifically associated with paper or pulp mills cited above.

TABLE 4.2.2-5		
Summary of Results for Phytosterols in Sediments		
Compound	Dredge Prism	Leave Surface
Stigmastanol	ND – 0.44	ND – 2.3
Campesterol	ND – 0.33	ND – 0.87
Beta-Sitosterol	ND – 4.1	ND – 15.0
Stigmasterol	ND – 3.30	ND – 0.29
Notes: All concentrations in ppm ($\mu\text{g/g}$). Results for dredge prism and leave surface samples reflect the range of concentrations measured in the samples.		

There are neither sediment screening levels nor TELs for these compounds in current versions of the DMEF, SEF, or NOAA Squirt tables. Because these compounds are not routinely tested for in Columbia River sediments, a database of background levels has not been established to which these concentrations can be compared.

Phytosterols are relatively insoluble in water. In laboratory studies assessing the effects of phytosterols on fish, these compounds were dissolved in ethanol or acetone before being added to the test waters (Lehtinen et al., 1999; Tremblay and Van Der Kraak, 1999). The mean TOC content in sediments from the DMMU samples was 0.25 percent (SWCA, 2006). The mean TOC content from the leave surface samples was 0.47 percent. The relatively low TOC content of the sediments within the dredge prism suggests a limited potential to mobilize phytosterols from the sediments during dredging or from the leave surface during operation of the facility.

Summary of Physical and Chemical Analysis of Sediments

Results for the physical and chemical analysis of the sediment from the proposed dredge prism and the two reference sites are summarized below.

- All sediment samples in the proposed dredge area consisted of at least 90.4 percent sand or gravel, and contained less than 1.8 percent TOC and less than 2.2 percent total volatile solids.
- Metals results were all well below DMEF, SEF, and NOAA Squirt screening and TELs, and were generally within background levels. The concentrations were generally evenly dispersed horizontally and vertically throughout the dredge prism.
- No VOCs or PCBs were detected.
- The only semi-volatile organic compounds detected were several PAHs, which were detected in two samples. The detected concentrations of these compounds were relatively low compared to applicable screening and TELs. The presence of the PAHs in the samples may be the result of accidental contamination during sampling by vessel diesel exhaust.
- Toxicity equivalency factor totals for dioxins and furans were well below the NOAA Squirt table UET level of 8.8 parts per trillion.
- Analytical results for guaiacols, resin acids, and phytosterols were variable across the samples with positive correlations observed between the concentrations and the presence of woody debris in the core samples. There are no sediment screening levels or TELs for these compounds in current versions of the DMEF, SEF, or NOAA Squirt tables.

Potential Dredging Impacts

Sediment Resuspension

NorthernStar would use hydraulic cutterhead dredging to excavate the berth area. Studies by the COE indicate that cutterhead dredging generally results in lower sediment resuspension than other forms of dredging (e.g., clamshell or hopper barge) (COE, 1986; COE, 1988). Dredging operations to excavate the ship berth would suspend sediments and affect water quality. In general, dredging-related water quality impacts would include both the physical effects of suspended sediment and alterations of water chemistry due to the release of various chemical constituents associated with the sediment (see sections 4.3.2.2 and 4.3.2.3 for further discussion of water quality impacts). Additional discussion of potential sediment resuspension effects is included below.

Hydrodynamic and Sediment Transport Alterations

During initial scoping discussions, the NMFS raised a number of concerns related to potential impacts resulting from erosion, sedimentation, and changes in channel stability that could result from dredging of the proposed berth area at the LNG terminal. These issues included the potential for:

- changes in the morphology and hydraulics of the Clifton Channel;

- alteration of sediment transport in the main navigation channel and impacts on downstream Tenasillahe Island (in particular, the Lewis and Clark National Wildlife Refuge (LCNWR));
- changes in water circulation in the dock area to adversely affect shallow water habitat;
- scour at the shoreline from altered depth contours and from vessel berthing and unberthing movements at the terminal (including wave wash); and
- turbidity from dredge activity, including suspended solids concentration, size and duration of the plume.

Additionally, the NMFS requested information on the expected frequency and volume of maintenance dredging. To address the concerns of the NMFS, NorthernStar conducted hydraulic and sediment transport analyses using a combination of the RMA2 hydrodynamic model and the SED2D-WES sediment transport model (WEST, 2006). The RMA2 model is a two-dimensional, depth-averaged, finite element hydrodynamic numerical model developed by the COE. The SED2D-WES model is also a two-dimensional numerical model for calculating depth-averaged transport, deposition, erosion, and formation of stream-bed deposits in non-cohesive (i.e., sandy) sediments. The models were calibrated using measured data for a period in mid-March 2006. The calibrated models were then used to evaluate the hydrodynamic and sedimentation characteristics for a range of potential river flows. Based on historical stage and flow data, NorthernStar modeled four river flow conditions including:

- a low flow condition (discharge rate of 125,000 cubic feet per second (cfs));
- a 50 percent exceedance flow (210,000 cfs);
- a high winter or spring freshet condition (545,000 cfs); and
- an extremely high flow condition, equivalent to the 1996 flood event (846,000 cfs).

The results of the modeling show that changes in the hydraulic characteristics of the Columbia River and its channels caused by the proposed project would generally be minor. Specific responses for each of the NMFS initial concerns are presented below.

Based on the modeling conducted by NorthernStar, the proposed project would cause a reduction in stream flow through the Clifton Channel, resulting in a reduction of the water surface profile, shear stresses, and flow velocities through the channel. The changes in hydraulic conditions would occur over a 1.5-hour period at the peak of flood and ebb tides for low to average flows, and over the entire tidal cycle for high flows. This trend would increase slightly with a ship docked at the proposed terminal. The SED2D-WES results indicate that minor deposition may occur for the 50 percent exceedance flow along the Clifton Channel. However, the results do not show significant changes to the overall bed conditions in the Clifton Channel for the range of flows modeled. The small changes in the hydraulic characteristics associated with the proposed project are not expected to alter the form of the Clifton Channel. The reduction in flow through the Clifton Channel as a result of the proposed project also makes it unlikely that Clifton Channel would become the primary flow channel in the future.

Based on the SED2-WES results, the proposed project would have an influence on flow and sediment transport within the main navigation channel. The proposed turning basin would not cause a change in the velocities, depths, or sediment transport capacity within the area near the Lewis and Clark National Wildlife Refuge. However, modeling indicates that minor changes would occur north of this area and near the navigation channel. A comparison of the change in bed elevations after 90 days simulation of the 50 percent exceedance discharge indicates that the change in bed elevation within this

area would be minor (0.05 to -0.05 feet). However, the change would be more pronounced within the Columbia River near the navigation channel.

The results of the RMA2 hydrodynamic modeling indicate that the proposed project would cause a reduction of the velocities and shear stresses along the shoreline near the project site. Because of the reduction in the shear stresses and velocities along the shoreline, the proposed project would not cause increased bank erosion due to changes in depth contours resulting from dredging to construct the turning basin and mooring facilities. The potential for bank erosion from ship generated waves was investigated by NorthernStar and is discussed in detail in sections 4.1.2.3 and 4.1.3.3.

NorthernStar's design for the maneuvering basin includes side slopes of 3 (horizontal) to 1 (vertical), which is a reasonable slope for sediments in the area of the LNG terminal (Proudfit, 2008). However, we received comments on the draft EIS expressing concerns that lateral side slope migration could occur, resulting in impacts on critical shallow water habitat. Therefore, **we recommend that:**

- **NorthernStar should prepare a plan to monitor the side slopes of the maneuvering area after dredging. The plan should include slope protection measures, should such mitigation be necessary. The plan should be filed with the Secretary for the review and written approval of the Director of OEP prior to construction of the LNG terminal.**

Dredging activities would resuspend sediments and result in increases in total suspended solids (TSS) and turbidity. NorthernStar proposes to use hydraulic cutterhead dredging to excavate the proposed turning basin and berthing facilities. The maximum additional suspended solids concentration in the water column resulting from dredging activities would range from a high of 1 milligram per liter (mg/L) at the dredge site to less than 0.1 mg/L before reaching either Tenasillahe Island or Hunt Creek. These values are significantly less than the background concentration of 10 mg/L measured in the Clifton Channel as part of the field measurements for the hydrodynamic and sediment modeling study, and would generally be imperceptible. The size of the material introduced in the water column during the dredging activities would be almost entirely sand, ranging in diameter between 0.065 and 0.4 mm. As a result, the size of the sediment plume would be very small and confined to an area immediately surrounding the proposed dredging site. Additionally, the plume would diminish very quickly once the dredging activities are concluded. Based on recent monitoring of dredging operations for the Columbia River Channel Improvement Project, the COE has observed background turbidity values of 3 to 8 nephelometric turbidity units (NTU), and turbidity plumes from dredging operations returning to within 1 NTU of background within 45 seconds of the end of dredging (WEST, 2006).

Based on the sediment transport modeling, NorthernStar estimated the frequency and volume of required maintenance dredging. The modeling indicated that sediment deposition would occur uniformly over the entire turning basin. The average annual change in stream bed depth would be about 0.25 foot per year. Using this rate of deposition, the frequency and volume of maintenance dredging was determined for various target dredging depths. Generally, maintenance dredging would occur when the turning basin depth is raised by sediment additions to -42 feet CRD (1 foot above the project depth of -43 feet CRD). If dredging to maintain the turning basin occurred only when the target depth of -42 feet CRD was reached, the volume of sediment that would likely need to be removed would be about 80,000 cubic yards. Based on the hydrodynamic modeling NorthernStar conducted, this would occur about every 4 years under average conditions. If the river flows are abnormally high, maintenance dredging would be required more frequently.

All of the analyses discussed above were based on an assumption of uniform deposition within the turning basin. NorthernStar indicated that uniform deposition would be unlikely, and that greater

deposition would probably occur along the eastern part of the proposed turning basin, adjacent to the federal navigation channel. Additionally, maintenance dredging could be required more frequently as a result of large flood events. Although these events occur infrequently, they cannot be ignored because of the significantly larger volumes of sediment transported during these events. The results of the sediment transport modeling indicated that about 0.5 foot of deposition could occur from a flow rate of 864,000 cfs over a period of 10 days, similar to the 1996 flood event.

4.2.3 Pipeline Facilities

4.2.3.1 Existing Soil Resources

Information regarding soils along the proposed pipeline route is based on the Soil Surveys of Clatsop County, Oregon (USDA-SCS, 1988), Columbia County, Oregon (USDA-SCS, 1986), and Cowlitz County, Washington (USDA-NRCS, 2006) and SSURGO (USDA-NRCS, 2003). Additional information about the soils was obtained from Official Soil Series Descriptions (USDA-NRCS, 2004).

Detailed soil characteristics along the pipeline route and aboveground facilities were identified and assessed using SSURGO (USDA-NRCS, 2003). The SSURGO database is a digital version of the original county soil surveys developed by the NRCS for use with geographic information systems. It provides the most detailed level of soils information for natural resource planning and management. The mapping scale in the project area is generally 1:20,000, with a minimum delineation size of 4.0 acres. SSURGO is linked to an attribute database that gives the proportionate extent of the component soils and their properties for each map unit (USDA-NRCS, 1995).

SSURGO attribute data consist of physical properties, chemical properties, and interpretive groupings. Attribute data apply to the whole soil (e.g., listed hydric, prime farmland soils, or slope class) as well as to layer data for soil horizons (e.g., texture or permeability). The soil attribute data can be used in conjunction with spatial data to describe the soils in a particular area.

The proposed pipeline would be located in the Northern Pacific Coast Range, Foothills, and Valleys MLRA (see section 4.2.2.1) and the Willamette and Puget Sound Valleys MLRA. The dominant soils in the Willamette and Puget Sound Valleys MLRA are Xerolls. These moderately deep to deep, moderately fine to fine textured soils have a mesic temperature regime and mixed mineralogy. Thirty-nine percent of the soils that would be crossed by the pipeline are somewhat poorly drained or wetter. The majority of these soils are located in the low-lying areas on the Oregon side of the Columbia River. More well drained soils (61 percent) are located in the areas to the north and south of the river. The percentages calculated for the drainage classes do not include waterbody crossings which account for approximately 3 percent (0.9 mile) of the pipeline route.

Soil Characteristics

The soils along the proposed pipeline route and additional temporary work spaces were evaluated for characteristics that could affect pipeline construction or increase the potential for construction-related soil impacts. Appendix E lists by milepost the soil map units crossed by the proposed route and table 4.2.3-1 summarizes the miles of each soil series crossed in each county. Table 4.2.3-2 provides a summary of the significant soil characteristics that would be crossed by the proposed pipeline route in each county. Individual soil characteristics are discussed separately below.

TABLE 4.2.3-1

Soil Series Crossed by the Proposed Pipeline Route

County/Soil Series	Total Miles Crossed
Clatsop County, Oregon	
Alstony gravelly loam	2.28
Braun-Scaponia silt loam	0.70
Harslow-Kilchis very gravelly loam	0.35
Locoda silt loam	1.96
Scaponia-Braun silt loam	0.13
Udipsamments	0.62
Columbia County, Oregon	
Crims silt loam	1.62
Locoda silt loam	4.68
Udipsamments	0.79
Wauna silt loam	2.33
Wauna-Locoda silt loam	3.32
Cowlitz County, Washington	
Buckpeak silt loam	0.21
Camas cobbly loam	0.11
Carrolls loamy sand	0.08
Centralia silt loam	4.43
Clato silt loam	0.45
Cowlitz extremely gravelly sand	0.08
Edgewick silt loam	0.26
Germany silt loam	4.77
Hazeldell gravelly silt loam	0.39
Kalama gravelly loam	0.23
Kelso silt loam	0.72
Lithic Haplumbrepts	0.12
Newberg fine sandy loam	0.18
Olequa silt loam	0.15
Olympic silt loam	3.96
Riverwash	0.02
Rose valley silt loam	0.01
Sara silt loam	0.38
Sauvola loam	0.05

TABLE 4.2.3-2

Acreages and Characteristics of Soils Affected by Construction of the Bradwood Landing Pipeline ^a

County/State	Total Crossed ^b	Highly Water Erodible ^c	Highly Wind Erodible ^d	Prime Farmland ^e	Hydric Soils ^e	Compaction Prone ^f	Stony/ Rocky ^g	Shallow to Bedrock ^h	Revegetation Concerns ⁱ
Clatsop, Oregon	92.2 (6.2)	46.3 (3.5)	16.2 (0.6)	0.0 (0.0)	28.1 (2.0)	28.1 (2.0)	36.3 (2.6)	46.3 (3.5)	62.3 (4.1)
Columbia, Oregon	177.8 (13.2)	12.2 (0.8)	12.2 (0.8)	0.0 (0.0)	112.5 (8.1)	159.8 (12.0)	0.0 (0.0)	0.0 (0.0)	12.2 (0.8)
Cowlitz, Washington	223.7 (16.9)	193.1 (15.0)	2.4 (0.1)	43.3 (2.9)	2.6 (0.1)	0.1 (0.0)	12.4 (0.9)	1.5 (0.1)	178.7 (13.7)
Pipeline Total	493.7 (36.3)	251.7 (19.2)	30.8 (1.5)	43.3 (2.9)	143.2 (10.2)	188.0 (13.9)	48.7 (3.6)	47.8 (3.6)	253.5 (18.6)

^a Quantities represent acres based on a 100-foot-wide construction right-of-way and additional temporary workspace. The crossing length in miles is provided in parentheses. The area affected does not include access roads or open water. NorthernStar would use existing access roads that would not require modification or improvement and would, therefore, not represent additional soil impacts.

^b Represents total acres of soil affected in each county.

^c Soils designated by the NRCS as highly erodible or potentially highly erodible land.

^d Soils with a WEG classification of 2 or less.

^e As designated by the NRCS.

^f Includes soils in somewhat poor to very poor drainage classes with surface textures of sandy clay loam and finer.

^g Soils with a cobbly, stony, bouldery, shaly, very gravelly, or extremely gravelly modifier to the textural class of the surface layer and/or having a surface layer that contains greater than 5 percent by weight stones larger than 3 inches.

^h Soils identified as containing bedrock at a depth of 5 feet or less from the surface.

ⁱ Soils with a slope of greater than 8 percent and/or having a surface texture of sandy loam or coarser and moderately well to excessively drained.

Erosion

Erosion is a continuing natural process that can be accelerated by human disturbance. Factors that influence the degree of erosion include soil texture, soil structure, length and percent of slope, vegetative cover, and rainfall or wind intensity. Soils most susceptible to erosion by water are typified by bare or sparse vegetative cover, noncohesive soil particles with low infiltration rates, and moderate to steep slopes. Wind erosion processes are less affected by slope angles. Clearing, grading, and equipment movement would expose soils to water and wind erosion and, without adequate protection, result in discharge of sediment to adjacent waterbodies and wetlands. Soil loss due to erosion could also reduce soil fertility and impair revegetation as a result of topsoil loss.

Approximately 25 percent (121.1 acres) of the soils along the proposed pipeline route are designated as HEL that is susceptible to erosion by water. The majority of these soils are located in the Clatsop County and Cowlitz County portions of the proposed route where approximately 70 percent of the soils have an average slope of greater than 8 percent. In addition, 26 percent (130.6 acres) of the soils, all of which are located in Cowlitz County, are considered PHEL. PHEL consists of those soils that have the potential to be highly erodible, but cannot be designated as HEL without a field determination of slope percent and length. Ninety-four percent (462.9 acres) of the soils that would be crossed by the proposed pipeline have a WEG classification of 3 or higher and are therefore not susceptible to wind erosion. The susceptibility of the remaining soils to wind erosion could result in the loss of topsoil and potential dust hazards.

NorthernStar would use prescribed erosion control devices (e.g., silt fence, hay bales) and construction practices as specified in its pipeline ESC Plan for Oregon and SWPPP for Washington to minimize erosion during and after construction activities (see section 2.4). Temporary erosion control

devices would be installed immediately after initial ground disturbance and monitored as required throughout construction (e.g., daily in areas of active construction, weekly in areas with no active construction, within 24 hours of each 0.5 inch of rainfall). Erosion and sedimentation controls on the pipeline right-of-way would be inspected and maintained as necessary until final stabilization is achieved. NorthernStar would also implement dust mitigation measures, including the use of water trucks to moisten the right-of-way, to reduce impacts from wind erosion. Permanent revegetation of the disturbed soils would control erosion after construction is completed.

Prime Farmland

The USDA defines prime farmland as “land that is best suited to food, feed, fiber, and oilseed crops” (USDA-Soil Survey Division Staff, 1993). This designation includes cultivated land, pasture, woodland, or other lands that are either used for food or fiber crops or are available for these uses. Urbanized land and open water are excluded from prime farmland. Prime farmland typically contains few or no rocks, is permeable to water and air, is not excessively erodible or saturated with water for long periods, and is not subject to frequent, prolonged flooding during the growing season. Soils that do not meet the above criteria may be considered prime farmland if the limiting factor is mitigated (e.g., artificial drainage).

Approximately 8 percent (37.2 acres) of the soils that would be crossed by the proposed pipeline route are considered to be prime farmland. An additional 1 percent (6.1 acres) is considered prime farmland if a limiting factor is mitigated. Essentially all of the soils considered to be prime farmland along the proposed route are located in Cowlitz County (see table 4.2.3-2).

Potential impacts on prime farmland would include interference with agricultural drainage (if present), mixing of topsoil and subsoil, and compaction and rutting. These impacts would result primarily from trench excavation and backfilling, and vehicular traffic along the construction right-of-way. Impacts would be temporary and would not result in permanent conversion of prime farmland to non-agricultural uses. NorthernStar would minimize impacts on prime farmland by constructing the pipelines in accordance with its ESC Plan and SWPPP.

Hydric Soils

Hydric soils are defined as “soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (Federal Register, 1994). Soils that are artificially drained or protected from flooding (e.g., by levees) are still considered hydric if the soil in its undisturbed state would meet the definition of a hydric soil. Hydric soils include very poorly, poorly, and some somewhat poorly drained soils.

Pipeline construction would affect approximately 143.2 acres of hydric soils. The majority (79 percent) of these soils would be located in Columbia County within the low-lying areas adjacent to the Columbia River. According to the Cowlitz County’s Critical Areas Ordinance map depicting NRCS hydric soils, these soil types also appear to be located adjacent to the Washington side of the Columbia River as well as around MP 28.0 and between MPs 34.0 and 35.0. Due to extended periods of saturation, hydric soils can be prone to compaction and rutting as discussed below. In addition, high groundwater levels associated with hydric soils could create a buoyancy hazard for the pipeline. NorthernStar would minimize rutting of hydric soils by using construction mats where hydric soils cannot support equipment and/or by employing low-ground-weight equipment according to its ESC Plan and SWPPP and our Procedures. Special construction methods such as concrete coating of pipe and other weighting methods would be used to overcome buoyancy hazards during operation of the pipeline.

Excavation of the pipeline trench in saturated soils could result in an increased trench width due to sloughing of unstable trench walls. In addition, larger spoil storage areas could be needed to accommodate the saturated material being removed and stockpiled along the right-of-way. NorthernStar has requested a variance from our Procedures to allow for a wider construction right-of-way through wetlands. While a wider construction right-of-way through wetlands may have additional impacts on hydric soils, we agree with NorthernStar that their request for a variance is justified to ensure the safe installation of the pipeline, because of the potential for a larger trench width due to slumping saturated soils in wetlands and the need to separate spoil piles (see section 4.4.1.3 for the FERC staff's conclusions regarding proposed modifications to our Procedures).

Compaction Potential

Soil compaction modifies the structure and reduces the porosity and moisture-holding capacity of soils. Construction equipment traveling over wet soils could compact and disrupt the soil structure, reduce pore space, increase runoff potential, and cause rutting. The degree of compaction depends on moisture content and soil texture. Fine-textured soils with poor internal drainage that are moist or saturated during construction are the most susceptible to compaction and rutting.

Approximately 38 percent (188.0 acres) of the proposed pipeline would cross soils prone to compaction. The majority of these soils are located in Columbia County in the low-lying areas adjacent to the Columbia River (see table 4.2.3-2). NorthernStar would minimize compaction and rutting impacts by using measures outlined in its pipeline ESC Plan and SWPPP and our Procedures (e.g., construction from timber mats, or low-ground-weight equipment) during construction in soft or saturated soils. As outlined in the FERC staff's Plan, one of the responsibilities of the environmental inspector is to advise the chief construction inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting. In residential and agricultural areas, the environmental inspector also ensures compaction testing is performed to assess the need for corrective action. In residential and agricultural areas, subsoil compacted by construction would be disked prior to returning the segregated topsoil.

Stony/Rocky and Shallow to Bedrock Soil

Introducing rocks to surface layers may reduce soil moisture-holding capacity, resulting in a reduction of soil productivity. Additionally, some agricultural equipment may be damaged by contact with large rocks. The presence of rocks within the surface horizons and/or shallow bedrock may also create poor revegetation conditions.

Approximately 10 percent (47.8 acres) of soils crossed contain bedrock within 5 feet of the surface. The majority of these soils are located in Clatsop County (see table 4.2.3-2). About 10.1 acres of these soils contain bedrock classified as paralithic (weathered) that would not likely require special construction techniques. However, the proposed route would cross 37.7 acres of soils with a lithic contact (unweathered bedrock) within 5 feet of the surface that may require blasting or other special construction techniques during installation of the proposed pipeline (see section 4.1.4.4 for more details regarding blasting). Approximately 48.7 acres of stony/rocky soils would be crossed by the proposed route in Clatsop and Cowlitz Counties.

Revegetation Potential

Successful restoration and revegetation are important for maintaining soil productivity and protecting the underlying soil from potential damage, such as erosion. Soils crossed by the proposed project were identified as having a poor revegetation potential based on the surface texture, slope, and

drainage class. Revegetation in soils that have a coarse surface texture and are moderately well to excessively drained may prove to be difficult to revegetate. The drier soils have less water to aid in the germination and eventual establishment of new vegetation. The coarser textured soils also have a lower water holding capacity following precipitation, which could result in moisture deficiencies in the root zone and creating unfavorable conditions for many plants. In addition, steep slopes along the pipeline route may make the establishment of vegetation difficult. The clearing and grading of soils with poor revegetation potential could result in a lack of adequate vegetation following construction and restoration of the right-of-way, which could lead to increased erosion, a reduction in wildlife habitat, and negative visual impacts.

About 51 percent (253.5 acres) of the proposed pipeline would cross soils with revegetation concerns. The majority of these soils are located in Clatsop and Cowlitz Counties (see table 4.2.3-2). This is due to the fact that approximately 70 percent of the soils crossed in these counties have a slope of greater than 8 percent. In accordance with its ESC Plan and SWPPP, NorthernStar would mitigate the effects of poor revegetation potential by applying fertilizer, pH modifiers, and using mulch (where appropriate) to create a favorable environment for the re-establishment of vegetation. A seed mixture, developed through consultation with the ODFW, Washington Department of Fish and Wildlife (WDFW), and NRCS, and in accordance with landowner agreements, would be applied to re-establish vegetation following final grading. Revegetation in non-agricultural areas would be considered successful if, upon visual survey, the density and cover of non-nuisance vegetation are similar to adjacent undisturbed areas. In agricultural areas, revegetation would be considered successful if crop yields are similar to adjacent undisturbed portions of the same field.

Soil Contamination

Contamination from spills or leaks of fuels, lubricants, and coolant from construction equipment could adversely affect soils. The effects of contamination are typically minor because of the low frequency and volumes of spills and leaks. NorthernStar's pipeline ESC Plan and SWPPP contain measures to prevent and contain, if necessary, accidental spills of any material that may contaminate soils, and to ensure that inadvertent spills of fuels, lubricants, or solvents are contained and cleaned up in an appropriate manner.

A search of numerous federal, state, and tribal environmental records identified 10 potentially contaminated sites within 1,500 feet of the proposed project facilities (see table 4.2.3-3). Based on the distance of these sites from the proposed project area and the fact that soil and groundwater contamination either has not been reported or has been cleaned up for each facility, NorthernStar does not expect to encounter contamination from these sites during pipeline construction. Although the potential to encounter contaminated soils is relatively low, mismanagement of contaminated materials encountered during construction could result in serious impacts on soils and other sensitive resources. To ensure that personnel working on the project are prepared to deal appropriately with an unanticipated encounter with contaminated soils, we have recommended that NorthernStar prepare a CMMP for the proposed Bradwood Landing Project (see section 4.2.2.1).

TABLE 4.2.3-3		
Potential Contaminated Sites within 1,500 feet of the Bradwood Landing Pipeline		
Location	Description	Proximity to the Project Work Area
OP&R – Bradley State Wayside UIC, Highway 30, Clatsop, Oregon	Two septic fields and a greywater injection well.	1,100 feet west of MP 1.6
Former Koppers Wood Treating Site, Taylorville Road, Clatskanie, Oregon	Various contaminants from a former wood treating operation.	1,500 feet north of MPs 3.6 to 4.0
Westmart Foodstore, Columbia River Highway, Westport, Oregon	Gasoline spill from an UST in 1996. Cleanup complete in 1997.	The town of Westport is located 1,300 feet south of MP 5.6
River Front Road, Clatskanie, Oregon	Identified in the ODEQ spill records. Specific material or quantity not identified.	600 feet north of MP 10.6
Lammi Sand & Rock Products, Midland District Road, Clatskanie, Oregon	One UST decommissioned on site.	1,300 feet south of MP 10.1
Kynsi Construction, Inc., Midland District Road, Clatskanie, Oregon	Aboveground storage of antifreeze, unleaded gasoline and diesel fuel.	1,400 feet south of MP 10.1
Beaver Plant, Kallunki Road, Clatskanie, Oregon	Waste oil released during decommissioning of a UST in 1997. Cleanup completed in 2001.	1,000 feet east of MPs 18.0 and 18.4 1,200 feet south of MPs 18.3 and 18.9
Slide Creek Road, Longview, Washington	VOCs derived from an illegal drug lab.	500 feet north of MP 21.1
Interstate Highway 5, Kelso, Washington	100 gallons of diesel fuel spilled in 2003.	1,500 feet from MP 35.3
Watkins Explosive Co., Inc., Ostrander Road, Kelso, Washington	Tier 2 hazardous waste generating facility.	1,500 feet south of MP 36.0

Aboveground Facilities

Construction of aboveground facilities associated with the proposed pipeline would temporarily impact a total of about 5.0 acres of soil, of which 1.4 acres would be permanently converted to commercial industrial uses by operation of the facilities. Only about 2 percent (0.1 acre) of the soils within the aboveground facilities are considered prime farmland. An additional 12 percent (0.6 acre) of the soils within the proposed facilities are considered prime farmland only if they are artificially drained. However, the prime farmland soils within these facilities are not currently actively cultivated. Approximately 50 percent (2.5 acres) of the soils are considered PHEL or HEL that is susceptible to erosion by water. Forty-nine percent (2.5 acres) of the soils within the proposed facilities have a WEG of 2 or less and are therefore considered susceptible to wind erosion. NorthernStar would implement measures described in its pipeline ESC Plan and SWPPP to minimize potential soil impacts associated with the construction and operation of the proposed aboveground facilities.

Pipe Storage and Contractor Yards

NorthernStar has identified two pipe storage and contractor staging yards that would be used during the construction of the proposed pipeline. These yards would affect a combined 18.5 acres of land. This land has been previously developed so no additional impacts on the soils would be expected. The 9.1 acres of soil within Yard A in Columbia County are not considered prime farmland, susceptible to erosion by water, hydric, or prone to compaction. These soils are considered to be susceptible to wind erosion and have revegetation concerns. The 9.3 acres of soil within Yard B in Cowlitz County are considered prime farmland. However, these soils have been previously developed and are not currently used for active cultivation. In addition, the site would be returned to preconstruction conditions, so no permanent impacts on prime farmland would result from use of the site. These soils are not considered to be susceptible to erosion by wind or water or to have revegetation concerns. All of the soils at this pipe storage yard are considered hydric and prone to compaction. NorthernStar would implement measures

described in its pipeline ESC Plan and SWPPP to minimize potential soil impacts associated with the use of the two pipe storage and contractor yards.

4.2.3.2 General Impacts and Mitigation

Construction activities such as clearing, grading, trench excavation, backfilling, and the movement of construction equipment over work areas may result in adverse impacts on soil resources. Clearing removes protective cover and exposes the soil to the effects of wind, sun, and precipitation, which may increase the potential for soil erosion and the movement of sediments to sensitive areas. Grading and equipment traffic may compact soil, reducing porosity and percolation rates, which would result in increased runoff potential and decreased agricultural productivity. Trench excavation and backfilling could lead to mixing of topsoil and subsoil and may introduce rocks to the soil surface from deeper soil horizons. Contamination from spills or leaks of fuels, lubricants, and coolants from construction equipment could also impact soils.

NorthernStar's pipeline ESC Plan and SWPPP⁵ incorporate elements of the FERC's Plan and Procedures, state and county regulations and provisions, stormwater pollution prevention plans, and spill prevention and response procedures. Drafts of these plans were included in NorthernStar's JPA and JARPA. Final versions of these plans would be developed after a construction contractor has been selected prior to construction. We have reviewed NorthernStar's pipeline ESC Plan and its SWPPP and find that in many cases they lack specific procedures, and are less detailed than or do not provide equivalent or greater protections to the environment compared to our Plan. On the other hand, the pipeline ESC Plan and SWPPP contain BMPs and mitigation measures for items outside the scope of our Plan, such as spills prevention and cleanup, wind erosion and dust control, and project-specific seasonal work restrictions. To ensure that potential impacts on soils as well as vegetation are effectively minimized, **we recommend that:**

- **NorthernStar should revise its pipeline ESC Plan and SWPPP to include the measures from the FERC's Plan that provide greater protections. NorthernStar's revised plans should be filed with the Secretary for the review and written approval of the Director of OEP prior to construction of the pipeline.**

⁵ NorthernStar included its terminal ESC Plan and pipeline ESC Plan as part of its JPA, and included its SWPPP as part of its JARPA. NorthernStar's JARPA was filed with the FERC on November 6, 2006, and supplemented with a filing on November 22, 2006. NorthernStar also filed its JPA on November 22, 2006, and filed revisions to the JPA with the FERC on April 5, 2007. These documents are available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range. The FERC's Plan and Procedures are also available to the public on the FERC's Internet web page by clicking on Industries, Gas, Environment, Guidelines.

4.3 WATER RESOURCES

4.3.1 Groundwater

4.3.1.1 Regional Hydrogeologic Setting

According to USGS (2005a) there are three aquifer systems in the project vicinity: 1) the Unconsolidated Sediment Aquifer of the Holocene, Pleistocene, Pliocene, and Miocene; 2) the Miocene Basaltic Rock Aquifer System; and 3) the Pre-Miocene Rock Aquifer System. The stratigraphy of these aquifer systems is detailed in section 4.1.1. The coastal region of Oregon and Washington receives large amounts of precipitation, 40 to 80 inches per year (USGS, 2005a), that recharge the aquifers in the area.

The Unconsolidated Sediment Aquifer System underlies the western half of the project area and is also part of the Pacific Northwest Basin-Fill Aquifer System (USGS, 2005b), a system comprised of unconsolidated deposits that are largely alluvial in nature. In the vicinity of the proposed project, this system consists primarily of unconsolidated sand and gravel and is associated with lowland areas along the Columbia River. These unconsolidated deposits are the most prolific aquifers and are important sources of water for public supply, domestic, commercial, agricultural, and industrial demands (USGS, 2005a).

The Miocene Basaltic Rock Aquifer System occurs where more resistant uplands consist of thick basaltic lava flows (USGS, 2005a) and also underlies the terminal facility and much of the proposed pipeline route. Basaltic rock aquifers tend to have open spaces filled with secondary clay minerals, calcite, silica, or unconsolidated alluvium deposited by streams or in lakes. Except where such fill materials are coarse grained, they tend to markedly decrease the permeability of these aquifer systems.

Aquifers in pre-Miocene rocks are distributed along the coast of Oregon and Washington. These aquifers consist of several types of igneous and metamorphic rocks, consolidated sedimentary rocks, and volcanic rocks. Permeability varies greatly in these aquifers. The eastern half of the Cowlitz County segment of the proposed pipeline crosses over the Pre-Miocene Rock Aquifer System. The aquifers of this system are in mountainous areas, and the water is used mostly for domestic and agricultural supplies.

4.3.1.2 Waterway for LNG Marine Traffic

LNG carriers would not use groundwater and the LNG marine traffic would not have an impact on groundwater resources along the waterway.

4.3.1.3 LNG Terminal

The presence of alluvial sediments of the Unconsolidated Sediment Aquifer at the proposed LNG terminal site was confirmed by the geotechnical investigation (URS, 2005), which characterized local conditions based on site reconnaissance and soil borings (see section 4.1.3.1). The soil borings encountered groundwater beginning at depths ranging from 12 to 15 feet below the ground surface. The Upper Alluvial Sand sequence is interpreted as the first aquifer occurring beneath the site. Because alluvial sand and gravel aquifers are typically the most productive and widespread aquifers in the Pacific Northwest (Whitehead, 1994), both of the alluvial sand aquifers are expected to have water production potential.

Public Water Supply and Wells

To assess the expected productivity of the shallow alluvial aquifer underlying the proposed LNG terminal site, Groundwater Solutions, Inc. (GSI) compared the results of the soil borings with the Columbia River bathymetry data for the channel near the site. Based on the soil borings completed at the site, the relative depth of the Upper Alluvial Sand Sequence (approximately 0 to 60 feet below msl) is consistent with the elevation range of the Columbia River channel bottom (20 to 50 feet below msl). The Upper Alluvial Sand Sequence is also relatively uniform in thickness and laterally extensive; therefore, the permeability and thickness of the aquifer unit should be adequate to supply more than 150 gpm (the proposed water use from the well during construction and operation) to a properly constructed well at the site (GSI, 2006a). In addition, the observation that groundwater levels at the site fluctuate with the river and tidal elevations suggests the Upper Alluvial Sand Sequence extends laterally beneath the river channel, maintains connectivity with the Columbia River, and provides for an unlimited source of aquifer recharge (GSI, 2006a).

According to data provided online through the Drinking Water Program of the Oregon Department of Human Services (ODHS), no public groundwater supplies near the proposed Bradwood Landing LNG terminal site are currently impacted by contamination (ODHS, 2005). The closest community groundwater systems are for the Knappa Water Association, Westport Heights, and Wauna Water District. The closest of these communities is Wauna, about 3 miles south-southeast of the proposed LNG terminal site. The Wauna Water District system is operated by the local government, while the other two are privately operated but have completed source water assessments.

Overall, the proposed LNG terminal would avoid water supply wells and springs. A search of all wells in Clatsop County within a 2-mile radius of the LNG terminal site identified only one water supply well (however, some wells may not be included in the database – particularly older wells). This well is privately owned and it is believed to be about 0.5 mile from the LNG terminal. No springs were identified within 150 feet of the construction areas based on topographic maps or web-based information. Furthermore, the ODHS database of wellhead protection areas (ODHS, 2006) indicated that the LNG terminal site is not located within any wellhead protection areas.

The proposed project would not be located near any EPA-designated sole source aquifers listed under section 1424(e) of the Safe Drinking Water Act (EPA, 2006). The EPA defines a sole or principal source aquifer as one that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer, and for which there are no other reasonably available alternative drinking water source(s) that could physically, legally, and economically supply all those who depend upon the aquifer for drinking water should the aquifer become contaminated. Of the 13 sole source aquifers that have been designated in EPA Region 10 (i.e., Alaska, Idaho, Oregon, and Washington), none are near the proposed LNG terminal facilities. No petitions for sole source aquifers are currently under EPA review in Region 10.

Groundwater Quality

In general, groundwater quality in coastal Oregon and Washington is fresh, with low concentrations of dissolved solids (less than 1,000 milligrams per liter (mg/L)) and is normally suitable for most uses. However, in coastal areas, more saline waters can be found in some aquifers at depth (McFarland, 1983). Additionally, saltwater can contaminate freshwater aquifers by entering from the ocean through river estuaries, such as the Columbia River, or along faults (USGS, 2005a). This is particularly true of the Pre-Miocene Rock Aquifers. Groundwater quality in the alluvial aquifers would be expected to have low dissolved solids, but no site-specific evaluation has been conducted. No further water quality information is available for these shallow, discontinuous aquifers.

No potential sources of groundwater contamination in the immediate vicinity of the LNG terminal site were found in published literature (Cole, 2004) or on an interactive website maintained by the ODEQ (ODEQ, 2005a). The nearest site where groundwater contamination has been documented is the former Koppers Wood Treating Site, located approximately 3 miles south-southeast of the Bradwood Landing LNG terminal site along the Columbia River. Groundwater beneath the former Koppers Wood Treating Site is flowing toward the Columbia River and, therefore, would not impact the LNG terminal site.

The ODEQ's Leaking Underground Storage Tank Cleanup Site Database (ODEQ, 2005b) shows no sites in the vicinity of the proposed Bradwood Landing LNG terminal. Of the closest three sites, two were located in Knappa and one in Westport, all several miles from the proposed LNG terminal site. Since cleanup was completed and the status of all three sites is "closed," these sites are not expected to have an impact on the groundwater at the Bradwood Landing LNG terminal.

Two industrial solid waste facilities were found in Clatsop County (ODEQ, 2005c). The Wauna Cogeneration Project and Wauna Mill Landfill, which are both apparently associated with a pulp and paper mill that operates on the former Koppers Wood Treating Site. The Wauna Cogeneration Project is not expected to have any impact on groundwater conditions beneath the LNG terminal site for the same reasons as those discussed above for the former Koppers Wood Treating Site.

Oregon's Underground Injection Control (UIC) database (ODEQ, 2005d) lists sites that involve placement of fluid below the ground or subsurface. The closest UIC site to the Bradwood Landing LNG terminal is found in Knappa, at least 3 miles away. Therefore, it is not expected to have any impact on the groundwater beneath the facility.

It is not known whether past activities at the former sawmill facility at Bradwood have affected groundwater conditions at the site. As described in section 4.2.2.1, AMEC conducted a Phase 1 Environmental Site Assessment in August 2005 that identified several RECs that could potentially affect or have already impacted groundwater conditions at the site (AMEC, 2005). However, groundwater at the site would not be used for drinking.

Groundwater Uses and Withdrawals

Groundwater would be used at the LNG terminal site during construction and operation (see table 4.3.1-1). An application for a limited water use license to use groundwater during construction of the LNG terminal has been submitted by NorthernStar to the ODWR.

To supply water to the LNG terminal, a single, 6-inch-diameter water well with a total depth of approximately 90 feet would be installed at the location shown on figure 2.1.3-1 (GSI, 2006b). A submersible pump would be installed in the well to supply water at a rate not to exceed 150 gpm. Water from the well would be pumped to an 180,000-gallon tank for storage and would be delivered from the tank to the construction site through approximately 1,000 feet of 3-inch-diameter steel pipe.

TABLE 4.3.1-1

Potential Water Intakes and Discharges Associated with the Bradwood Landing Project

Purpose	Volume (millions of gallons)	Timeframe	Rate	Structure/Location Source
Construction				
Water Intake				
Personal/sanitary ^{a, b}	7.7	Intermittent	Variable	Groundwater well
Vehicle wheel washing ^b	2.0	Intermittent	Variable	Groundwater well
Hydrostatic testing of piping within LNG terminal	1.5	One-time use	Variable	Groundwater well
Concrete making ^b	0.9	Intermittent	Variable	Groundwater well
Initial charging of SCVs	0.2	One-time use	Variable	Groundwater well
Hydrostatic testing of LNG tanks	60.0 ^c	One-time use	4,000 gpm	Columbia River
Soil compaction and ground improvements	15.0	Intermittent	160 gpm	Columbia River
Hydrostatic testing of pipeline	9.0	One-time use	2,000 gpm	Columbia River
Water Discharge				
Personal/sanitary ^{a, b}	7.7	Intermittent	Variable	Septic system
Vehicle wheel washing ^b	2.0	Intermittent	Variable	Groundwater
Hydrostatic testing of piping within LNG terminal	1.5	One-time use	Variable	Groundwater or Columbia River
Hydrostatic testing of LNG tanks	60.0 ^c	One-time use	5,000 gpm	Columbia River
Soil compaction and ground improvements	15.0	Intermittent	Variable	Columbia River via log pond
Hydrostatic testing of pipeline	9.0	One-time use	Up to 1,000 gpm	Upland site in straw bale enclosure
Pipeline trench dewatering	Minimal	Intermittent	Variable	Upland site (vegetated area or to a dewatering structure)
Operation				
Water Intake				
Personal/sanitary	0.64	Annually	Variable	Groundwater well
Landscape irrigation	0.41	Annually	Variable	Groundwater well
Ballast water and ship engine cooling ^d	20 - 50	About every 3 days	Up to 35,000 gpm	Columbia River
Testing of fire suppression system	0.26	Weekly	4,400 gpm	Columbia River
Water Discharge				
Personal/sanitary	0.64	Annually	Variable	Septic system
Landscape irrigation	0.41	Annually	Variable	Groundwater
Ship engine cooling ^{d, e}	20 - 50	About every 3 days	Variable	Columbia River
Condensate water from SCVs	0.23	Daily	160 gpm	Columbia River
Testing of fire suppression system	0.26	Weekly	Up to 4,400 gpm	Columbia River

^a NorthernStar currently plans to use portable bathrooms during construction, which would eliminate the need for groundwater withdrawal for personal/sanitary use.

^b Water appropriation and discharge would occur over a period of 3 years.

^c Assumes that hydrostatic test water for the LNG tanks would not be recycled; however, NorthernStar plans to schedule construction activities to enable water used to test the first tank to be reused to test the second tank.

^d NorthernStar proposes to offer incentives to retrofit LNG carriers with a water intake system that would allow the water supplied to the carriers to be first used to cool the engines and then used to fill the ballast tanks, which would result in the total volume of water withdrawn and discharged being less than that presented in this table.

^e In the case that ships arriving at the LNG terminal have not been retrofitted to use the screened water intake system, water used to cool the engines would be discharged to the Columbia River.

NorthernStar estimates the maximum volume of groundwater required during the 3-year construction period would be 12.3 million gallons, although the rate of water use is not expected to be constant throughout the entire construction period. To provide 12.3 million gallons of water during the 3-year construction period, the well would be operated about 5 percent of the time. Water use associated with general construction activities such as dust suppression, road grading, concrete making, personal/sanitary use, and truck wheel washing would occur at varying rates depending on the intensity of construction activities; however, the maximum volume of groundwater needed for these uses is estimated to be 10.6 million gallons. Initial charging of the vaporizers and hydrostatic testing of the piping would be done during the last year of construction. The volume of groundwater needed for charging vaporizers and testing piping is estimated to be 1.7 million gallons. Actual groundwater use during the construction period is expected to be less than the estimated maximum. Currently, NorthernStar is planning to contract with a vendor for supply and maintenance of portable bathrooms during the construction period. If portable bathrooms are used, then groundwater use could be reduced by as much as 7.7 million gallons. Small volumes of groundwater also may be pumped on a temporary basis for dewatering during construction of the terminal facility.

The well and the 180,000-gallon storage tank used to supply water for the temporary construction activities would also be used to supply non-potable water during LNG terminal operations. Water would be pumped from the well to the storage tank and then distributed around the LNG terminal facility. Annual use of groundwater at the LNG terminal is estimated to be 1.05 million gallons. Of this amount, 0.41 million gallons would be used annually for landscape irrigation and 0.64 million gallons would be used annually for personal/sanitary purposes. Annual groundwater use during operations at the LNG terminal would be much lower than the maximum capacity of the well, and the well would operate about 1.3 percent of the time.

The on-site water well would be about 200 feet from the Columbia River, about 900 feet from Hunt Creek, and 800 feet from any wetlands. The mean sustained discharge from the well would only be about 2.0 gpm, and because the soils surrounding the well are very permeable, the cone of depression produced by the well would be small. During the geotechnical study, water levels in the boreholes were observed to vary with the tide, suggesting that river water would be readily drawn into the aquifer and would minimize drawdown at the well. The well would be unlikely to have an effect on Hunt Creek or the wetlands, and any effect on flow in the Columbia River would be negligible.

Disposal of Water to the Ground

The elevation of the LNG terminal site would be raised by the placement of dredged material from the ship berth and maneuvering area. The dredged material would be piped to the site from a hydraulic cutterhead dredge. All or most of the dredge water is expected to infiltrate into the ground. During terminal construction, stormwater and water used for vehicle wheel washing, hydrostatic testing of the LNG storage tanks, and soil compaction would be disposed of by infiltration into the ground. During LNG terminal operation, excess irrigation water, sanitary wastewater, and most stormwater would be disposed of by infiltration into the ground. The soils at the site would be sufficiently permeable, even after compaction, for effective infiltration of water without major ponding or surface runoff. The water table would be 22 to 30 feet below the finished grade, depending on the final site elevation.

Vehicle wheel washing would occur on a paved wash pad near the point where the access road crosses the realigned railroad. No soaps or surfactants would be used for vehicle wheel washing and the temperature of water used for washing would be equal to that of water being stored in the on-site storage tank (no hot water would be used). Excess water from the pad would be discharged to a two-cell sedimentation/infiltration pond. The first cell of the pond would provide treatment by allowing settling of

sediment. Clarified water from the first cell would be conveyed to the second cell and infiltrated into the ground. A total of 2 million gallons of vehicle wheel washing water would be discharged.

During construction, all stormwater runoff would be infiltrated into the ground in accordance with the conditions contained in the NPDES permit issued by the ODEQ. NorthernStar has stated that it anticipates discharging approximately 1.5 million gallons of hydrostatic test water from testing the piping to the ground at an upland location that has not yet been determined. This discharge would occur once during the third year of construction. However, NorthernStar has stated that this discharge may be to the Columbia River. For this reason, potential impacts from the discharge of hydrostatic test water from the piping to the Columbia River are also discussed in section 4.3.2.3.

Once operations begin at the LNG terminal, sanitary wastewater from toilets, sinks, and showers in the office and maintenance/service buildings would be conveyed to an underground septic tank and drainfield or other approved secondary treatment and disposal configuration, if site conditions are not appropriate for a drainfield (see figure 2.1.3-1). A permit would be obtained from the ODEQ for the septic system, which would be sited and sized in accordance with the ODEQ requirements and recommendations. The septic system would be sized according to the number of employees on site during any given day (although 65 permanent employees would be hired for operation of the LNG terminal, NorthernStar anticipates that 50 employees would be on site during an average day), assuming a water use rate of 35 gallons per person per day, and shower facilities on site (Cox, 2006). An estimated 0.64 million gallons per year would be discharged to the septic system.

The drainfield or other approved secondary treatment and disposal system would be designed and installed based on the results of permit requirements and a site evaluation, which cannot be conducted until fill has been added to bring the site to final grade. The location of the system would follow the minimum separation distances specified in table 1 of OAR 340-71-0220. If a drainfield is not recommended for treatment and disposal of wastewater, other alternatives would be considered and could include the use of a pretreatment system, a sand filter, or a holding tank. There would be no potential for surface water contamination because the system would comply with the ODEQ's requirements.

If a septic tank and drainfield system are used, the tank outlet and the drainfield would be 3 to 5 feet below grade. The finished site elevation would be at least 20 feet NAVD, so the tank outlet and drainfield would be at an elevation of at least 15 feet NAVD. The 500-year flood elevation is 13.83 feet NAVD. Therefore, it is highly unlikely that the septic system would be inundated by surface waters. Other septic treatment alternatives may require installation of systems at grade instead of below grade, which would further reduce the potential for inundation.

Most water applied to landscaped areas would evaporate or be used by plants. A portion of the water used for irrigation, approximately 0.08 million gallons per year, would infiltrate into the ground. During operation, stormwater runoff would be collected in shallow infiltration ditches and routed to unlined settling ponds for infiltration into the ground in accordance with the conditions contained in the NPDES permit issued by the ODEQ. The stormwater retention ponds would be large enough to hold the volume of runoff generated from a 100-year storm.

Impacts and Mitigation

In general, construction and operation of the LNG terminal would have little or no adverse effect on groundwater resources. Potential impacts that could occur would be avoided or minimized through appropriate construction and hazardous material handling practices.

Construction and operation activities that could adversely impact groundwater quality include inadvertent releases from the refueling of construction equipment and the transportation and storage of petroleum and hazardous materials. In order to minimize potential impacts on groundwater resources resulting from the construction of the LNG terminal, NorthernStar has developed a terminal ESC Plan that contains BMPs for management of stormwater during construction as well as containment and management of fuels, lubricants, and other hazardous materials that may be used during construction. For example, fuel for construction vehicles would be stored in aboveground tanks located over a concrete slab with a perimeter curb to provide secondary containment. If chlorination and dechlorination of hydrostatic test water is required, the tanks containing sodium hypochlorite and sodium bisulfite would be stored on containment pallets. To avoid any potential impacts on groundwater quality as a result of the infiltration of stormwater runoff during construction, stormwater runoff from the wheel washing pad would be treated before disposal.

Blasting is currently proposed at the extreme southwestern part of the LNG terminal, where basalt may be mined to make aggregate material for use during on-site construction and along Clifton Road, as described in section 2.4.1.1. Blasting carried out at the LNG terminal site would be conducted before installation of the on-site water well.

Although the potential to encounter contaminated groundwater is relatively low during terminal construction, mismanagement of contaminated groundwater encountered during construction could result in impacts on surface water and other sensitive resources. In addition, the identification of RECs at the proposed LNG terminal site indicates that contaminated groundwater could be present at the site. We have recommended that NorthernStar prepare a CMMP that would specify the procedures to be followed to identify, characterize, and properly manage potentially contaminated materials, including groundwater (see section 4.2.2.1). The CMMP would be submitted to the appropriate agencies for approval before construction.

The overall effects on the groundwater system from dewatering during the construction of the LNG terminal would likely be small and temporary. Based on the relatively low volumes expected to be withdrawn and the proximity of the site to the Columbia River, a potential source of groundwater recharge, the likelihood of drawing off-site groundwater contaminants to the site through such dewatering activities is considered to be low.

4.3.1.4 Pipeline Facilities

On-line water well databases for Oregon (ODEQ, 2006a) and Washington (WDE, 2006a) were reviewed to identify aquifers within the excavation depth of the pipeline. More than 90 percent of the water well reports indicated that first-encountered groundwater was deeper than the pipeline excavation depth; however, some water well reports indicated that first-encountered groundwater was within pipeline excavation depth. Groundwater within the pipeline excavation depth occurs in small, discontinuous aquifers encountered as shallow as 3 feet below ground surface. The lithology of the sediment within the pipeline excavation depth is generally silty or clayey, and groundwater yields are, therefore, low. The wells where groundwater was encountered within pipeline excavation depths are screened in deeper aquifers; therefore, groundwater within the pipeline excavation depth is not used for domestic, irrigation, or municipal purposes.

Public Water Supply and Wells

NorthernStar conducted a search for records of public and private water wells along the proposed pipeline route (ODEQ, 2006a; WDE, 2005a). The water well databases do not provide exact coordinates for each well but instead give the location by township, range, section, and quarter-quarter section. The

well location is specified as the center of the quarter-quarter section. The wells identified within any quarter-quarter section crossed by the pipeline are listed in table 4.3.1-2.

Location (MP)	Well Number	Primary Use
20.87	270618	Domestic
21.03	346986	Domestic
21.03	356385	Domestic
21.03	270240	Domestic
21.03	10172	Domestic
27.57	271657	Domestic
31.72	1913	Domestic
31.72	1914	Domestic
31.72	8049	Domestic
31.72	1395	Domestic
31.72	8050	Domestic
31.72	1394	Domestic
31.72	3029	Domestic
31.72	3030	Domestic
33.70	314350	Domestic
33.70	326653	Domestic
33.87	10043	Domestic
34.11	387597	Domestic
35.80	10193	Domestic
35.80	60589	Domestic

No private wells potentially within 150 feet of the proposed pipeline construction right-of-way were identified in Oregon. Twenty private wells were identified in Cowlitz County, Washington. The database contained no municipal water wells potentially within 400 feet of the construction workspace of the proposed pipeline in either Oregon or Washington. NorthernStar would work with property owners along the pipeline route to identify new or unregistered wells located within or near the right-of-way that are not included in the above table.

No springs were identified within 150 feet of the proposed pipeline construction areas based on topographic maps or web-based information. The original pipeline alignment was adjusted to avoid a water supply spring identified by a landowner at approximate MP 31.1 (see table 3.1.8-2). If additional springs are identified as discussions with landowners proceed, NorthernStar would work with the landowner to minimize impacts on any springs located near the pipeline construction work space.

The State of Washington Department of Health (WDOH) has identified wellhead protection areas to keep groundwater recharge areas directly contributing to the water being withdrawn from a public water supply well safe from potential sources of contamination. A review of a database of wellhead protection areas (WDOH, 2006) indicated that seven wellhead protection areas in Cowlitz County are located within 0.25 mile of the proposed pipeline. The seven wellhead protection areas were defined by the default 1,000-foot radius approach (WDOH, 2006). The wellhead protection areas are:

- Robertson Road Water #1 – 1,000-foot wellhead buffer is at or near the proposed pipeline centerline at approximate MP 20.5;

- Crow Butte – essentially the same location as Robertson Road Water #1; 1,000-foot wellhead buffer is at or near the proposed pipeline centerline at approximate MP 20.5;
- Illahee Water – 1,000-foot wellhead buffer is within approximately 1,000 feet of the proposed pipeline centerline, at approximate MP 21.5;
- Allen Creek Water – 1,000 foot wellhead buffer intersects the northern edge of the 0.25-mile search corridor at approximate MP 33.0;
- Lone Fir Tavern Inc. – 1,000-foot wellhead buffer crosses the proposed pipeline centerline at approximate MP 35.0, and an HDD exit hole location is within this range;
- All Season Landscapes & Nursery – 1,000-foot wellhead buffer crosses the proposed pipeline centerline at approximate MP 35.2, and an HDD exit hole location is within this range; and
- LDS Church – 1,000-foot wellhead buffer crosses the proposed pipeline centerline at approximate MP 35.4.

The ODHS database of wellhead protection areas (ODHS, 2006) indicated that no wellhead protection areas are located within 0.25 mile of the proposed pipeline centerline in Clatsop or Columbia Counties, Oregon. The proposed pipeline would not be located near any EPA-designated sole source aquifers. Sole source aquifers are further described in section 4.3.1.3.

In areas where nonpoint source activities have resulted in groundwater contamination, a Groundwater Management Area (GWMA) is declared. No GWMAs are located near the proposed Bradwood Landing pipeline route in Washington or Oregon. Oregon has three declared GWMAs, the nearest of which is the Southern Willamette Valley GWMA, located over 100 miles south of the project area (ODEQ, 2005e). Additionally, the only GWMA designated in Washington, the Columbia Basin GWMA, is in southeast Washington and would not be affected by the pipeline facilities (Columbia Basin GWMA, 2005).

No declared critical groundwater areas are present within Clatsop and Columbia Counties (ODWR, 2005). However, Sweet et al. (as cited in ODEQ, 2003) reported that the aquifer that occurs in the alluvium between Wauna and Port Westward along the Columbia River is a “sensitive aquifer” of the North Coast Basin. The Bradwood Landing pipeline would pass over this aquifer, close to the Columbia River in this area. Between approximate MPs 33.8 and 34.9 the pipeline appears to cross an area designated as an aquifer recharge area in Cowlitz County’s Critical Areas Ordinance.

Groundwater Quality

The Wauna Mill Landfill is located adjacent to the proposed pipeline between MPs 2.4 and 2.6. The landfill was permitted and began operations in the early 1980s. Between the early 1980s and early 1990s, the landfill was primarily utilized as a receptacle for pulp sludge. The sludge stream was then diverted to boilers to produce steam and energy for the plant’s operation. Since the 1990s, the primary material for the landfill site has been the plant’s residual lime and ash spoils. The landfill is situated downgradient from the proposed pipeline right-of-way and the water table is likely below the lowest portion of the landfill, which is situated about 500 feet from the proposed easement. All but one of the landfill’s monitoring wells are situated downgradient and are not currently monitored for methane gas. According to Georgia-Pacific personnel, there are no reported groundwater contamination issues.

To avoid any potential wicking or flow of groundwater down or through the pipeline ditch, NorthernStar proposes to install a combination of sandbag dams and bentonite plugs at appropriate intervals along the ditch line where it parallels the existing landfill. This would effectively prevent the pipeline excavation from providing a conduit for groundwater flow.

Since the early 1990s, the landfill has not received waste that has the potential to produce methane gas. While the sludge has some potential for producing methane, the addition of lime and ash would have significantly impaired the potential for methane production by elevating the pH, lowering the moisture content of the soils, decreasing soil permeability, and creating an aerobic environment.

The landfill is located within a former clay quarry that was used by Georgia-Pacific to excavate clay for use within their paper making processes. This indicates that the soils nearby are likely fine-grained as well and are also relatively impermeable. In addition to the lack of porosity/permeability required for migration of landfill gasses any appreciable distance, methane gas production typically peaks within 2 years of placement and cover of the organic waste (Tchobanoglous et al., 1993). Combining these factors with the distance between the pipeline and landfill (in excess of 700 feet) indicates that the potential for the pipeline trench to act as a conduit for gas migration is very low.

As described in section 4.2.3.1, a search of environmental records (Environmental Data Resources, 2006) identified 10 potentially contaminated sites within 1,500 feet of the proposed project facilities (see table 4.2.3-3). The distance of these sites from the proposed project area, the groundwater flow direction, and the fact that soil and groundwater contamination either has not been reported or has been cleaned up for each facility suggest they would be very unlikely to have an impact on groundwater in the pipeline project area. Therefore, it is unlikely that NorthernStar would encounter contamination from these sites during pipeline construction.

Groundwater Uses and Withdrawals

Some groundwater withdrawals may occur as a result of dewatering operations during construction of the pipeline. Temporary trench dewatering may be necessary at limited areas along the pipeline corridor where the water table is near the ground surface.

Impacts and Mitigation

In general, construction and operation of the Bradwood Landing pipeline would have little or no adverse effect on groundwater resources, including designated wellhead protection areas. Potential impacts from accidental spills associated with construction equipment would be avoided or minimized through appropriate construction and hazardous material handling practices.

Construction and operation activities that could adversely impact groundwater quality include inadvertent releases from the refueling of construction equipment and the transportation and storage of petroleum and hazardous materials. In order to minimize potential impacts on groundwater resources resulting from the construction of the pipeline, NorthernStar has developed a pipeline ESC Plan (Oregon), a SWPPP (Washington), and a *Waterbody and Wetland Construction and Mitigation Procedures Plan* containing BMPs for management of stormwater during construction as well as containment and management of fuels, lubricants, and other hazardous materials that may be used during construction.

A cluster of private water wells is apparently located in close proximity to the proposed pipeline centerline at MP 31.7. NorthernStar would work with the owners of these wells and the other wells listed in table 4.3.1-2, as well as other property owners along the pipeline route, to confirm the exact locations of any wells within 150 feet of the construction area, and would identify and mark, as appropriate, any

undocumented water wells during preconstruction surveys. NorthernStar has prepared a preliminary well protection plan to address the effects of HDD and trenching activities. In addition, NorthernStar would develop a final well protection plan that would include at least the following activities, actions, or prohibitions: 1) fueling of vehicles and storage of fuel or hazardous materials would be prohibited within 200 feet of the wells; 2) blasting activities would be prohibited within 100 feet of the wells; and 3) monitoring would be performed before, during, and after construction within 150 feet of the wells. In the event a water well is damaged as a result of the construction, NorthernStar would arrange for an immediate temporary source of potable water, if required, and provide for the repair of the well or replacement of the water supply.

During pipeline construction activities, it is possible that HDD boreholes could penetrate local shallow aquifers. However, these activities are not expected to impact groundwater conditions other than in the immediate vicinity of the borehole, where bentonite drilling mud could result in localized alteration of aquifer hydraulic properties. Additionally and as mentioned in the preceding paragraph, wells located within 150 feet of the construction area would be monitored to evaluate water quality, which would detect any localized changes that might occur in response to the HDD activities.

Shallow groundwater can lead to the problem of pipeline buoyancy (i.e., the pipeline “floats” to the surface). NorthernStar would mitigate this impact by coating the pipe with a minimum of 4 inches of concrete to maintain negative buoyancy in areas of shallow groundwater (typically wetlands).

Blasting is not expected to be necessary for pipeline installation. However, in the event that blasting is required for pipe trench excavation, care would be taken to prevent damage to underground structures such as well casings. NorthernStar would work with the landowners of nearby wells to establish a well monitoring program, such as described above, for wells that might be affected by the vibrations generated by blasting.

Although the potential to encounter contaminated groundwater is relatively low during pipeline construction, mismanagement of contaminated groundwater encountered during construction could result in impacts on surface water and other sensitive resources. Before construction, we have recommended that NorthernStar prepare a CMMP that would specify the procedures to be followed to identify, characterize, and properly manage potentially contaminated materials, including groundwater (see section 4.2.2.1). The CMMP would be submitted to the appropriate agencies for approval before construction.

Any trench dewatering operations conducted for pipeline construction would be brief, typically lasting several days or less. Potential impacts on the groundwater would include minor fluctuations in groundwater levels and/or increased turbidity within the aquifer adjacent to the activity. Most alluvial aquifers exhibit moderate to rapid recharge and groundwater movement. Therefore, such effects would be temporary. If there is adequate vegetation to function as a filter medium, discharge would be directed to the vegetated land surface to control erosion. Where adequate vegetation is absent or in the vicinity of waterbodies or wetlands, trench water would be pumped into a filter bag or settling basin constructed of hay bales or silt fence so that silt-laden water would be filtered before release from the construction right-of-way. These practices would minimize the impacts on groundwater quality as the water removed from open trenches would be allowed to infiltrate back into the aquifer in the immediate vicinity of trenching activities.

If contaminated groundwater is encountered during trench dewatering activities, in addition to implementing the CMMP, the groundwater removed from the trench would be stored in Baker tanks, tested, and disposed of in accordance with local and state regulations. Trench dewatering would be conducted in compliance with applicable permits. As a result, impacts on groundwater associated with trench dewatering are not expected to be significant.

4.3.2 Surface Water

4.3.2.1 Surface Water Regulations and Standards

Federal Regulations

Construction of project facilities that affect waters of the United States would be regulated by the COE under section 10 of the RHA and section 404 of the CWA. Section 10 of the RHA prohibits the creation of any obstruction to the navigable capacity of any waters of the United States without specific approval of the COE. Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the United States.

In addition to the COE permitting requirements, NorthernStar's proposed pipeline installation, LNG terminal development, and dredging activities would need to comply with section 401 of the CWA. NorthernStar would be required to obtain a section 401 water quality certificate demonstrating that the discharges associated with the project comply with federal and state water quality standards. The state agencies responsible for section 401 water quality certifications are the ODEQ and the WDE. NorthernStar would also need to certify that its project is consistent with the enforceable policies of the CZMA (see section 4.7.2.4).

Oregon Water Quality Regulations and Standards

Pursuant to the federal CWA, the ODEQ lists Oregon waterbodies that remain out of compliance with ambient water quality standards after conventional water pollution controls have been implemented. The lower Columbia River is listed as out of compliance for PCBs, arsenic, and water temperature (ODEQ, 2007).

The mainstem Columbia River has its own set of standards and policies that the ODEQ designed and enforces (under OAR 340-41), which include the following:

- the 7-day-average maximum temperature must not exceed 68.0 °F;
- coldwater refugia must be distributed so as to allow salmon and steelhead migration without significant adverse effects from higher water temperatures elsewhere in the waterbody;
- the seasonal thermal pattern in the Columbia River must follow the natural seasonal thermal pattern;
- pH values must be in the range of 7.0 - 8.5 (from the mouth of the river to CRM 309); and
- unless authorized by the ODEQ, total dissolved solids should not exceed 200 mg/L on the mainstem Columbia River (CRMs 120 - 147 and 210 - 309), or 500 mg/L for all other parts of the mainstem.

Water Quality Limited Waters (OAR 340-041-0046)

The state of Oregon identifies receiving streams as water quality limited through the biennial assessment report, as required by 305(b) of the CWA. The report gives details of the area of waterbody or segment of stream that is limited, the time of year water quality standards violations occur, and the

parameter(s) of concern. The water quality limited list is placed on public notice and reviewed through a public hearing process. ODEQ may add waterbodies to the list between status assessment reports by following the same process of placing the action on public notice and conducting a public hearing.

In the case of interstate waterbodies, the portion of the waterbody within Oregon's border is assessed. For waterbodies designated as "water quality limited," requests for load increases may be considered using the process set out in OAR 340-041-0004(9)(b).

Section 303(d) List

Section 303(d) of the CWA requires that states periodically prepare a list of all surface waters in the state for which beneficial uses, such as drinking, recreation, aquatic habitat, and industrial use are impaired by pollutants. This list is prepared by the ODEQ and typically provided biennially to the EPA as required under section 305(b) of the CWA. The 2004/2006 list is the most recent list that was approved by the EPA for Oregon.

The water quality standards are not being met for the Columbia River's beneficial use of fish habitat. The portion of the Columbia River between CRMs 0 and 306.1 is on ODEQ's 303(d) water quality-limited list for temperature (year-round, non-spawning). In addition, between CRMs 35.2 and 98.0, the Columbia River is listed for exceeding total maximum daily loads (TMDL) for arsenic, dichlorodiphenyl-trichloroethane (DDT), and PCBs year-round. Although previously listed for dissolved oxygen levels, fecal coliform, and temperature, the Clatskanie River has been removed from the 303(d) list.

Outstanding Resource Waters

Outstanding Resource Waters (ORW) are existing high quality waters that constitute an outstanding state or national resource. Oregon's rules establish a classification of ORWs. Oregon's Environmental Quality Commission has the authority to classify waterbodies as ORWs but has not yet developed procedures for classifying waterbodies using this system.

Washington Water Quality Regulations and Standards

The WDE is responsible for water quality standards for all surface waters within the state as required under section 303(c) of the CWA. The WDE has developed a classification system to describe the highest designated use(s) and associated minimum water quality requirements for surface waters in Washington. The purpose of the WDE's Water Quality Standards for Surface Waters (WAC 173-201A) is to establish water quality standards consistent with public health and public enjoyment, and the propagation and protection of fish, shellfish, and wildlife. The water use and quality standards are established in conformance with present and potential uses of the surface waters and in consideration of natural water quality potential and limitations. The Water Quality Program in WAC 173-201A refers to "existing and designated uses" of waterbodies. Existing uses are defined as "those uses actually attained in fresh or marine waters on or after November 28, 1975, whether or not they are designated uses. Introduced species that are not native to Washington, and put-and-take fisheries comprised of nonself-replicating introduced native species, do not need to receive full support as an existing use." Designated uses are defined as "those uses specified in this chapter (WAC 173-201A) for each waterbody or segment, regardless of whether or not the uses are currently attained." Designated uses for those waterbodies crossed by the Bradwood Landing Project include aquatic life, recreational, water supply, and miscellaneous uses (e.g., wildlife habitat, harvesting, commerce/navigation, boating, and aesthetics). Like Oregon, the State of Washington also designates certain waterbodies as ORWs.

WDNR Stream Typing

On March 1, 2006, the WDNR implemented a new statewide water typing system. Although the maps used by the WDNR are new, the existing Forest Practices rule (WAC 222-16-031) was used to define water types. The new classification types are described below.

- Type S Water – Includes all waters, within their ordinary high-water mark (OHWM), inventoried as “shoreline of the state” under the RCW Chapter 90.58 and the rules promulgated pursuant to RCW Chapter 90.58, but not including those waters’ associated wetlands as defined in RCW Chapter 90.58.
- Type F Water – Includes segments of natural waters that are not classified as Type S Water and have a high fish, wildlife, or human use.
- Type N (Np or Ns) Water – Includes segments of natural waters within the bankfull width of defined channels that are not classified as Type S or F Waters, and which are perennial (Np) or seasonal (Ns) waters of nonfish-bearing streams.
- Type U Water – Because most stream typing for the state was done with photos, any streams or drainages showing up on the photos that have not yet been designated because field evaluation is still pending are listed as Type U. After the completion of field evaluations, most Type U Waters are designated as Type Ns Waters.

The waterbodies impacted by the proposed pipeline route are designated, in descending order of prevalence, as follows: 15 Type N Waters, 7 Type S Waters, 6 Type F Waters, and 1 Type U Water.

Section 303(d) List

Section 303(d) of the CWA requires that states periodically prepare a list of all surface waters in the state for which beneficial uses, such as for drinking, recreation, aquatic habitat, and industrial use are impaired by pollutants. This list is prepared by the WDE and typically provided biennially to the EPA as required under section 305(b) of the CWA. The surface waters are classified according to the most beneficial existing and potential future uses of the waterbody and to provide protection for a variety of uses. Water quality is classified as impaired if it exceeds the state-designated TMDL for various pollutants such as fecal coliform, temperature, pH, and dissolved oxygen-consuming compounds. A TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet the intended or designated water quality use standards. The current section 303(d) list for Washington is the 2002/2004 list, which simply lists impaired waters and does not further categorize other waters in the state. The 2002/2004 list is the most recent list that was approved by the EPA.

Table 4.3.2-1 summarizes the section 303(d)-listed waterbodies in Washington and their status relative to each list, including the water quality parameters that are considered impaired in each waterbody. Seven waterbodies crossed by the portion of the proposed pipeline route in Washington are listed as section 303(d) waterbodies. The portion of the Columbia River in the vicinity of the proposed project is listed for temperature variations and mercury and arsenic levels outside of the water quality standards. Cameron Creek, Abernathy Creek, Germany Creek, Tributary 5 to Coal Creek, Coal Creek, and Ostrander Creek are listed for temperature variations outside the water quality standards. A discussion of the potential impacts on waterbodies that would be crossed by the proposed pipeline route is provided in section 4.3.2.4.

TABLE 4.3.2-1			
Summary of Section 303(d)-Listed Waterbodies Crossed by the Bradwood Landing Project in Washington			
Waterbody Name	MP	2002/2004 Section 303(d) Listed Impairments	Proposed Crossing Method
Columbia River	19.0 - 19.6	Temperature, Mercury, Arsenic	HDD
Cameron Creek	20.6	Temperature	HDD
Abernathy Creek	21.1	Temperature	HDD
Germany Creek	22.4	Temperature	HDD
Tributary 5 to Coal Creek	27.5	Temperature	Bore
Coal Creek	28.0	Temperature	HDD
Ostrander Creek	36.2	Temperature	Bore
Source: WDE, 2005b			

Designated Shorelines

As discussed in section 1.3.11, the Shoreline Management Act requires cities and counties to develop SMPs that regulate development along larger streams, lakes, and marine waters. The areas regulated include lands within 200 feet of a shoreline. The general management designations for shorelines in the state include: Natural, Rural and/or Conservancy, Aquatic, High-intensity, Urban Conservancy, and Shoreline Residential. Individual cities and counties may have slightly modified designations. A summary of the designated shorelines that would be affected by the proposed pipeline is provided in table 4.3.2-2.

TABLE 4.3.2-2			
Designated Shorelines Crossed by the Bradwood Landing Project in Washington ^a			
Waterbody Name	MP	Shoreline Designation	Proposed Crossing Method
Columbia River	19.0 - 19.6	Conservancy & Urban	HDD
Cameron Creek	20.6	Conservancy	HDD
Abernathy Creek	21.1	Conservancy	HDD
Germany Creek	22.4	Conservancy	HDD
Coal Creek	28.0	Conservancy	HDD
Cowlitz River	34.3	Conservancy & Urban	HDD
Ostrander Creek	36.2	Rural or No Designation	Bore
^a Designated as a stream/river constituting shorelines of the state per the Shoreline Management Act (Chapter 173-18 WAC).			

Seven waterbodies crossed in Cowlitz County are designated as streams/rivers constituting shorelines of the state per the Shoreline Management Act. Based on a review of Cowlitz County's SMP, the shorelines of five of these waterbodies are designated as "Conservancy" (Columbia River, Cameron Creek, Abernathy Creek, Germany Creek, and Coal Creek), one is designated as "Urban" (Cowlitz River), and one as "Rural" (Ostrander Creek). Utilities including gas pipelines are permitted within the Conservancy, Urban, and Rural Districts (Cowlitz County, 1977).

Critical Areas Ordinance

As discussed in section 1.3.11, the Growth Management Act requires local governments to identify and protect critical areas, including frequently flooded areas. Frequently flooded areas include, at a minimum, the 100-year floodplain designations of FEMA and the National Flood Insurance Program

(Washington State Department of Community, Trade, and Economic Development, 2003). Floodplain permits are issued wherever a pipeline crosses a mapped floodplain, which is referred to as a Special Flood Hazard Area on the FEMA maps. In some instances, the floodplain permit is administered through the Frequently Flooded Areas Section of the Critical Areas Ordinance, while in others it may be separate from the critical areas ordinance and governed by a stand-alone flood chapter of the county code. In Cowlitz County, development within designated frequently flooded areas is subject to the Cowlitz County Floodplain Management Ordinance (Chapter 16.25 CCC). Development is defined as a construction project involving property improvement or a change of physical character within the site and the act of using land for building or extractive purposes. Placement of a pipeline is included in this definition. A review of the Cowlitz County FEMA Flood Zone maps indicates that that pipeline would cross frequently flooded areas at the Columbia River (MP 19.6), Germany Creek (MP 22.4), Cowlitz River (MP 34.3), Tributary to Ostrander Creek (MP 35.0), and Ostrander Creek (MP 36.2).

4.3.2.2 Waterway for LNG Marine Traffic

Existing Surface Water Resources

As described in section 2.1.2, the waterway for LNG marine traffic associated with the Bradwood Landing Project extends from the territorial seas boundary to the proposed LNG terminal site at CRM 38 on the Columbia River. The Columbia River Basin is bound by the Rocky Mountain system on the east and north, the Cascade Range on the west, and the Great Basin on the south. Including upland areas, the total area of this drainage basin is 258,000 square miles. Waterways and lakes in the Columbia River Basin account for approximately 3,000 square miles, of which 2,500 square miles are within the United States.

The majority of the precipitation in the Columbia River Basin is in the mountainous areas during the winter season in the form of snow. These deep snowpacks provide significant runoff during spring snowmelt, with approximately 60 percent of the natural runoff occurring in May, June, and July. Due to this seasonal fluctuation in runoff, streams within this basin have low flows during the winter months and sustained, high flows during the spring and early summer.

The Columbia River begins at Columbia Lake in the Canadian Selkirk Mountains. It crosses the Canada-United States border near Spokane and is joined by the Snake River in central Washington. It continues to flow for approximately 1,214 miles before entering the Pacific Ocean near Astoria, Oregon. Average runoff at the mouth of the Columbia is about 275,000 cfs (COE, 2002). The Columbia River is tidally influenced, but considered freshwater because the extent of significant saltwater intrusion is generally limited to the lower reach of the river, where the salinity level ranges from 32 parts per thousand at the mouth of the river to 1 part per thousand at CRM 30, which is about 8 miles downstream of the proposed Bradwood Landing LNG terminal site (COE, 1999).

Temperature in the lower Columbia River is at risk from changes in the flow regime created by the federal dam system and from changes associated with global warming. Natural sediment loads have been decreased by the storage of fine sediment behind the dams. The dams have also significantly altered the natural hydrology of the Lower Columbia River by flattening out the peak flows during winter and spring and contributing to lower water levels during the summer and fall when water is withheld behind the dams. Chemical contamination (e.g., PCBs) and excess nutrient loading are issues in the lower Columbia River generally.

The lower Columbia River displays appropriate wetted width to maximum depth ratio. Stream banks are in relatively good and stable condition, with riparian vegetation present at most locations.

However, dikes and bank armoring with riprap have dramatically reduced the floodplain connectivity. This condition is exacerbated by the lack of significant flooding since the construction of upstream dams.

Parts of the Columbia River have been dredged periodically for more than 128 years to allow ships and barges carrying cargo to reach ports along the river. The mainstem of the river recently underwent channel deepening by the COE as part of the Columbia River Channel Improvement Project. As a result of the COE's dredging project, the main channel depth increased from 40 to 43 feet from the mouth of the river to the City of Portland.

Past the mouth of the Columbia River, the waterway extends 12 nautical miles across the continental shelf of the Pacific Ocean. The run off of the Columbia River is one of the largest in the United States, discharging approximately 244 billion cubic meters per year (at 275,000 cfs) (Federal Columbia River Power System, 2001). The coastal waters off northern Oregon and southern Washington are highly influenced by this freshwater run off (DeRobertis et al., 2005). Where the Columbia River meets the Pacific Ocean, a freshwater plume develops offshore. This plume is influenced by the mixed semi-diurnal tides, and therefore it is a transient feature (Morgan et al., 2005). Average sea temperatures from 1984 to 2001 ranged between a maximum of 59 °F and a low of 48 °F (NOAA, National Data Buoy Center, 2005).

Impacts and Mitigation

Dredging of the Ship Berth and Maneuvering Area

Impacts and mitigation associated with construction and maintenance dredging of the ship berth and maneuvering area are described in detail in section 4.3.2.3. Water quality impacts associated with dredging are expected to be temporary and minor.

Shoreline Erosion and Propeller Wash from LNG Carriers and Tugs

Propeller wash from LNG carriers associated with the project, as well as ship wakes breaking on shore could cause increased erosion along the shoreline and resuspend the eroded material within the water column. Shoreline erosion is discussed in more detail in sections 4.1.2.3, 4.1.3.3, and 4.5.2.1. During operation of the proposed LNG terminal, propeller wash and wakes from LNG carriers and tugs could temporarily increase suspended sediments and turbidity within the ship berth and maneuvering area and along the LNG carrier transit route. As a vessel navigates through a waterway, it generates hydraulic disturbances in the form of waves and currents, mainly drawdown, return current, slope supply currents, wash waves, and jet wash (Wolter and Arlinghaus, 2003). These activities have the potential to resuspend, and subsequently redeposit, sediments, resulting in impacts similar to those for dredging. Impacts associated with propeller wash would occur more frequently than dredging because as many as 125 LNG carriers may unload their cargos at the LNG terminal annually. Given the regular vessel traffic along the Columbia River, regular maintenance dredging of the navigation channel, the proposed location of the LNG terminal adjacent to the navigation channel, and the relatively coarse particles that make up the sediments at the ship berth and maneuvering area, we do not anticipate that propeller wash from LNG carriers and tugs would result in a significant degradation of water quality in the Columbia River.

Ballast Water and Ship Engine Cooling

Because the LNG carriers would be fully loaded when arriving at the proposed terminal, no ballast water would be discharged into the Columbia River. However, as the LNG cargo is unloaded, a carrier would take on water to maintain trim and stability and for cooling engines while docked at the

terminal. Potential impacts on water quality and aquatic resources due to ballast water intake and engine cooling water appropriations and discharges are discussed in sections 4.3.2.3 and 4.5.2.1, respectively.

Release of LNG or Fuel

In the unlikely event that LNG is spilled into the water from an accidental or intentional breach of an LNG carrier during transit, the cryogenic liquid would vaporize rapidly upon contact with the warm air and water. Being less dense than water, LNG would float on the surface before vaporizing. Because LNG is not soluble in water and would completely vaporize shortly after being spilled, the LNG could not mix with or contaminate the water.

Fuel (e.g., diesel) used for vessel propulsion or auxiliary/emergency generators on an LNG carrier could potentially spill or leak. However, fuel on each carrier is protected by the vessel's double hull. Furthermore, each LNG carrier would maintain a *Shipboard Oil Pollution Emergency Plan* (SOPEP) as required by international convention. The SOPEP would comply with MARPOL [marine pollution] 73/78 Consolidated Edition 2002 Annex 1 Regulation 26, which requires every oil tanker of 150 tons gross and above, and every vessel of 400 tons gross and above to carry an approved SOPEP. All LNG carriers would also be required to comply with state spill prevention and contingency plans, including the applicable requirements in Chapter 317-40 of the WAC – Bunkering Operations.

4.3.2.3 LNG Terminal

Existing Surface Water Resources

Two waterbodies within the Columbia River Basin would be affected by construction of the LNG terminal, the Columbia River and Hunt Creek. Existing conditions within these waterbodies are discussed below. Based on the wetland and other waters delineation report prepared for the project, nine small streams are located within the proposed 100-foot-wide construction corridor for the power line (URS, 2006c). These streams are intermittent; however, because most of the streams are fed, at least in part, by springs and seeps, they likely contain flows for much of the year. The majority of these streams eventually flow northwest from the proposed power line corridor to the Columbia River via Hunt Creek.

Columbia River

Columbia River water near the proposed LNG terminal site contains low concentrations of total dissolved solids (typically 80 to 100 mg/L), nitrates, carbonates, phosphates, and metals. Dissolved oxygen concentrations are usually close to saturation and turbidity levels are moderate. Typical total suspended solids (TSS) concentrations are 12 to 30 mg/L. Water temperatures are cool most of the year but can rise to 73 °F in the summer.

Currently, the water quality of the Columbia River is considered “marginally healthy” (COE, 2003). The segment of the Columbia River that would be impacted by the proposed project is an anadromous coldwater and warmwater fishery. It is designated as EFH for coho and Chinook salmon by the NMFS, as critical habitat for 12 salmonid evolutionary significant units (ESU) or distinct population segments (DPS) by the NMFS, and as Aquatic Natural or Aquatic Conservation areas by Clatsop County. The LNG terminal site location is also included in the Lower Columbia River Estuary, which belongs to the EPA's National Estuary Program. The EPA is working in coordination with the states of Idaho, Oregon, and Washington as well as the Columbia Basin Tribes to reduce pollutant loads within the river and to meet federal water quality standards.

Hunt Creek

The lower reaches of Hunt Creek are located immediately adjacent to the proposed LNG terminal site. The lower reach of Hunt Creek begins where an approximately 40-foot-high waterfall descends to the Columbia River floodplain and is characterized by low gradient meanders, tidally influenced backwater ponds, and freshwater tidal estuary at its junction with the Columbia River. Bottom sediments appear to be alluvial fine silt/sand, with a short section of gravel-bottom pool-riffle sequences near the waterfall. Upstream of the waterfall, Hunt Creek is characterized by high-gradient riffle/pool complexes confined to a deeply incised valley.

The water quality of Hunt Creek is not currently listed as either water quality limited or impaired by the ODEQ, due in part to the intact canopy and lack of recent disturbances. There is some sedimentation in the stream and evidence of turbidity during high flows, but the stream also contains a sizable proportion of clean gravels. Chemical contamination and excess nutrient loading are not a problem in the watershed.

Although Hunt Creek is designated a coldwater residential recreational fishery, angling is not currently permitted. Hunt Creek provides habitat for resident coldwater fish species, such as coastal cutthroat trout, and has been designated as EFH for coho and Chinook salmon and as critical habitat for federally listed salmonids (see section 4.6.2.2). Hunt Creek has been designated as Essential Salmonid Habitat by the ODFW.

Stormwater runoff from Clifton Road generally flows into a series of roadside ditches along the eastern side of Clifton Road. From the roadside channels, runoff flows west under Clifton Road via culverts, where it outfalls and sheet flows (or infiltrates) over dense native riparian vegetation towards Hunt Creek. Generally, the roadside ditches combine with streams conveying runoff from the upland areas along Clifton Road. A perennial stream is located east of the Highway 30 and Clifton Road intersection that conveys runoff from the southern portion of Clifton Road towards Hunt Creek. Based on a wetland/waterway survey conducted by NorthernStar in August 2006, 19 individual roadside ditches were identified along the 2.4-mile stretch of Clifton Road from Highway 30 to Bradwood Road. Table 4.3.2-3 summarizes the discharge locations along Clifton Road, along with the approximate milepost location (MP 0.0 represents the intersection of Highway 30 and Clifton Road).

TABLE 4.3.2-3			
Stormwater Runoff Discharge Locations from Clifton Road			
MP	Type of Discharge	MP	Type of Discharge
0.3	Stream	1.4	Stream/culvert
0.3	Stream	1.5	Stream/culvert
0.6	Culvert	1.6	Culvert
0.8	Culvert	1.6	Stream/culvert
0.9	Culvert	1.7	Stream/culvert
1.0	Stream/culvert	1.8	Culvert
1.2	Stream/culvert	2.0	Stream/culvert
1.2	Stream/culvert	2.2	Culvert
1.3	Stream/culvert	2.4	Stream/culvert

Construction Impacts and Mitigation

Activities associated with construction of the LNG terminal that could affect surface water resources include dredging of the ship berth and maneuvering area, dredged material placement, water

appropriation and discharge, stormwater runoff, electric power line, modifications to access roads and the Hunt Creek Bridge replacement, railroad realignment, and accidental spills or leaks of hazardous materials.

Dredging of the Ship Berth and Maneuvering Area

The primary impact of the project on surface water quality would result from using a hydraulic cutterhead dredge to remove approximately 700,000 cubic yards of material from the proposed ship berth and maneuvering area. Details of NorthernStar's proposed dredging are described in section 2.4.1.2. The effects of dredging on hydraulics in the Clifton Channel and main channel of the Columbia River are described in the discussion of NorthernStar's hydraulic and sediment transport modeling presented in section 4.2.2.2.

Dredging would result in a temporary increase in suspended solids in the water around the dredged area and the subsequent settling of the suspended particles, or sedimentation. The suspended sediment would temporarily reduce light penetration and could lower the rate of photosynthesis and aquatic productivity of the area. The introduction of sediment could also increase the amount of organic material and/or nutrients in the affected areas, which could lead to an increase in biological oxygen demand. This could reduce dissolved oxygen levels or cause a release of chemical constituents, such as metals, PCBs, pesticides, or PAHs, if present in the sediments. NorthernStar collected and tested sediment samples from the proposed dredge area to evaluate the quality and characteristics of the sediments that would be disturbed during construction of the project. As discussed in section 4.2.2.2, samples were collected in accordance with a SAP that was approved by the COE, EPA, and ODEQ through the RMT.

NorthernStar contracted WEST to conduct a hydrodynamic and sediment transport assessment for the dredging of the ship berth and maneuvering area (WEST, 2006). The assessment indicates that the proposed cutterhead dredge would spill approximately 0.5 percent of dredged materials. The total volume of material to be dredged for the berthing area and turning basin was estimated at 700,000 cubic yards. Based upon 0.5 percent spillage, the project would spill about 3,500 cubic yards of sediment during dredging activities. Based on their modeling, WEST concluded that the maximum sediment concentration would occur within 10 feet of the cutterhead.

Sediment spilled during dredging would create a plume of suspended sediment, reducing in-water visibility through increased turbidity. The size and duration of the sediment plume is highly dependent upon the grain size of the material being dredged. SWCA conducted a sediment analysis of the material which would be dredged as part of the proposed project. Within the dredge footprint, the substrate is almost exclusively sand, with very low silt and clay component (SWCA, 2006). Sand settles rapidly in the water column. Modeling by WEST shows that only particles smaller than 0.4 mm diameter are likely to be transported to areas outside the dredge footprint, while larger particles would settle within 10 feet from the cutterhead dredge. WEST's hydrodynamic model predicts that project-related suspended sediment loads would not exceed 1 mg/L at the dredge site and would diminish to 0.1 mg/L before reaching either Tenasillahe Island or Hunt Creek. By comparison, the typical TSS concentrations described above ranged between 12 and 30 mg/L and background levels of TSS measured in the field were on the order of 10 mg/L. Therefore, even assuming a considerable level of uncertainty in any of the model parameters, the impacts of the dredging operation would be very small and confined to an area immediately surrounding the proposed facility.

Background levels of turbidity in the Columbia River range from 3 to 10 NTUs. The WEST study demonstrates that turbidity plumes from dredging for the Bradwood Landing Project would return to within 1 NTU of background levels within 1 minute after suspension (WEST, 2006).

Dredging and all other in-water work in the Columbia River would be done during the in-water work window of November 1 to February 28. Additional information regarding impacts associated with dredging activities on sediment transport, aquatic resources, and special status species are provided in sections 4.2.2.2, 4.5.2.1, and 4.6.2.2, respectively.

Dredged Material Placement

As described in section 2.4.1.1, NorthernStar proposes to place up to 700,000 cubic yards of dredged material on the LNG terminal site to raise the base of the LNG terminal site to an elevation of 20 to 25 feet NAVD 88. As a result of the added fill, approximately 856,607 square feet (19.7 acres) of the LNG terminal site, including areas associated with Bradwood Road and Hunt Creek Bridge, that are currently below the 100-year floodplain would be raised above the 100-year floodplain. Before dredged material placement, a perimeter berm would be constructed around the area receiving dredged materials, forming a basin into which the dredged material would be placed. After fish and other aquatic life have been removed from the log pond (see section 4.5.2.1), the channel connecting the log pond to the Columbia River would be filled to complete the perimeter berm and isolate the pond from the river.⁶

As it is deposited on site, the water would separate from the dredged materials. Based on the relatively high permeability of the existing soils at the site and the dredged materials to be applied, infiltration rates are expected to be greater than the rate at which water would be applied during dredging. Therefore, NorthernStar anticipates that all of the water would percolate into the sandy soil at the site. However, during rainfall events, where the infiltration capacity of the soil may be more limited, the log pond would serve as a temporary holding area for excess water that would be generated. The pond would have approximately 50,000 cubic yards of storage volume, assuming a full depth of 20 feet. It is likely that water may continually be present that would reduce the capacity. Water from the dredged materials would not be allowed to overtop the perimeter berm and discharge to the river untreated.

Although it is expected that most of the water that accumulates in the pond would percolate into the ground, the log pond would be equipped with an overflow structure. The overflow structure would allow clarified water in excess of the storage capacity of the pond to drain to the Columbia River, and would be designed to have sufficient capacity to transport large volumes of water to the river through a temporary outfall discharge. This discharge would be located below the surface of the river a minimum of 20 feet from the shoreline. The residence time of any water that accumulates in the pond would be such that sediment would settle to the bottom of the pond and would not discharge to the river through the overflow structure. This water would not be expected to carry a high silt load because almost all the dredged material would be coarse and medium sand (see section 4.2.2.2).

Oregon's water quality standards require that discharges not increase the turbidity of river water more than 10 percent above background concentration. It is expected that this standard would be met at the point of discharge or outside a mixing zone that extends no more than 10 feet from the outfall.

Given the infiltration rate of the soils on site and the capacity of the holding pond for additional storage, NorthernStar expects discharge from the overflow structure to be very intermittent and only during periods of extremely high rainfall in conjunction with dredge material application. Water conveyed with the dredge material, as it is deposited on site, would separate fairly rapidly given the relative large grain size associated with the dredge material. It is anticipated that any water that would overflow would be low in sediment and of equal quality as Columbia River water.

⁶ NorthernStar included its *Work Area Isolation and Fish Salvage Plan* as part of its JPA. NorthernStar filed its JPA with the FERC on November 22, 2006, and filed revisions to the JPA on April 5, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

The overflow structure is expected to be a stand pipe-type system with a downturned elbow that would allow discharge of water that has had the greatest amount of time to allow for separation and settlement of any particulates. The log pond itself would be the last area to be filled on site, during which the stand pipe would either be removed or sealed in place.

In its May 11, 2007 letter to the FERC, the NMFS asked us to explain why the log pond could not be filled with existing dredged material stored at the western end of the LNG terminal site where no infrastructure except the stormwater treatment and infiltration gallery (which appears could be moved eastward) is proposed. The NMFS stated that such a modification would appear to minimize the volume of fill needed, reduce the terminal footprint, and provide the opportunity for some on-site wetland restoration. In response, all of the existing dredged material currently stored on the site would first be graded as the initial step in raising the site grade to an elevation of 20 to 25 feet NAVD. Additional fill would be supplied from the material dredged from the ship berth and maneuvering basin. Because the log pond would be used as a dewatering basin to collect water drained from the dredged sediments, it would be the last area filled. The western end of the site would be used during construction as a staging and storage area. NorthernStar has already aggressively minimized the layout during operation (see section 3.1.6.2) and no changes to the location of the stormwater treatment system could be made that would significantly reduce the facility footprint.

The material that is dredged from the ship berth and maneuvering area that is not placed at the LNG terminal site would be placed at the Wahkiakum County Sand Pit site, located at the northern end of Puget Island. This site currently includes a settling basin consisting of earthen fill levees designed to contain the dredged material and hold the return water while allowing sand and suspended sediment to settle. Weirs would be used to regulate the return of water to the river. Water returned to the river through weirs would be subject to applicable water quality standards, after dilution, at an appropriate point of compliance. Once the pipeline dredge deposits the material and the water is drained, the sand would be spread evenly around the holding area. The de-watered sand would then be distributed and graded by earthmoving equipment along the eroding shoreline on Puget Island and pushed into scour holes adjacent to the shoreline. These activities could potentially increase suspended sediments and turbidity in the vicinity of the dredged material placement site. A specific model has not been run to determine the anticipated turbidity levels resulting from placement of dredged materials at the Wahkiakum County Sand Pit site. However, given the coarse grain size of the sediments, the materials are expected to rapidly settle out of the water and water quality impacts would be similar to that at the LNG terminal site during dredging operations (see *Dredging of the Ship Berth and Maneuvering Area*). Therefore, water quality impacts are expected to be temporary and minor.

Water Appropriation and Discharge

NorthernStar has applied for a temporary water use permit from the ODWR for the maximum quantity of water that would be needed during construction of the proposed LNG terminal. As indicated in table 4.3.1-1, water would be appropriated from the Columbia River for multiple uses during construction of the LNG terminal, including:

- up to 60 million gallons for testing of the LNG tanks; and
- 15 million gallons for soil compaction and ground improvements.

Figure 2.1.3-3 shows the proposed intake and discharge locations. No potable water intakes were identified within 3 miles downstream of the proposed LNG terminal, although several are located upstream. NorthernStar would obtain up to 60 million gallons of water from the Columbia River for hydrostatic testing of the LNG storage tanks. Testing of a single LNG storage tank would require 30 million gallons of water. NorthernStar plans to schedule construction activities to enable water used to

test the first tank to be reused to test the second tank, which would reduce the amount of water needed for hydrostatic testing of the tanks to 30 million gallons. However, if construction does not proceed as planned, the two tanks may need to be tested at different times, in which case, twice the amount of water would be needed. Hydrostatic testing of the LNG tanks is expected to take approximately 1 month per tank; however, the timing is dependent on the construction of the tanks themselves so a specific time that the activity would occur is not known yet. For additional information on water appropriations for construction of the LNG terminal, see sections 4.3.1.3 and 4.5.2.1.

River water used for hydrostatic testing of the tanks would be filtered before use to remove suspended solids and tested for bacteria. If bacteria concentrations are high enough to cause corrosion of the 9 percent nickel steel tanks and stainless steel surfaces within the tanks, then a sodium hypochlorite solution would be used to chlorinate the water before hydrostatic testing. After use, the hydrostatic test water from the tanks would be discharged to the Columbia River through a temporary outfall extending approximately 300 feet offshore. If the water has been chlorinated, it would be tested for chlorine residual before discharge. If chlorine residual exceeds applicable effluent limits, the spent hydrostatic test water would be dechlorinated using a sodium bisulfite solution before discharge. The sodium bisulfite dose rate would be established based on the level of chlorine residual. Sodium bisulfite solution would be introduced into the discharge pipeline close to the storage tanks, and the dechlorination reaction would be complete before discharging the water to the river.

It is expected that the hydrostatic test water from the tanks would not need treatment, other than possible dechlorination, before it is discharged to the river. However, all batches of hydrostatic test water would be sampled and analyzed before discharge to determine whether they contain any substances that would not meet Oregon's water quality standards. If such substances are detected, the hydrostatic test water would be treated as necessary to enable safe discharge to the river. Assuming that the hydrostatic test water does not need treatment beyond dechlorination, it is expected that it would meet Oregon's ambient water quality standards at the point of discharge.

Water used for hydrostatic testing of piping at the LNG terminal (approximately 1.5 million gallons) may be discharged to the Columbia River through a temporary outfall. Similar to water used to hydrostatically test the storage tanks, it is expected that the hydrostatic test water from the piping would not need to be treated before discharge to the river. However, all batches of water used for hydrostatic testing of piping would be sampled, analyzed, and treated, if necessary, to enable safe discharge to the river.

During construction, NorthernStar would also appropriate approximately 15 million gallons of water from the Columbia River for soil compaction and ground improvements. This work would occur over a period of 3 to 4 months and likely between the months of July and December. The water would not be discharged to surface waters, and is discussed further in section 4.3.1.3.

No water would be either appropriated from or discharged to Hunt Creek.

Stormwater Runoff

Stormwater runoff during construction of the LNG terminal could potentially affect water quality in both the Columbia River and Hunt Creek. To minimize these potential affects, NorthernStar has developed a terminal ESC Plan that contains BMPs for management of stormwater during construction. Additional information on NorthernStar's terminal ESC Plan is provided in section 4.3.1.3.

Electric Power Line

The proposed electric power line route and associated 100-foot-wide right-of-way would impact 0.6 acre of habitat within nine waterbodies. Based on the information provided by NorthernStar, these waterbodies are relatively narrow and occur in steep areas. In some cases, these waterbodies are intermittent and/or flow underground for portions of their length.

The impacts of power line construction on the minor intermittent and perennial streams along the route would generally be localized and short term. It is expected that the power line would span the tributaries so as to avoid impacts on surface waters. However, if required, clearing trees and vegetation adjacent to these waterbodies would have the greatest effect on water quality, including potential increases in water temperature. Sediments could be resuspended by in-stream construction activities or by erosion of cleared stream banks and riparian areas. Turbidity resulting from the resuspended sediments could reduce light penetration and the corresponding photosynthetic oxygen production. Resuspension of deposited organic material and inorganic sediments could cause an increase in consumption of biological and chemical oxygen, decreasing available dissolved oxygen. However, the potential impacts on surface waters would be minimized through the implementation of BMPs by PacifiCorp and the requirements of state and local permits and approvals.

Access Roads and Hunt Creek Bridge Replacement

To accommodate vehicle traffic associated with construction and operation of the project, Clifton Road would need to be paved and widened to 28 feet, including shoulders (based on engineering drawings submitted by NorthernStar). In addition, a drainage ditch would be constructed on the west side of the road. Impacts on Hunt Creek would be minimized through the implementation of NorthernStar's terminal ESC plan and our Plan and Procedures. To this end, NorthernStar has indicated that construction on the eastern side of the road (adjacent to Hunt Creek) would be completed in a manner that would not allow any sediment to wash into Hunt Creek. Because Hunt Creek has been designated as both EFH and critical habitat for federally listed salmonids, potential impacts on water quality due to construction of Clifton Road will be analyzed in additional detail in the revised BA and EFH Assessment.

As discussed in section 2.1.3.6, Bradwood Road enters the LNG terminal site from Clifton Road over a bridge that crosses Hunt Creek. Although most of the existing roadway is above the 100-year flood elevation (13.23 NAVD), the portions below the 100-year flood elevation would be raised. Following construction, the elevation of Bradwood Road would vary, but would generally exceed 14 NAVD. Bradwood Road would also need to be paved and widened to 24 feet for use during construction and operation of the proposed project. Similarly, the existing bridge over Hunt Creek is not adequate to withstand the anticipated loadings associated with construction-related traffic and would be replaced with a 24-foot-wide bridge.

The new Hunt Creek Bridge would be built from four pre-cast concrete deck bulb T-girders. These would be supported on 12-inch-diameter concrete-filled steel piles that would be placed above the mean higher high water (MHHW) elevation and then vibrated into place. The new Hunt Creek Bridge deck would be 2.4 feet above the 100-year flood elevation. Each side of the bridge would be curbed and have curb-mount rails. Cast-in-place concrete aprons would be added at the ends of the bridge to match the existing grade. The bridge would be sloped to one side, and an additional 25 feet of extruded concrete curb would be constructed beyond the concrete apron on the downslope side of the bridge from both the west and the east. This curb is designed to guide stormwater to vegetated roadside areas before draining to Hunt Creek.

Bridge demolition, activities below the OHWM, and construction of over-water portions of the bridge would occur during the in-water work period for Columbia River tributaries between Big Creek and St. Helens of July 1 – September 15. NorthernStar would implement its terminal ESC Plan to avoid or minimize impacts on water quality during construction of the Hunt Creek Bridge (see Attachment B-1). In addition, NorthernStar would apply the following bridge demolition and construction BMPs:

- Existing pilings would be left in place unless they interfere with the proposed bridge. In-water work would be very limited, consisting of cutting off existing bridge piers and piles that would interfere with the new bridge.
- Excavation required for the installation of the concrete abutments would be conducted from up-bank, and would be minimized to the amount necessary to place the structure. NorthernStar does not expect placement of the abutments to result in any measurable turbidity during construction.
- A temporary erosion and sediment control plan would be developed prior to beginning any construction work. The plan would include erosion control methods to prevent silt or toxic material-laden water generated from any land-disturbed areas or construction equipment servicing areas from entering Hunt Creek. These methods may include silt fences, filter fabric, straw bales, dust suppression, temporary sediment ponds, check dams of pea gravel-filled burlap bags or other material, diversion dams with flexible drainage pipe outfalls and pumps as necessary to divert flows, a controlled construction entrance, and mulching of exposed areas upon completion.
- Equipment servicing and fueling would be conducted a minimum of 100 feet upland from Hunt Creek. Any heavy equipment operating over (or within) Hunt Creek would be inspected for lubrication or fuel leaks. Any leaks detected would be corrected prior to commencing work.
- During bridge demolition and construction work, water quality monitoring would be conducted at a point 100 feet downstream from the bridge. A baseline observation for water clarity would be taken at a point upstream from the work area past the prominent meander loop. The final location of the sites would be determined as a condition of the 1200-C permit issued by the ODEQ. NorthernStar would use a turbidity meter to determine turbidity levels at both the background site and the downstream monitoring site.
- In the event that turbidity at the downstream monitoring site exceeds a level approximately 10 percent above turbidity at the background site, work would stop until either the turbidity was cleared or it could be ascertained that the difference in turbidity levels was not due to construction activities.⁷ During periods of low turbidity, fluctuations of 10 percent could occur naturally due to complex interactions between Hunt Creek and the Columbia River.
- The areas where the demolition activity would involve bank-side disturbances would be revegetated with native vegetation that is typical to the area. Revegetation is described in detail in section 4.4.2.2.

⁷ Note that short-term exceedance of the 10 percent turbidity threshold is allowed for construction if all available BMPs have been used and the potential for exceedance is recognized in the section 401 Water Quality Certification for the Joint Permit issued by the ODEQ.

- During activities associated with paving of the Hunt Creek Bridge deck, NorthernStar would employ the following additional BMPs developed by the ODEQ:
 - Selection and deployment of oil-absorbing materials and pads as well as a complete spill kit for use in response to accidental discharges and/or spills of petroleum or chemical products.
 - Prevention of stormwater pollution through the proper disposal of waste, control of stormwater run on, and minimization of stormwater runoff.
 - Elimination of discharge litter and/or other discarded debris by providing appropriate, labeled, and accessible containers for solid waste disposal.

Improvements to Bradwood Road and the Hunt Creek Bridge could potentially increase turbidity and suspended sediment levels within Hunt Creek. However, turbidity associated with bridge construction is expected to be of very short duration and would be associated primarily with removing the supports from the old bridge that interfere with construction of the new bridge. Any turbidity that would develop would be minimized by implementation of the BMPs described above, very localized (e.g., within 50 to 100 feet of the bridge), and expected to clear within a tidal cycle or sooner. If the supports are cut above the water line, turbidity associated with their removal would be negligible. However, in its May 11, 2007 letter to the FERC, the NMFS raised concerns regarding the level of monitoring proposed at Hunt Creek during demolition and construction, and specifically the absence of an upstream (as opposed to merely a background) monitoring point. Hunt Creek is tidally influenced and contains high-quality habitat for federally listed salmonids. Therefore, in addition to placing its baseline monitoring site upstream from the proposed bridge replacement, **we recommend that:**

- **NorthernStar should conduct water quality monitoring at points both 100 feet downstream and 100 feet upstream from the Hunt Creek Bridge during demolition or construction activities. In the event that water clarity exceeds a level approximately 10 percent above the baseline observation at either monitoring point, work would cease until either the turbidity was cleared or it could be ascertained that the difference in turbidity levels was not due to construction activities.**

Railroad Line Realignment

During construction, the existing railroad line would be rerouted and would parallel Hunt Creek for approximately 2,000 feet. For most of this length, the creek and the edge of the railroad right-of-way would be between 50 and 400 feet apart. Hunt Creek would not be directly affected by railroad construction; however, for about 50 feet, the edge of the railroad right-of-way and Hunt Creek would be less than 50 feet apart. The railroad tracks would occupy approximately 22 feet at the center of the 100-foot-wide railroad right-of-way, and would have approximately 5-foot-wide ditches maintained along both sides of the railroad tracks. To minimize potential impacts on Hunt Creek, a 2-foot-high berm of earth covered with native grass would be constructed between the Hunt Creek oxbow and the railroad tracks. The berm would extend for 100 feet centered on the apex of the oxbow. In addition, NorthernStar would use concrete railroad ties in place of treated railroad ties within 100 feet of any wetland or waterbody, including Hunt Creek. NorthernStar's terminal ESC Plan describes measures that would be taken to prevent railroad bed ballast, other construction materials, or eroded soil from entering Hunt Creek during construction.

Accidental Spills and/or Leaks of Hazardous Materials

Water quality in the Columbia River and Hunt Creek could also be adversely affected by a spill, leak, or other release of hazardous materials during construction activities. NorthernStar would minimize potential impacts associated with spills or leaks of hazardous materials during construction by implementing the spill prevention and response procedures in its terminal ESC Plan. Among these procedures are paving operation controls developed by the ODEQ that NorthernStar would implement during construction of the Hunt Creek Bridge. These include proper disposal of waste, controlling stormwater run on, and minimizing stormwater runoff.

The only area where uncured concrete would potentially come in contact with surface water is during construction of the wharf. During dock construction, expandable foam would be used to seal the forms and ensure that uncured concrete is fully contained. The forms used for concrete work would be built taller than the necessary height to ensure that uncured concrete (and any rainwater that collects on top) could not discharge to surface water. Any water generated as the result of concrete curing and/or rainwater collected in the concrete forms would be pumped to the terminal for treatment as necessary to meet water quality standards.

Operation Impacts and Mitigation

Operation of the LNG terminal could potentially impact water resources through stormwater runoff, maintenance dredging of the ship berth and maneuvering area, shoreline erosion, propeller wash from LNG carriers and tugs, water appropriations and discharges, and accidental spills or leaks of hazardous materials during operation of the LNG terminal.

Stormwater Runoff

During operation of the proposed project, there is potential for stormwater runoff to affect water quality in the Columbia River and Hunt Creek. As part of its Removal-Fill Permit application to the ODSL and COE, NorthernStar has developed a *Stormwater Management Plan for Removal/Fill Permit Applications* for the LNG terminal.⁸ Given the limited guidelines for stormwater facility design in Clatsop County, NorthernStar referenced the City of Portland's Stormwater Management Manual for calculating stormwater runoff volumes, flow rates, and for initial facility design (City of Portland, 2004). Current site and soil characteristics promote the use of infiltration for disposal of stormwater generated from impervious surfaces. Based on final grade elevation, NorthernStar divided the proposed LNG terminal facility into three primary drainage basins. The drainage basins would be maintained regularly to remove any accumulated debris and sediment that would reduce their effectiveness. Because stormwater would be managed on site via infiltration, there would be no overflow into either Hunt Creek or the Columbia River.

Relative to stormwater runoff from Clifton Road, the total existing impervious surface associated with Clifton Road is approximately 5.8 acres, assuming an average width of 20 feet along its 2.4-mile length. Widening of the paved roadway to 24 feet plus 2-foot-wide shoulders on either side (see section 2.4.1.1) is expected to result in an increase of approximately 2.3 acres of impervious surface. Additional culverts and drainage ditches would be installed to improve the drainage. Permanent erosion and sediment control for the road will be analyzed in additional detail in the revised BA and EFH Assessment.

⁸ NorthernStar included its *Stormwater Management Plan for Removal/Fill Permit Applications* as part of its JPA. NorthernStar filed its JPA with the FERC on November 22, 2006, and filed revisions to the JPA on April 5, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

Improvements to Bradwood Road and the Hunt Creek Bridge would result in slight increases to the total impervious surface. The existing site access road varies from 15 to 19.5 feet wide and the existing bridge ranges from 20 to 21.5 feet wide. The existing road is graveled, with an asphalt layer underneath approximately 75 percent of the roadway. The total impervious surface (including gravel area) associated with the existing road and bridge is about 0.4 acre. Current drainage from the existing roadway is directed onto adjacent heavily vegetated roadside areas (the site is relatively flat along Bradwood Road) and primarily infiltrates into the sandy substrate. The existing bridge discharges to Hunt Creek because the deck is made of timber members with gaps between them.

As described in section 2.4.1.1, the proposed roadway and bridge alignment generally follows the existing alignment, except immediately west of the Hunt Creek Bridge, where the road swings wider onto the old second bridge alignment. The proposed roadway and bridge would be surfaced in asphalt. The total impervious surface associated with the proposed modifications to Bradwood Road and the new Hunt Creek Bridge is approximately 0.6 acre.

Of the total modified roadway and new bridge area, approximately 0.3 acre would be area associated with the existing roadway and bridge alignment. Approximately 0.1 acre of area associated with the existing roadway and bridge alignment at the east end would be removed and revegetated as a result of the new, shorter proposed roadway and bridge alignment. Therefore, the total impervious surface associated with the proposed roadway and bridge alignment is 0.6 acre, where 0.3 acre is redeveloped impervious surface and 0.3 acre is new impervious surface. Accounting for the existing impervious surface that would be removed, the net new impervious surface is 0.2 acre.

Although the new Hunt Creek Bridge would increase the total impervious surface, it would have a solid surface decking and curbing that would prevent untreated stormwater from discharging directly into Hunt Creek. Existing topography and vegetation would be used for stormwater management as much as possible. Stormwater would discharge from the end of the curb extensions into small rock flow spreader structures before flowing through vegetation. On the east side of the bridge, the over-ground flow distance between the discharge site and Hunt Creek is about 45 feet, vegetation is dense, and the slope is relatively gentle. In addition, during site restoration, there would be an opportunity to add additional native vegetation next to the road edge to improve dissipation of stormwater. On the west side of the bridge, the curb would discharge to the former road bed, which has an over-ground flow distance to Hunt Creek of about 30 feet (see figure 2.1.3-2). This area would be revegetated with native species after construction. A bioswale placed on the west side of the bridge would be designed to increase this flow distance and provide storage necessary to promote infiltration. Any roadside swale used for erosion and sediment control during construction-phase activities could be retained to provide treatment via infiltration, and control overflow to the relatively steeper slope leading to Hunt Creek.

Based on the design parameters outlined in NorthernStar's SWMP, the discharge sites described above would be adequate to provide water quality treatment for at least the 2-year 24-hour storm. The impervious area that would drain to the curb ends is approximately 10,125 square feet, with half of this drainage going to each end. The 2-year 24-hour storm, approximately 3.8 inches, would produce about 1,600 cubic feet of precipitation over the bridge and adjacent curbed area. Assuming that 98 percent of that precipitation is runoff, and using a conservative (i.e., low) infiltration rate of 0.3 feet per hour, about 225 square feet would be required on each side of the bridge to fully infiltrate such a storm. However, as described by the NMFS (2003a), no detention is needed because flow in Hunt Creek discharges almost immediately into the Columbia River, which is large compared to the runoff expected from with the small amount of impervious surface area associated with the bridge. Sediment discharged from the road would not be expected to markedly alter infiltration rates, as it would not be enough to damage established woody vegetation.

The proposed roadway would continue to direct stormwater into heavily vegetated roadside areas where the sandy substrate would allow rapid infiltration. Existing contours indicate that the area associated with the extended portion of the roadway (which runs 170 feet farther east than the existing alignment) currently drains towards a ditch that eventually discharges to Hunt Creek. Drainage of the roadway extension is expected to follow the same flow patterns and discharge location as the existing bridge. In summary, no significant change in the drainage area discharging to Hunt Creek is expected as a result of the improvements to Bradwood Road and the Hunt Creek Bridge.

In its May 11, 2007 letter to the FERC, the NMFS inquired why inundation would not threaten bridge integrity. In response, NorthernStar filed additional information stating that the bridge design calls for the use of pre-cast concrete sections that cannot float. Therefore, regardless of water stage, the weight of the bridge would cause it to remain on the abutments. Debris at the site has been of negligible consequence for the existing bridge, which is many decades old, made of wood, has in-water supports, and experiences twice-daily inundation (the bottom of the deck gets wet) from Columbia River high tide backwater effects. This bridge survived the 1996-1997 floods with no such damage. Because the new bridge would have no in-water supports, it would be able to convey debris much more easily. The new bridge would also be higher than at least the existing 10-year flow water surface elevation. In addition, flow velocities in Hunt Creek during floods are typically very low, as the downstream portion of the creek is backwatered from high water on the Columbia River. Therefore, lateral forces from debris loads necessary to displace the bridge are highly unlikely to develop.

Maintenance Dredging of the Ship Berth and Maneuvering Area

NorthernStar estimates about 80,000 cubic yards of material would be removed from the ship berth and maneuvering area approximately every 2 to 4 years as part of maintenance dredging. Material from maintenance dredging would be deposited at the Wahkiakum County Sand Pit site located at the northern end of Puget Island or some other approved dredge disposal site. If placement is at the Wahkiakum County Sand Pit site, NorthernStar anticipates using a cutterhead section dredge with a 30-inch discharge pipe and a 4,950 HP pump, which would be consistent with the size used to complete the initial dredging of the ship berth and maneuvering area. NorthernStar is currently proposing to use the Port of Portland's dredge "Oregon" for maintenance dredging. The operation rate of this dredge is 1,500 cubic yards per hour (WEST, 2006). Therefore, with time for initiation and set up, it is expected that maintenance dredging would occur over a 2-week time frame. If a different dredge material disposal site is used, a clamshell/barge or hopper dredge would be necessary and the dredging time frame may vary depending on the disposal location.

A specific model has not been run to determine the anticipated turbidity levels resulting from placement of dredged materials at the Wahkiakum County Sand Pit site or other approved disposal site. However, given the coarse grain size of the sediments, the materials are expected to rapidly settle out of the water and water quality impacts would be similar to that at the LNG terminal site during dredging operations (see *Construction Impacts and Mitigation, Dredging of the Ship Berth and Maneuvering Area*). Therefore, water quality impacts are expected to be temporary and minor.

Water Appropriation and Discharge

As indicated in table 4.3.1-1, water would be appropriated from and discharged to the Columbia River for multiple uses during operation of the LNG terminal, including ballast water and ship engine cooling, testing of the fire suppression system, and condensate water from the SCVs. Potential impacts on water quality from these appropriations and discharges are discussed below.

Ballast Water and Ship Engine Cooling

LNG carriers unloading at the LNG terminal would appropriate water from the Columbia River for ballast and ship engine cooling. LNG carriers would not discharge any ballast or onboard wastewater during off-loading operations at the LNG terminal site. As described in section 2.1.1.5, NorthernStar has stated that it would construct and install a system capable of delivering filtered river water to the LNG carriers. This system would use a screened water intake located at the wharf (see figure 2.1.3-3) that would minimize the entrainment and impingement of juvenile fish. NorthernStar's design plans require that LNG carriers be retrofitted to utilize the system and to cycle engine cooling water into the ballast tanks to avoid the discharge of warm water to the Columbia River.

We recommended in the draft EIS that NorthernStar prepare a plan to ensure that only LNG carriers that have been retrofitted to use the screened water supply system at the wharf are allowed to unload cargo at the Bradwood Landing LNG terminal. The FERC received numerous comments on the draft EIS in support of the recommendation. We also received comments questioning the engineering feasibility of the screened water supply system to accommodate various ship designs, the engineering feasibility of the necessary retrofitting to allow LNG carriers to utilize the system, and the feasibility of enforcement. In filings to the FERC on March 24 and April 9, 2008, NorthernStar stated that it could not guarantee that all LNG carriers that arrive at the terminal would have the necessary retrofitting in place to allow the use of the screened water supply system. NorthernStar described that its proposed project could require the use of various types of shipping contracts, such that some LNG carriers calling on the LNG terminal would not use the terminal on a regular basis (e.g., spot market contracts, short term contracts, and the occasional use of replacement carriers for long-term contracts). Because LNG carriers could only be retrofitted to use the screened water supply system when in dry-dock (something that happens only twice over a five year period), or during new construction, NorthernStar stated that some carriers using the LNG terminal would not be retrofitted to use NorthernStar's screened water supply system.

NorthernStar has stated that it would continue to offer incentive-based contractual agreements for vessels to accommodate the screened water supply system, but that performance standards should be used to address regulatory gaps and bolster the mitigation potential of the LNG terminal's onsite water system. NorthernStar proposes to develop a performance standard for the temperature of all cooling water discharges at the wharf and a performance standard for entrainment of juvenile fish at the wharf. Both performance standards would have a monitoring component. To date, we have not been provided any information on these potential performance standards.

To minimize impacts on aquatic resources, we are recommending in section 4.5.2.1 that NorthernStar adhere to the condition requiring LNG carriers to be retrofitted, as recommended in the draft EIS, or develop an alternative system meeting the same standard that does not require vessel retrofitting. We recognize that an alternative system design may not eliminate cooling water discharge. Therefore, we have included a discussion below of potential impacts on water quality in the case that LNG carriers arriving at the LNG terminal have not been retrofitted to use the proposed screened water intake system and therefore, discharge cooling water in a traditional mode of ship operation.

NorthernStar estimates that LNG carriers unloading cargo at the terminal would appropriate between 20 and 50 million gallons of water for ballast and ship engine cooling, combined. NorthernStar has not provided a break down of the water requirements for engine cooling and ballast separately, which is necessary to determine the potential volume of water discharge from LNG carriers and the volume of water that would be removed from the system. Therefore, table 4.3.2-4 presents the typical intakes and discharges associated with LNG carrier ballast and engine cooling that were provided in the final EIS for the Broadwater LNG Project (FERC, 2008). The estimates are for 145,000 m³ and 250,000 m³ capacity LNG carriers, and thus represent an approximation since NorthernStar expects that LNG carriers ranging

in capacity from 100,000 m³ to 200,000 m³ would service its terminal. We note that the Coast Guard would restrict the size of the LNG carriers operating on the Columbia River to a maximum cargo size of 148,000 m³ until additional risk analyses addressing larger vessels have been completed.

TABLE 4.3.2-4		
LNG Carrier Intakes and Discharges while Berthed at the LNG Terminal Wharf		
Type of Intake or Discharge	Volume of Intake (million gallons)	Volume of Discharge (million gallons)
Ballast Water		
145,000 m ³ LNG carrier (steam powered)	13.2	Not expected
250,000 m ³ LNG carrier (diesel powered)	25.6	Not expected
Cooling Water		
145,000 m ³ LNG carrier (steam powered)	57.2	57.2
250,000 m ³ LNG carrier (diesel powered)	18.6	18.6

As with other large cargo ships, LNG carriers would take on ballast water to maintain stability and trim as cargo is off-loaded. The amount of ballast water required varies according to vessel size, weather conditions, cargo load, water salinity, sea state, and the ship master's discretion. A typical 145,000 m³ LNG carrier would require approximately 13.2 million gallons of ballast water, which also would support routine operational needs such as generation of freshwater and fire suppression systems. This is comparable to ballast requirements of the average large oil tanker operating on the lower Columbia River, which may take on between 8.3 and 13.8 million gallons of water for ballast while at port. In the future, larger diesel powered LNG carriers (250,000 m³ capacity) would require nearly twice as much ballast water (25.6 million gallons) as the smaller steam powered LNG carriers. There are currently 218 LNG carriers operating world-wide, ranging in capacity from 1,100 m³ to 154,000 m³, and nearly all of them are steam powered. Approximately 15 percent of LNG carriers under construction will be diesel powered.

Ballast water obtained from the Columbia River is transported out of the river when the carrier departs. Based on the normal flow rate used by WEST in the Hydrodynamic and Sediment Transport Assessment (210,000 cfs), about 136 billion gallons of water per day would pass the LNG terminal. Thus, the amount of water removed by a typical LNG carrier for ballast would be less than 0.01 percent of the total volume of water present at any given time. The impact of removing this water volume from the lower Columbia River system would be minor. Furthermore, we do not expect the reduction in flow to significantly affect aquatic habitats, discussed further in section 4.5.2.1.

In addition to ballast water, LNG carriers would appropriate and discharge water for ship engine cooling while docked at the wharf. Based on the estimates provided in the final EIS for the Broadwater, LNG Project (FERC, 2008), a steam powered LNG carrier would intake and discharge a total of about 57.2 million gallons of water while berthed at the proposed LNG terminal (less than 24 hours). The next generation of LNG carriers (larger and diesel powered) are estimated to require approximately 18.6 million gallons of cooling water while berthed at the proposed LNG terminal, about one-third of the cooling water needed for steam powered carriers. Because none of these diesel powered LNG carriers have been constructed, all information regarding water use is an approximation.

LNG carriers would discharge cooling water throughout the transit route from the territorial seas to the proposed LNG terminal location. Although various types of LNG carriers could offload at the proposed site, the greatest cooling water discharge would be associated with steam powered carriers. Based on the estimates provided in the final EIS for the Broadwater LNG Project (FERC, 2008), the cooling water discharged from a 150,000 m³ steam powered LNG carrier could initially be 19.4 °F higher than ambient water temperatures. Because the cooling water intake would be at ambient temperature,

which is seasonally dependent (ranging between 42 °F and 68 °F in Astoria, Oregon), the water discharge temperature would be expected to range between about 61 °F and 87 °F at the immediate discharge location. Impacts associated with cooling water discharge from the larger diesel powered LNG carriers would be expected to be comparable to or less than those described above for steam powered LNG carriers.

As described above (see *Oregon Water Quality, Section 303(d) List* and *Washington Water Quality, Section 303(d) List*), the Columbia River is currently listed as impaired for water temperature. LNG carriers that have not been retrofitted to use the screened water intake system could temporarily exacerbate elevated water temperatures in the immediate vicinity of the wharf. NorthernStar has indicated that it would develop a performance standard for the temperature of all cooling water discharges at the wharf, which would have a monitoring component. The impacts of LNG carrier water discharges at the terminal would be mitigated to a less than significant level after detailed modeling and the establishment of appropriate performance standards and a detailed set of operating procedures that would reasonably assure that the standards could be met.

The cooling water for the LNG carriers may be injected with a low dose of biocide (expected to be sodium hypochlorite for LNG carriers). This is standard practice in the shipping industry to prevent the growth of marine organisms. This residual chlorine concentration is not expected to significantly affect water quality, due to the low concentration of sodium hypochlorite that may be present in the discharge. Mixing upon discharge would occur rapidly due to the volume of water in Columbia River and mixing by the tides and currents.

LNG carrier operations and any resulting impacts on water quality would be comparable to typical shipping traffic, and would need to comply with international and U.S. shipping regulations. Impacts on water quality from current and future LNG carriers would be minor, but a recurring and incremental impact on the water resources of the lower Columbia River. The potential impacts on aquatic resources as a result of LNG carrier water intakes and discharges are discussed further in section 4.5.2.1. To ensure development of performance standards that minimize impacts on water quality from LNG carrier water withdrawals and discharges at the wharf, **we recommend that:**

- **Within 30 days after the issuance of the final EIS, NorthernStar should develop the following performance standards for water discharges at the Bradwood Landing terminal wharf:**
 - a. **standards for water temperature impacts due to discharging cooling water from LNG carriers into the Columbia River that should include modeling to determine the temporal and spatial extent of impacts on water quality and salmonids; and**
 - b. **standards for impacts from biocide use that should include specific forms and concentrations of biocide that would be used, the anticipated concentration of biocide at the discharge location, and modeling to determine the temporal and spatial extent of toxicity to aquatic resources.**

Testing of the Fire Suppression System

About 13.7 million gallons of water would be withdrawn from the Columbia River every year to test the fire suppression system at the LNG terminal. Although the fire suppression system would only be used in emergencies, water would be required weekly for system testing. After completion of the weekly test, the test water would be returned directly to the Columbia River without any other use. The quality of the water discharged from the fire suppression system would be essentially the same as the quality of

water withdrawn from the river. Fire suppression water would be obtained from the Columbia River at a rate of 4,400 gpm for 1 hour each week using the permanent water intake and pump station on the dock as shown on figure 2.1.3-3. It would be returned to the Columbia River at rate up to 4,400 gpm via outlets on the fire suppression system piping on the north end of the dock approximately 300 feet from the shoreline. The return of fire suppression water to the Columbia River would have no adverse effects on water quality and would meet ambient water quality standards at the point of discharge. Because the discharge outlets would be located over 300 feet from the shoreline in an area with an approximate water depth of 42 feet, the potential for scour would be negligible and diffusers would not be necessary.

Condensate Water from the SCVs

Water is produced as a by-product in the LNG vaporization process proposed by NorthernStar. Under the proposed design, the SCVs would generate up to 160 gpm (0.23 mgd) of condensate water. Because this water condensate is typically acidic, it must be neutralized with alkaline chemicals before discharge. Table 4.3.2-5 shows the results of chemical analysis of neutralized condensate from two existing LNG terminals. Condensate from the proposed terminal would be expected to have similar characteristics. NorthernStar proposes to discharge the excess SCV water directly to the Columbia River under an NPDES permit following pH adjustment. Sampling and analysis of the SCV discharge would be carried out in accordance with the requirements of the NPDES permit issued by the ODEQ. The ODEQ began the NPDES permit process on October 18, 2007 when the COE published its Public Notice for Permit Application associated with the JPA and JARPA, which included the ODEQ's 401 Water Quality Certification Public Notice.

The SCV condensate water would be discharged using an outfall/diffuser system mounted about 15 feet below the water surface in water approximately 25 feet deep (MLLW), with its main alignment parallel to shore at a distance of about 150 feet from shore on the main pipe trestle. This location would take advantage of better water circulation in the mainstem of the Columbia River. The proposed diffuser would be 40 feet long, 31/32 inch in diameter, and would have nine ports. The outfall/diffuser system would be designed to rapidly mix the discharged condensate with river water.

The pH of the water bath in an SCV is typically maintained at 5.6 standard units and the temperature of the discharge water would be 68 °F. Before discharge, the pH of the SCV discharge water would be increased in a neutralization tank. An allowable discharge pH would be established during the NPDES permit review process. The average water temperature in the Columbia River measured in Astoria between December 2005 and 2006 was 54.4 °F, ranging between 42 °F and 68 °F, depending on the season (NOAA National Oceanographic Data Center, 2006). On average, the SCV discharge water would generally be warmer than the ambient water temperatures but would not exceed a maximum of 68 °F, which is the ODEQ's lower Columbia River water quality criterion for temperature (Coast & Harbor Engineering, Inc. (CHE), 2007). Furthermore, the Columbia River flows at a rate of more than 45,000,000 gpm more than 95 percent of the time. Given the volume of discharge (160 gpm) in relation to the volume of flow, we anticipate that water temperatures near the outfall would rapidly return to ambient conditions.

In its May 11, 2007 letter to the FERC, the NMFS questioned whether LNG could be used to cool the SCV condensate water to more closely approximate the temperature of the Columbia River water. In response, NorthernStar explained that such a heat exchange process, while theoretically possible, would not be economically feasible or practicable due to the extreme temperature difference between the LNG (at -260 °F) and the condensate (at 68 °F).

TABLE 4.3.2-5		
Constituent Data for Vaporizer Condensate		
Parameter	Sample Site 1 Concentration (mg/L unless specified)	Sample Site 2 Concentration (mg/L unless specified)
pH (liquid)	7.17 (Standard Units)	
Total Dissolved Solids	1,074	
Alkalinity	987 mg/L as CaCO ₃	832 mg/L as CaCO ₃
Chloride	5.7	
Fluoride	<0.5	
Nitrate-Nitrogen	3.8	
Nitrite	0.6	
Specific Conductance	1,700 µmhos/cm	1,494 µmhos/cm
Sulfate	<0.5	
TOC		22
Turbidity	0.3 NTU	
Aluminum	<0.02	
Arsenic	<0.005	
Barium	<0.01	Below reporting limit
Beryllium	<0.002	
Chromium	0.03	
Copper	<0.005	
Iron	<0.05	Below reporting limit
Magnesium	<0.005	0.02
Manganese	<0.05	
Nickel	<0.005	
Selenium	<0.005	
Silica		0.15
Silver	<0.002	
Strontium		Below reporting limit
Zinc	<0.05	

As part of the NPDES permit application process, CHE modeled the mixing zone created by the SCV discharge using the CORMIX computer model (Jirka et al., 1996). The results were provided in a technical memorandum titled *Mixing Zone Analysis for Bradwood Landing Point Source Discharges – NorthernStar Natural Gas*, which was submitted by NorthernStar in response to our recommendation in the draft EIS.⁹ The goal of the analysis was to provide the approximate lateral extents of the acute and chronic mixing zones within which discharge concentrations and temperatures may be above the State of Oregon acute and chronic water quality criteria. The modeling was based on conservative assumptions (i.e., very low flow conditions with an ambient current velocity of 0.0 ft/s and maximum rather than average constituent concentrations).

Prior to mixing, the SCV condensate discharge would meet the acute and chronic water quality criteria for temperature and all modeled constituents except chromium VI, copper, and silver. Of these, the highest level of acute mixing would be required for chromium VI (16.9 times) and the highest level of chronic mixing would be required for silver (150 times). Therefore, these constituents determine the size of the acute and chronic mixing zones, which were calculated by the model to extend 2 feet and 100 feet

⁹ NorthernStar filed its *Mixing Zone Analysis for Bradwood Landing Point Source Discharges – NorthernStar Natural Gas* with the FERC on October 15, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

from the discharge, respectively. In other words, for some constituents under the conservative conditions modeled, concentrations within 2 feet of the discharge would be above acute water quality standards and concentrations within 100 feet of the discharge would be above chronic water standards. Total chromium data from an existing LNG facility was used for the mixing zone analysis but was conservatively assumed to be chromium VI, although chromium VI was not specifically detected. Also it is important to note that the input data used for the silver was based on a laboratory detection limit, because no silver was actually detected in the SCV discharge.

Accidental Spills or Leaks of Hazardous Materials

Spills, leaks, or other releases of hazardous materials during operation of the proposed project could also adversely affect surface water quality. As discussed above, a 5-foot-high perimeter berm would surround the portion of the LNG terminal containing the LNG storage tanks and vaporization units. The berm would provide containment in the unlikely event of a tank rupture. Within the bermed area, any equipment that has the potential to leak oil and grease would be isolated from the rest of the site with curbing so any leakage can be contained and cleaned up. In the unlikely event that LNG is spilled into the water from the terminal, the cryogenic liquid would vaporize rapidly upon contact with the warm air and water. Being less dense than water, LNG would float on the surface before vaporizing. Because LNG is not soluble in water and would completely vaporize shortly after being spilled, the LNG could not mix with or contaminate the water.

4.3.2.4 Pipeline Facilities

Existing Surface Water Resources

The proposed pipeline route would impact 94 waterbodies in Oregon and Washington. Of these, 65 are located in Oregon and 28 are located in Washington; the remaining waterbody is the Columbia River, which is located in both states. These waterbodies and their proposed crossing methods are listed in table 4.3.2-6. In addition, levees are located adjacent to several waterbodies in Oregon.

Between MPs 0.0 and 19.4, the proposed pipeline would be located in the State of Oregon. Based on information from the ODEQ, there are currently no state waters listed as ORWs as defined under the anti-degradation statutes of the State of Oregon. Any waters that meet or exceed all the listed beneficial uses for that waterbody are considered High Quality Waters. Thus, any waterbodies along the Oregon portion of the pipeline route that are not listed as impaired waters are High Quality Waters. Also, waterbodies containing federally listed threatened and endangered species or their designated critical habitat can be qualified as sensitive surface waters (see section 4.6.2.3). Along the portion of the proposed pipeline route in Oregon, four waterbodies qualify as sensitive surface waters, including the Westport Slough (MP 5.2), Westport Slough/Midland Canal (MP 10.0), Clatskanie River (MP 13.2), and Columbia River (MP 19.0). NorthernStar would use the HDD construction method at each of these crossings to avoid impacts on waterbody banks and beds. These waterbodies, and the federally listed species occurring in them, are discussed in section 4.6.2.3.

TABLE 4.3.2-6

Waterbodies Impacted by the Bradwood Landing Project

Waterbody	MP	Type/Flow Conditions	Wetted Width (feet)	Soil Stability	Substrate ^a	NMFS/WDNR Classification ^b	Proposed Crossing Method
OREGON - Clatsop County							
Tributary 1 to Driscoll Slough	4.1	Perennial	<10 ^c	High	Silt loam	F	HDD
Driscoll Slough	4.2	Perennial	82 ^c	High	Silt loam	F	HDD
Tributary to Westport Slough	5.0	Intermittent	<10	High	Silt loam	F	HDD
Westport Slough	5.2	Perennial	328	High	Silt loam	F	HDD
- Columbia County							
Whiskey Joe Slough	6.1	Perennial	17	High	Silt loam, protected	N	Dam and Pump
Ludviksen Slough	6.9	Perennial	50	High	Silt loam, protected	N	Dam and Pump or Flume
Unnamed Ditch	7.0	Intermittent	24	High	Silt loam, protected	N	Dam and Pump or Flume
Ditch 1 to Ludviksen Slough	7.2	Intermittent	30	High	Silt loam, protected	N	Dam and Pump or Flume
Ditch 2 to Ludviksen Slough	7.4	Intermittent	17	High	Silt loam, protected	N	Dam and Pump
Ditch 3 to Ludviksen Slough	7.5	Intermittent	18	High	Silt loam, protected	N	Dam and Pump
Ditch 4 to Ludviksen Slough	7.8	Intermittent	19	High	Silt loam, protected	N	Dam and Pump
Ditch 1 to Randa Slough	8.1	Intermittent	17	High	Silt loam, protected	N	Dam and Pump
Ditch 2 to Randa Slough	8.4	Intermittent	11	High	Silt loam, protected	N	Dam and Pump
Ditch 1 to Kelli Slough	8.4	Intermittent	<10 ^c	High	Silt loam, protected	N	HDD or bore
Kelli Slough	8.5	Perennial	66 ^c	High	Silt loam, protected	N	HDD or bore
Ditch 1 to Tributary of Kelli Slough	8.6	Intermittent	<10	High	Silt loam, protected	N	HDD or bore
Ditch 2 to Tributary of Kelli Slough	8.7	Intermittent	12	High	Silt loam, protected	N	Dam and Pump
Ditch 3 to Tributary of Kelli Slough	8.8	Intermittent	10	High	Silt loam, protected	N	Dam and Pump
Tributary 1 to Kelli Slough	8.8	Perennial	28	High	Silt loam, protected	N	Dam and Pump or Bore
Ditch 1 to Tributary of Westport Slough	8.9	Intermittent	15	High	Silt loam, protected	N	Dam and Pump
Ditch 2 to Tributary of Westport Slough	9.0	Intermittent	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 3 to Tributary of Westport Slough	9.1	Perennial	<10	High	Silt loam, protected	N	Dam and Pump
Tributary to Tributary of Westport Slough	9.2	Intermittent	15	High	Silt loam, protected	N	Dam and Pump
Ditch 4 to Tributary of Westport Slough	9.3	Perennial	15	High	Silt loam, protected	N	Dam and Pump
Ditch 6 to Tributary of Westport Slough	9.4	Intermittent	<10 ^c	High	Silt loam, protected	N	Dam and Pump
Ditch 5 to Tributary of Westport Slough	9.5	Perennial	20	High	Silt loam, protected	N	Dam and Pump
Ditch 7 to Tributary of Westport Slough	9.8	Intermittent	<10 ^c	High	Silt loam, protected	N	Dam and Pump
Westport Slough/ Midland Canal	10.0	Perennial	164 ^c	High	Silt loam, protected	F	HDD

TABLE 4.3.2-6 (cont'd)

Waterbodies Impacted by the Bradwood Landing Project

Waterbody	MP	Type/Flow Conditions	Wetted Width (feet)	Soil Stability	Substrate ^a	NMFS/WDNR Classification ^b	Proposed Crossing Method
Ditch 1 to Uncle Tom Slough	10.3	Intermittent	<10	High	Silt loam, protected	N	Dam and Pump
Uncle Tom Slough 1	10.6	Perennial	54	High	Silt loam, protected	N	Bore
Uncle Tom Slough 2	11.2	Perennial	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 4 to Uncle Tom Slough	11.3	Perennial	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 5 to Uncle Tom Slough	11.4	Perennial	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 6 to Uncle Tom Slough	11.5	Perennial	15	High	Silt loam, protected	N	Dam and Pump
Ditch 7 to Uncle Tom Slough	11.6	Perennial	10	High	Silt loam, protected	N	Dam and Pump
Ditch 8 to Uncle Tom Slough	11.7	Perennial	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 9 to Uncle Tom Slough	11.8	Perennial	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 10 to Uncle Tom Slough	11.8	Perennial	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 11 to Uncle Tom Slough	11.9	Intermittent	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 12 to Uncle Tom Slough	11.9	Intermittent	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 13 to Uncle Tom Slough	12.0	Intermittent	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 14 to Uncle Tom Slough	12.2	Intermittent	<10 ^c	High	Silt loam, protected	N	Dam and Pump
Ditch 15 to Uncle Tom Slough	12.3	Intermittent	10	High	Silt loam, protected	N	Dam and Pump
Ditch 16 to Uncle Tom Slough	12.4	Intermittent	11	High	Silt loam, protected	N	Dam and Pump
Ditch 17 to Uncle Tom Slough	12.6	Perennial	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 19 to Uncle Tom Slough	12.7	Intermittent	<10 ^c	High	Silt loam, protected	N	Dam and Pump
Clatskanie River	13.2	Perennial	487	High	Silt loam, protected	F	HDD
Ditch 1 to Beaver Slough	13.4	Intermittent	<10 ^c	High	Silt loam, protected	N	Dam and Pump
Ditch 2 to Beaver Slough	13.7	Intermittent	<10 ^c	High	Silt loam, protected	N	N/A ^d
Ditch 3 to Beaver Slough	13.9	Intermittent	<10 ^c	High	Silt loam, protected	N	Dam and Pump
Ditch 1 to Larson Slough	14.2	Perennial	<10 ^c	High	Silt loam, protected	N	N/A ^d
Larson Slough	15.0	Perennial	22	High	Silt loam, protected	F	Dam and Pump
Ditch 1 to McLean Slough	15.8	Intermittent	<10	High	Silt loam, protected	N	Dam and Pump
Ditch 2 to McLean Slough	16.2	Intermittent	10	High	Silt loam, protected	N	Dam and Pump
Ditch 3 to McLean Slough	16.4	Intermittent	11	High	Silt loam, protected	N	Dam and Pump
McLean Slough 1	16.9	Intermittent	12	High	Silt loam, protected	F	Dam and Pump
Ditch 4 to McLean Slough	16.9	Intermittent	10	High	Silt loam, protected	N	Dam and Pump
Ditch 5 to McLean Slough	17.0	Intermittent	13	High	Silt loam, protected	N	Dam and Pump
Ditch 7 to McLean Slough	17.2	Intermittent	14	High	Silt loam, protected	N	Dam and Pump
Ditch 9 to McLean Slough	17.4	Intermittent	<10	High	Silt loam, protected	N	Dam and Pump

TABLE 4.3.2-6 (cont'd)

Waterbodies Impacted by the Bradwood Landing Project

Waterbody	MP	Type/Flow Conditions	Wetted Width (feet)	Soil Stability	Substrate ^a	NMFS/WDNR Classification ^b	Proposed Crossing Method
McLean Slough 2	17.7	Intermittent	<10 ^c	Low	Silt loam, protected	F	N/A ^d
Ditch 10 to McLean Slough	18.2	Intermittent	<10 ^c	High	Silt loam, protected	N	Dam and Pump
Ditch 11 to McLean Slough	18.3	Intermittent	<10 ^c	High	Silt loam, protected	N	N/A ^d
Columbia River	19.0	Perennial	1,700	High	Sandy soils	F	HDD
WASHINGTON - Cowlitz County							
Columbia River	19.6	Perennial	1,300	Low	Gravelly sandy loam	S	HDD
Tributary 1 to Abernathy Creek	20.2	Perennial	21	High	Gravelly silt loam	N	Dam and Pump or Flume
Tributary to Cameron Creek	20.5	Perennial	17	High	Gravelly silt loam	N	HDD
Cameron Creek	20.6	Perennial	29	High	Gravelly silt loam	S	HDD
Abernathy Creek	21.1	Perennial	35	High	Silt loam	S	HDD
Tributary 2 to Abernathy Creek	21.4	Perennial	14	Low	Silt loam	N	Dam and Pump
Germany Creek	22.4	Perennial	19	Low	Silt loam	S	HDD
Fall Creek	23.2	Perennial	38	High	Silt loam	F	Dam and Pump or Flume
Tributary to Harmony Creek	24.5	Perennial	<10 ^c	High	Silt loam	N	Dam and Pump or Flume
Harmony Creek	24.7	Perennial	17	Moderate	Silt loam	F	Bore
Brock Creek	26.0	Perennial	28	Moderate	Silt loam	F	Dam and Pump or Flume
Tributary 3 to Brock Creek	26.6	Intermittent	<10 ^c	Low	Cobble, sand, silt	N	Dam and Pump
Tributary 2 to Brock Creek	26.7	Intermittent	3	Low	Sand, silt	N	Dam and Pump
Tributary 5 to Coal Creek	27.5	Perennial	10	High	Silt loam	N ^e	Bore
Tributary 1 to Coal Creek	27.7	Intermittent	<10 ^c	Low	Silt loam	F	N/A ^d
Coal Creek	28.0	Perennial	34	High	Silt loam	S	HDD
Tributary 1 to Clark Creek	30.3	Intermittent	<10 ^c	Low	Silt loam	F	Dam and Pump
Clark Creek	30.4	Perennial	22	Moderate	Silt loam	F	Dam and Pump or Flume
Tributary 2 to Clark Creek	30.7	Intermittent	15	High	Silt loam	U	Dam and Pump
Tributary 7 to Leckler Creek	31.5	Intermittent	<10 ^c	High	Silt loam	N	Dam and Pump
Tributary 6 to Leckler Creek	31.7	Intermittent	<10 ^c	High	Silt loam	N	Dam and Pump
Tributary 2 to Leckler Creek	32.4	Intermittent	<10 ^c	High	Silt loam	N	Dam and Pump

TABLE 4.3.2-6 (cont'd)

Waterbodies Impacted by the Bradwood Landing Project

Waterbody	MP	Type/Flow Conditions	Wetted Width (feet)	Soil Stability	Substrate ^a	NMFS/WDNR Classification ^b	Proposed Crossing Method
Tributary 3 to Leckler Creek	33.1	Intermittent	<10 ^c	Moderate	Silt loam	N	Dam and Pump
Tributary 4 to Leckler Creek	33.4	Intermittent	<10 ^c	Low	Silt loam	N	Dam and Pump
Tributary 5 to Leckler Creek	33.7	Intermittent	<10 ^c	Low	Silt loam	N	Dam and Pump
Cowlitz River	34.3	Perennial	429	High	Sand, silt	S	HDD
Tributary 1 to Ostrander Creek	35.0	Intermittent	10	Low	Loamy sand	N	HDD
Tributary 2 to Ostrander Creek	35.2	Intermittent	<10 ^c	High	Silt loam	N	HDD
Ostrander Creek	36.2	Perennial	28	High	Silt loam	S	Bore

^a Protected substrates describe areas that have been protected from flooding, often referring to agricultural areas.

^b NMFS, Northwest Fisheries Science Center, 2005

F Fishbearing.

N Nonfish-bearing streams, may be perennial or intermittent.

WDNR, 2006

S Shoreline, fish-bearing streams.

F Waters that have a high fish, wildlife, or human use, and are not classified as Type S.

N Nonfish-bearing streams, may be perennial or intermittent.

U Undetermined.

^c Approximate width.

^d Not crossed by proposed centerline. No crossing method proposed.

^e Tributary 5 to Coal Creek is designated as a nonfish-bearing stream by the WDNR; however, this waterbody is known to contain coho salmon.

Between MPs 19.4 and 36.3, the proposed pipeline would be located in Cowlitz County, Washington. No ORWs are currently listed in Cowlitz County. Waterbodies that contain threatened and endangered species or their designated critical habitat can also be qualified as sensitive surface waters. Nine sensitive surface waters occur along the portion of the proposed route in Washington, including: Columbia River (MP 19.6), Cameron Creek (MP 20.6), Abernathy Creek (MP 21.1), Germany Creek (MP 22.4), Tributary 5 to Coal Creek (MP 27.5), Coal Creek (MP 28.0), Cowlitz River (MP 34.3), Tributary 1 to Ostrander Creek (MP 35.0), and Ostrander Creek (MP 36.2). As is the case in sensitive waterbodies in Oregon, NorthernStar would use the HDD or bore method to cross each of these sensitive surface waters. These waterbodies and the federally listed species known to occur in them are further discussed in section 4.6.2.3.

Source Water Assessment reports and maps from the ODEQ show that there are five drinking water protection areas (DWPA) in the general vicinity of the Oregon portion of the pipeline route. The Westport Water Association, the City of Clatskanie, and the Midland Water Association DWPAs are all upstream from the pipeline route and would not be affected by the project construction or operation. However, the proposed pipeline route would cross the Wauna Mill and PGE Beaver Power Plant DWPAs.

Wauna Mill has a water intake on the Columbia River. This water supply serves the mill and about 750 citizens with public water. The intake on the Columbia River is within 3 miles of the proposed pipeline route but more than 10 miles downstream of the proposed crossing of the Columbia River. The DWPA for this water intake stretches along the Columbia River east from Wauna to Port Westward. The pipeline route would also cross Driscoll and Westport Sloughs, whose confluences with the Columbia River are each less than 3 miles upstream from the Wauna Mill intake. Because NorthernStar plans to cross these waterbodies using the HDD method, construction of the proposed pipeline would not be expected to affect this DWPA.

The Beaver Power Plant also has a water intake on the Columbia River. The proposed pipeline route would cross the Columbia River just downstream of the intake structure, but the proposed right-of-way would pass through a small portion of the Beaver Power Plant DWPA along the Columbia River. The construction and operation of the pipeline should not affect the DWPA.

Impacts and Mitigation

Activities associated with the proposed pipeline route that could affect surface water resources include waterbody crossings, water appropriation and discharge associated with hydrostatic testing, stormwater runoff, accidental spills or leaks of hazardous materials, and operation and maintenance of the pipeline. These activities and their potential impacts on surface waters are discussed below.

Waterbody and Levee Crossings

To minimize impacts on surface waters, NorthernStar would adhere to the protective measures specified in its *Waterbody and Wetland Construction and Mitigation Procedures Plan*, pipeline ESC Plan for construction in Oregon and SWPPP for construction in Washington, and our Procedures. The method used for installing the pipeline across waterbodies is determined, at least in part, by the size of the waterbody (i.e., minor, intermediate, or major) and on the condition of each waterbody at the time of crossing. Minor waterbodies include all waterbodies with a width less than or equal to 10 feet at the water's edge at the time of crossing, intermediate waterbodies include all waterbodies with a width greater than 10 feet but less than or equal to 100 feet at the water's edge at the time of crossing, and major waterbodies include all waterbodies with a width greater than 100 feet at the water's edge at the time of crossing.

Several waterbody crossings would also include levees that are located adjacent to the waterbody. Levees are owned and managed by local levee districts that are recognized by the state. If construction activities occur within the levee district's easement, the district will review the construction plans and send them to the COE for a structural integrity review. The COE has technical guidance in place regarding the construction of pipelines under levees that would be taken into account in its structural integrity permit. NorthernStar would complete construction of its pipeline across levees in accordance with the local levee district's construction easement and the COE's technical guidance.

All waterbody crossings that involve open trenching would occur during established in-water work windows. HDD or conventional bores may be performed outside of the in-water work times as they do not involve construction below the OHWM or MHHW.

In general, NorthernStar intends to segregate and store topsoil separately during pipeline construction, except in saturated wetlands. However, topsoil segregation takes up more construction right-of-way and, near a waterbody, it may require clearing more riparian vegetation or driving back and forth in a riparian area. To avoid these additional adverse impacts, NorthernStar may not segregate topsoil within 50 feet of waterbody crossings, depending on the vegetation and land use present.

NorthernStar proposes to install the pipeline across up to 18 waterbodies using the HDD method (see table 4.3.2-3). As shown on figure 2.4.2-4, the HDD method eliminates the need to excavate a trench through the stream or river channel, and would minimize or eliminate the impacts associated with sedimentation and turbidity from the standard wet open-cut methods of pipeline construction. NorthernStar has agreed to follow our Procedures, which require submittal of a plan prior to construction containing site-specific construction diagrams showing the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction. In addition, the Procedures require a contingency plan for an alternative crossing method at each HDD location in the event that the HDD method is unsuccessful. Such alternative methods may require permits and approvals, which would be needed in advance to avoid significant construction delays. NorthernStar has indicated in its *HDD Contingency Plan* that it would have approved alternative crossing methods for implementation in the event of HDD borehole failure.¹⁰

A loss of drilling mud to the waterbody during the HDD procedure (referred to as a "frac-out") would introduce sediment into the waterbody. Frac-outs occur when the path of least resistance for the drilling mud is to the surface, rather than back along the borehole to the entry or exit pits. This may happen if a fault or fracture zone is encountered, or if the driller fails to keep the borehole clear of cuttings. Drilling mud, which is composed of approximately 5 percent bentonite clay and 95 percent water, may frac-out to the ground surface or into the waterbody being crossed. The highest potential for a frac-out typically occurs at the beginning or the end of the HDD where the separation between the borehole and ground surface is the least. NorthernStar's *HDD Contingency Plan* provides procedures and measures to be taken during an inadvertent release of drilling mud. NorthernStar would station the necessary equipment and supplies to respond to a release of drilling mud upon discovery of loss of drilling fluid. At the time of a release of drilling mud, NorthernStar would stop drilling immediately, contain drilling fluids, and notify appropriate agencies. Appropriate resource experts, such as fisheries biologists and wetland scientists would be on site to monitor resources and effects of the release.

In its December 19, 2007 letter providing comments on the draft EIS, the EPA recommended that the *HDD Contingency Plan* include mitigation measures for frac-outs to water, marsh, and uplands.

¹⁰ NorthernStar included its revised *HDD Contingency Plan* (Frac-out Plan) as Attachment B of its *Waterbody and Wetland Construction and Mitigation Procedures Plan*. NorthernStar filed this plan with the FERC on December 21, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

Although NorthernStar's *HDD Contingency Plan* provides mitigation measures for frac-outs to waterbodies and wetlands, mitigation measures for frac-outs to uplands are not addressed. To assure that adequate protection is provided to uplands in the event of a frac-out, **we recommend that:**

- **NorthernStar should revise its *HDD Contingency Plan* to include mitigation measures for frac-outs to uplands. Prior to pipeline construction, the revised *HDD Contingency Plan* should be filed with the Secretary for the review and written approval of the Director of OEP.**

Geotechnical investigations were conducted at 13 proposed HDD waterbody crossing locations (URS, 2006b). The results indicated that the assessed HDD alignments were generally feasible from a geologic standpoint and presented little risk of frac-out. URS recommended additional investigation after project approval to refine the subsurface conditions beneath difficult geometries and/or sensitive watersheds prior to final HDD design. Also see our recommendation in section 4.1.4.3 regarding additional site-specific geotechnical studies that would be required.

NorthernStar is also proposing to use the conventional bore method for up to eight waterbody crossings (see table 4.3.2-3). The bore method is similar to the HDD method in that the pipeline is installed beneath a waterbody without disturbing the bed and bank of the waterbody. Boring requires the excavation of pits on each side of the feature. Potential impacts on water quality resulting from boring operations would be due to the relatively large work areas and continuous pumping in order to manage groundwater during pipeline installation. NorthernStar would implement the FERC staff's Procedures in order to minimize impacts on water quality. In addition, trench boxes or sheet piling may be used to support the pit walls and to help cut off groundwater inflows. Dewatering systems using deep wells or well points are frequently employed. The specific type of bore (e.g., jack and bore, slick bore, hammer bore) that would be utilized in a given area depends on the construction site characteristics, the type of soils present, and the contractor's familiarity with available methods.

In addition to using the HDD or bore methods for crossing waterbodies, NorthernStar also would use an open-cut technique for waterbody crossings. Clearing and grading of streambanks, in-stream trenching, backfilling, and trench dewatering could affect surface water quality through increased sedimentation, increased turbidity, decreased dissolved oxygen concentrations, and stream warming. Open-cut crossings would use a standard dry-trench method including either the dam and pump or flume method. As described in section 2.4.2.2, the dam and pump method is a dry-crossing technique that uses pumps to isolate water from the construction work area, thereby avoiding in-stream activities (see figure 2.4.2-3). The flume method is similar to the dam and pump method except that dams and flumes are used instead of pumps to move water across the construction work area (see figure 2.4.2-2). Use of these waterbody crossing methods in flowing streams would reduce exposure of waterbodies to erosion and sedimentation, and thus reduce the overall impact on the waterbody.

The impacts of the open-cut construction method on the minor intermittent and perennial streams along the pipeline routes would generally be localized and short term. Clearing, grading, and trenching within and adjacent to these streams would have the greatest effect on water quality. Clearing of trees, vegetation, and large woody debris (LWD) in and around streams could lead to an increase in water temperature. Sediments would be resuspended by in-stream construction activities or by erosion of cleared stream banks and riparian areas. Turbidity resulting from the resuspended sediments could reduce light penetration and the corresponding photosynthetic oxygen production. Resuspension of deposited organic material and inorganic sediments could cause an increase in consumption of biological and chemical oxygen, decreasing available dissolved oxygen. To minimize impacts on surface waters, NorthernStar would implement its *Waterbody and Wetland Construction and Mitigation Procedures Plan*, pipeline ESC Plan for Oregon and SWPPP for Washington, and our Procedures. The stream bed

substrate would be conserved at each crossing and restored. If additional material is needed, matching material would be used. Most in-stream work within minor waterbodies would be completed within 24 hours, and stabilization and restoration of the stream banks would begin within 24 hours of construction, or before returning flow to the waterbody for dry crossings. However, due to the importance of numerous waterbodies along the proposed route for federally listed species, **we recommend that:**

- **NorthernStar should continue to consult with the COE, NMFS, FWS, and other appropriate federal and state agencies to finalize its *Waterbody and Wetland Construction and Mitigation Procedures Plan*. The final plan should include the following:**
 - a. **a description of the specific methods of in-water habitat mitigation to be conducted;**
 - b. **measures to prevent the spread of invasive species due to construction activities within waterbodies and wetlands; and**
 - c. **procedures for monitoring the success of the revegetation and weed control efforts.**

The plan, including agency comments on the plan, should be filed with the Secretary for review and written approval by the Director of OEP prior to pipeline construction.

With the implementation of the proposed measures, impacts on water quality would be temporary and would be expected to return to preconstruction levels soon after the stream crossing is completed.

The seven waterbodies impacted in Cowlitz County designated as shorelines of the state would be crossed using either the HDD or bore method. As previously discussed, utilities including gas pipelines are permitted within the Conservancy, Urban, and Rural Districts (Cowlitz County, 1977); however, typically the county places the following restrictions on utilities in these districts:

- All utility systems shall be underground unless such undergrounding would not be feasible;
- Where utility systems occupy shoreline areas, clearing necessary for installation or maintenance shall be kept to the minimum width necessary to prevent interference by trees and other vegetation with the proposed transmission facilities; and
- Upon completion of installation of such utility systems or of any maintenance project that disrupts the environment, the disturbed area shall be regraded to compatibility with the natural terrain and replanted to prevent erosion and provide an attractive, harmonious vegetation cover.

NorthernStar's proposed pipeline facilities within shoreline areas in Cowlitz County would be located underground. At some waterbodies, use of the HDD or bore method (with bore pads set back from the OHWM and associated wetlands by at least 200 feet) would minimize vegetation clearing (see section 4.4.2.3). To reduce impacts on vegetation within the construction and permanent rights-of-way and improve revegetation potential for open-cut waterbody crossings, NorthernStar would implement its SWPPP and *Waterbody and Wetland Construction and Mitigation Procedures Plan* in Washington. Following construction, all work areas would be restored, seeded with conservation grasses (a mixture of grasses, legumes, and forbs), native plant species, or other standard erosion control/cover species, where

required, and allowed to naturally revegetate to preconstruction conditions. Additional information on operation and maintenance of the pipeline is provided below. For these reasons, it appears that the proposed pipeline segment through Cowlitz County would be consistent with the substantial development and conditional use provisions of the SMP.

Water Appropriation and Discharge Associated with Hydrostatic Testing

Following backfilling of the trench, the pipeline would be hydrostatically tested to ensure it is capable of safely operating at the design pressures. As indicated in table 4.3.1-1, approximately 9 million gallons of water would be required for hydrostatic testing of the proposed pipeline. In order to account for any water losses and make-up water, NorthernStar obtained a Limited Use License from the ODWR for approximately 9.5 million gallons of water. The water would be supplied via temporary piping connections or transported by tanker truck. Water temperature in the Columbia River would not be impacted from this diversion of water.

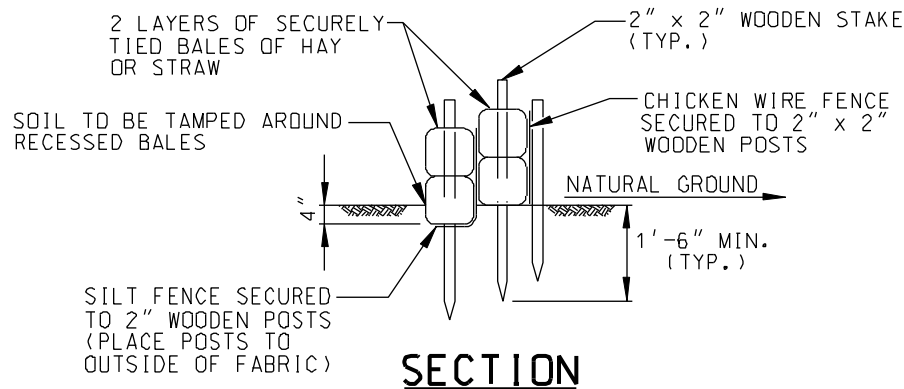
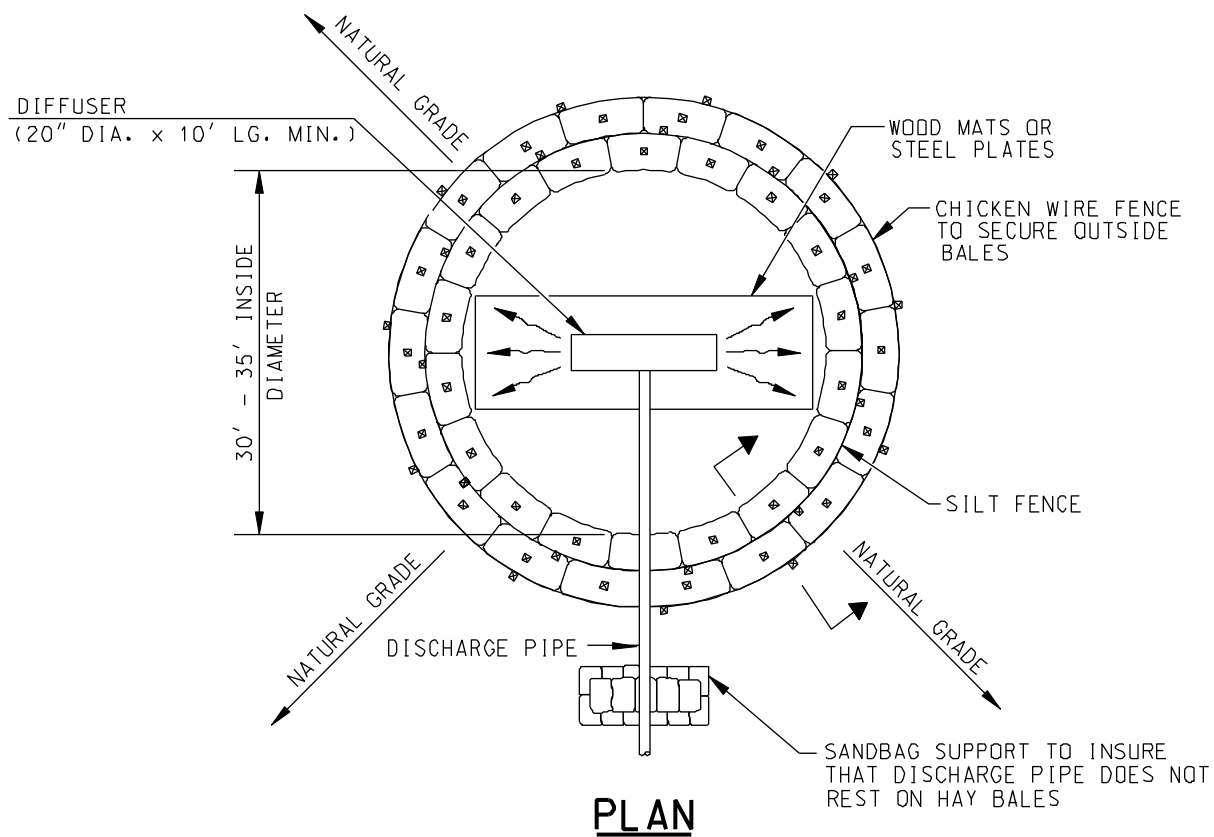
Water for project use would be acquired from the Columbia River at the location where the pipeline construction right-of-way meets the river on the Oregon side of the project. The method of diversion would be a single diesel-fired pump via an 8-inch-diameter intake hose equipped with a fish screen that complies with the NMFS screen design requirements. The maximum rate at which water would be diverted from the Columbia River for hydrostatic testing of the pipeline is 2,000 gpm.

NorthernStar anticipates that the completed pipeline would be tested in multiple segments, reusing the test water, including separate tests for each HDD pull section before and after being pulled into the borehole. Following each HDD hydrostatic test, the water would be collected and reused as water for the drilling mud or subsequent HDD hydrostatic test sites. Make-up water would be trucked from the Columbia River. At the completion of the last HDD testing cycle, which would probably be the Columbia River HDD, the final test water would be discharged to the ground at an upland site. Discharge rates may be up to 1,000 gpm and would be through a straw bale enclosure designed to reduce the discharge velocity in order to prevent erosion, and to filter the water to reduce turbidity. The discharge would have no direct overland contact with any waterbody. The water would be discharged at an upland location near the point of diversion to ensure a cross-watershed disposal would not occur. A general design for the straw bale enclosure is shown on figure 4.3.2-1. This design would be modified as appropriate to fit conditions specific to the discharge site.

Testing would not be required for the pipeline hydrostatic test water discharge as no contaminants (e.g., oil, grease, solvents,) are used in the construction procedures for the pipeline. The only addition to the water would be dirt and some scale from the pipe, which would be filtered out of the discharged water by the straw bale enclosure.

Stormwater Runoff

Stormwater runoff during construction of the proposed pipeline could affect surface water quality in the vicinity of the project. To minimize these potential effects, NorthernStar has developed a *Waterbody and Wetland Construction and Mitigation Procedures Plan*, a pipeline ESC Plan for Oregon, and SWPPP for Washington.



NOTE:
STAKES SECURING SILT FENCE BETWEEN
HAY BALES ARE NOT SHOWN FOR CLARITY

NOTES:

1. STRUCTURE SHALL BE PLACED ON A LEVEL WELL VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM STRUCTURE AND ANY WORK AREAS.
2. FLOW RATES THROUGH DISCHARGE AND DIFFUSER PIPE SHALL BE SUCH THAT STRUCTURE WILL NOT OVERFLOW.
3. A 30' x 30' RECTANGULAR STRUCTURE MAY BE SUBSTITUTED FOR THE CIRCULAR CONFIGURATION SHOWN.
4. DIMENSIONS SHOWN ARE THE MINIMUM ACCEPTABLE AND MAY BE VARIED DEPENDING UPON SPECIFIC LOCATION.

Figure 4.3.2-1
Bradwood Landing Project
Straw Bale Enclosure General Design

Accidental Spills or Leaks of Hazardous Materials

Surface water quality could also be adversely affected by a spill, leak, or other releases of hazardous materials during construction activities. NorthernStar would minimize potential impacts associated with spills or leaks of hazardous materials during construction by implementing spill avoidance and response procedures included in its pipeline ESC Plan, SWPPP, and *Waterbody and Wetland Construction and Mitigation Procedures Plan*.

Operation and Maintenance of the Pipeline

The proposed pipeline would be operated and continuously monitored by a remote control center to be located at the LNG terminal. Operational activities with the potential to impact water quality would be limited to maintenance of the permanent right-of-way and repair of the pipeline. To minimize impacts on water quality and riparian vegetation, NorthernStar would allow a riparian buffer at least 25 feet wide, as measured from the waterbody's MHW mark, to permanently revegetate with native plant species across the entire right-of-way after construction is completed. However, trees greater than 15 feet tall, or deep-rooted shrubs that could damage the pipeline's protective coating, obscure periodic surveillance, or interfere with potential repairs, would not be allowed to grow within 15 feet of the pipeline. The frequency of the vegetation maintenance would depend upon the vegetation growth rate. This ongoing maintenance may have a discountable effect on stream temperature where large trees are not allowed to establish, and may reduce localized cover.

Periodic inspections by pipeline personnel may identify soil erosion that may expose the pipe, stressed vegetation that may indicate a leak in the line, or other conditions that require preventive maintenance or repairs. Impacts on water quality due to pipeline maintenance would be similar to those described above for waterbody crossings and would be subject to additional state and federal permitting.

4.4 WETLANDS AND TERRESTRIAL VEGETATION

4.4.1 Wetlands

Wetlands are defined by the COE and the EPA as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of wetland vegetation typically adapted for life in saturated soil conditions (Environmental Laboratory, 1987). Wetlands can be a source of substantial biodiversity and serve a variety of functions that include providing wildlife habitat, recreational opportunities, and flood control, as well as naturally improving water quality.

Wetlands in the project area are regulated at the federal, state, and local levels. On the federal level, the COE has authority under section 404 of the CWA to review and issue permits for activities that would result in the discharge of dredged or fill material into waters of the United States, including wetlands. Wetlands are also regulated at the state level by the ODSL and WDE, and at the local level by counties and some cities. For example, wetlands are considered critical areas and included in the Critical Areas Ordinance of Cowlitz County. Section 404 of the CWA requires that proposed dredge and fill activities be issued section 401 Water Quality Certification by the designated state agency, in this case the ODSL or WDE. The WDE also has authority to regulate wetlands under two state laws, the State Water Pollution Control Act and the Shoreline Management Act. The ODSL has authority to regulate wetlands under the Oregon Removal-Fill Law.

Wetlands within the project area were classified according to the Cowardin et al. (1979) system which classifies wetlands based on specific shared characteristics. Cowardin defines five systems: 1) the marine system includes open ocean and its associated high energy coastline; 2) the estuarine system includes semi-enclosed salt and brackish marshes, non-vegetated tidal shores, and brackish waters of coastal rivers and embayments; 3) the riverine system includes freshwater rivers and streams with flowing water; 4) the lacustrine system includes large open water fresh lakes and ponds; and 5) the palustrine system includes freshwater marshes, bogs, swamps, and shallow ponds. In the Cowardin system, wetlands are further defined by cover type. Emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes. Emergent wetlands are often associated with waterbodies, such as lakes or rivers, and are characterized by intermittent and seasonal inundation. Scrub-shrub wetlands are dominated by woody vegetation, including shrubs and small trees generally less than 20 feet tall. Forested wetlands are dominated by woody vegetation that is at least 20 feet tall. Unconsolidated shores and bottoms are characterized by areas with less than 30 percent vegetative cover and at least 25 percent cover of particles smaller than stones.

4.4.1.1 Waterway for LNG Marine Traffic

Wetlands located along the waterway to the LNG terminal are shown on the maps included in Appendix C and wetlands within the Zones of Concern are shown on figure 4.4.1-1. Major aquatic habitat types in the upper estuary section of the Columbia River include estuarine tidal scrub-shrub and emergent wetlands, shallow water/flats, medium depth water, and deep water (LCFRB, 2004). Tidal scrub-shrub and emergent wetlands in this portion of the river typically occur between MHW and the line of non-aquatic vegetation. Tidal scrub-shrub consists of dense forest and shrub thickets, while emergent wetlands are most often found on floodplain margins and in backwater sloughs. Shallow water/flats are defined as being between elevations slightly above the MLLW to 6 feet below MLLW (LCFRB, 2004). Shallow water/flats often contain emergent vegetation where water levels are shallow and submerged aquatic vegetation such as Canadian waterweed (*Elodea canadensis*) in areas of deeper water. Medium depth water is between 6 and 18 feet below MLLW, while deep water is defined as 18 feet and deeper. Emergent vegetation is absent in medium and deep open water areas, with the river bottom providing rocky, sandy, or occasionally submerged aquatic vegetative habitats.

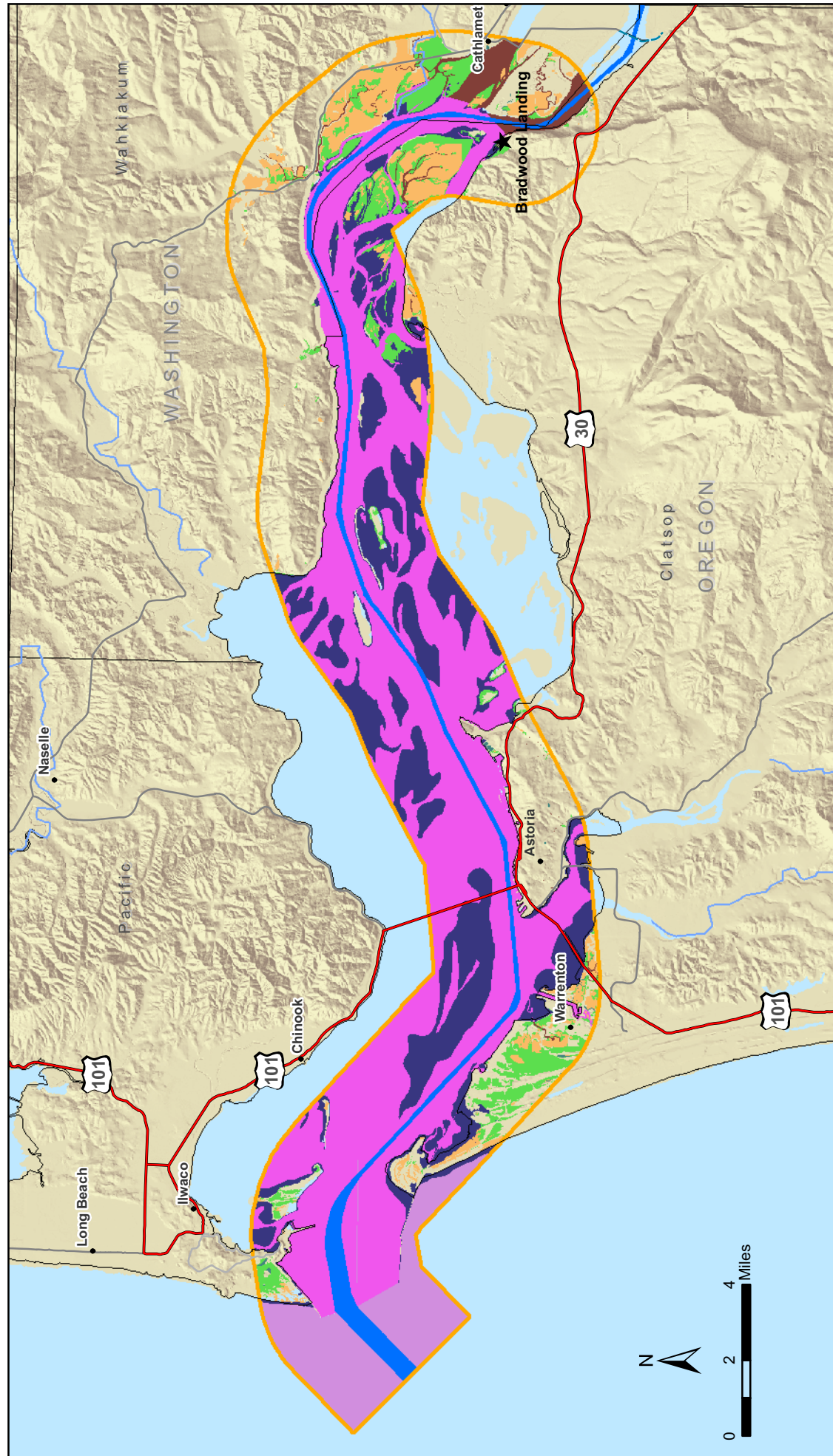


Figure 4.4.1-1
Bradwood Landing Project
 Wetland Areas in Zones of Concern

Data Source:
 Wetlands: U.S. Fish & Wildlife Service, National Wetlands
 Inventory/Date: Ranges from Oct. 1981 to present;

Estuarine scrub-shrub, estuarine emergent, palustrine scrub-shrub, and palustrine emergent wetlands are present along the waterway. Estuarine scrub-shrub wetlands are characterized by wetland-associated shrubs, including red-osier dogwood (*Cornus stolonifera*), Sitka willow (*Salix sitchensis*), and rose spiraea (*Spiraea douglasii*). Estuarine emergent wetlands are characterized by mudflats and shallow water areas that support emergent vegetation. Dominant vegetation includes Canadian waterweed and non-natives reed canary-grass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus discolor*). Palustrine scrub-shrub wetlands are primarily comprised of red-osier dogwood and Sitka willow. Palustrine emergent wetlands are of relatively low quality, with dominant vegetation consisting of reed canary-grass and other nonnative weedy species.

The wetlands located nearer to the navigation channel have some potential to be affected by vessel transit, although not measurably above baseline conditions due to the altered nature of much of the shoreline. That is, the depth of the navigation channel prevents wetland formation immediately adjacent to it and much of the steeper shoreline areas are armored, diked, or otherwise hardened. Furthermore, because of the sheer size of the Columbia estuary area (i.e., the width of the channel in the lower river), wave energy dissipates more before reaching shoreline areas. The wetlands are created and maintained by dynamic riverine and geomorphic processes and are more influenced by changes in river flow affecting water levels and adjacent land use practices than they are by industrial river traffic. Many, if not most, of the wetlands are located adjacent to very shallow water side channels and sloughs and around islands in the estuary, such that any vessel with steering problems would run aground of these shallows and sand shoals long before encountering fringe wetlands. There are a few exceptions where the deeper navigation channel is closer to upland areas with wetlands inside well-maintained dike and levy systems, but again the wetlands are protected by the dikes and isolated to some extent from the river. However, limited impacts on wetland habitats attributed to shoreline erosion may occur as a result of the proposed project. As described in section 4.1.2.3, FERC staff continues to study this issue and additional analysis regarding shoreline erosion will be included in the revised BA and EFH Assessment. If applicable, mitigation for impacts on wetlands along the waterway would be included in NorthernStar's final Compensatory Mitigation Plan. Because NorthernStar's Compensatory Mitigation Plan has not been finalized, we recommended in section 2.1.5 that NorthernStar continue to consult with the COE, NMFS, FWS, ODFW, ODSL, WDE, and other appropriate agencies to finalize its Compensatory Mitigation Plan.

During transit to the LNG terminal, the potential exists for an accidental or intentional breach of an LNG carrier resulting in a release of LNG. However, LNG is less dense than freshwater or saltwater so it would float on the surface. Immediately upon contact with any warmer substance such as water or air, it would begin to evaporate. Because LNG is not soluble in water and the LNG would completely vaporize shortly after being spilled, there would be no liquid left that could mix with and/or contaminate the water or sediments. As the LNG vaporizes, a vapor cloud may form that is initially heavier than air and may be dispersed by wind. An LNG vapor cloud cannot explode in the open atmosphere, but can burn. If the LNG vapor cloud were to burn, wetland vegetation along the Columbia River could be damaged. However, the area of effect of an LNG release and any resulting fire would be fairly limited and short-lived, unless conditions were such that a forest fire was triggered (see section 4.4.2.1). Affected areas would likely revegetate naturally except in the immediate vicinity of the breach. With implementation of the mitigation measures described in the Coast Guard's WSR (Appendix G), a release would be highly unlikely, and therefore, the potential impacts on wetlands would be less than significant.

4.4.1.2 LNG Terminal

Wetlands within the proposed LNG terminal area were delineated in accordance with the 1987 COE Wetland Delineation Manual (Environmental Laboratory, 1987) and Oregon State Wetland Delineation Report Guidance (ODSL, 2000). Wetland delineations were conducted at the proposed terminal site by the Columbia River Estuary Study Taskforce (CREST) in July, 2003. Wetland

boundaries delineated by the CREST were subsequently approved by the ODSL in July 2005. Additional field surveys were conducted by Rhea Environmental Consulting, LLC (Rhea) and URS in 2005 to include expanded areas outside the original survey area. In September 2006, all wetlands previously delineated by the CREST within the study area were verified and, in many cases, expanded by URS. The 2006 URS delineation reclassified the estuarine wetlands at the LNG terminal site as palustrine. An explanation was not provided for the change.

Common wetland vegetation identified during the field surveys of the proposed LNG terminal site is presented in table 4.4.1-1.

TABLE 4.4.1-1			
Common Wetland Species Identified in Delineations Within the Bradwood Landing LNG Terminal Site			
Common Name	Scientific Name	Common Name	Scientific Name
Red alder	<i>Alnus rubra</i>	Reed canary-grass	<i>Phalaris arundinacea</i>
Slough sedge	<i>Carex obnupta</i>	Creeping buttercup	<i>Ranunculus repens</i>
Giant horsetail	<i>Equisetum arvense</i>	Himalayan blackberry	<i>Rubus discolor</i>
Common velvetgrass	<i>Holcus lanatus</i>	Sitka willow	<i>Salix sitchensis</i>
Paleyellow iris	<i>Iris Pseudacorus</i>	Small-fruited bulrush	<i>Scirpus microcarpus</i>
Common rush	<i>Juncus effuses</i>	Rose spiraea	<i>Spiraea douglasii</i>
Purple loosestrife	<i>Lythrum salicaria</i>	Skunk cabbage	<i>Symplocarpus foetidus</i>
Water parsely	<i>Oenanthe sarmentosa</i>	Cattail	<i>Typha latifolia</i>

Impacts and Mitigation

A total of 13 wetlands were identified within the proposed LNG terminal site, including forested, scrub-shrub, and emergent wetlands as well as unconsolidated shores and bottoms. In addition, 3,000 feet of unconsolidated shore along the Columbia River would also be affected by the proposed project. Construction of the LNG terminal facilities would result in temporary impacts on 14.8 acres of wetlands. Permanent wetland impacts at the LNG terminal would include: 2.7 acres of scrub-shrub wetlands, 5.7 acres of emergent wetlands, and 4.5 acres of area that includes multiple wetland types. The majority of these wetlands have been previously disturbed by industrial activities, including the installation of a railroad, site grading, excavation, and road construction.

Since the issuance of the draft EIS, NorthernStar has proposed modifications to Bradwood and Clifton Roads and has stated that a parking lot would be provided for construction workers southeast of the Taylorville interchange at Highway 30. NorthernStar has not submitted information to the FERC regarding vegetation or other resource impacts at these locations. Therefore we recommended in section 4.2.2.1 that NorthernStar quantify and file impacts on wetlands associated with the modifications to Bradwood and Clifton Roads as well as the new proposed construction worker parking lot prior to construction.

Table 4.4.1-2 summarizes the potential impacts on wetlands associated with the construction and operation of the proposed LNG terminal. Figure 4.4.1-2 depicts the wetlands delineated within the proposed LNG terminal site.

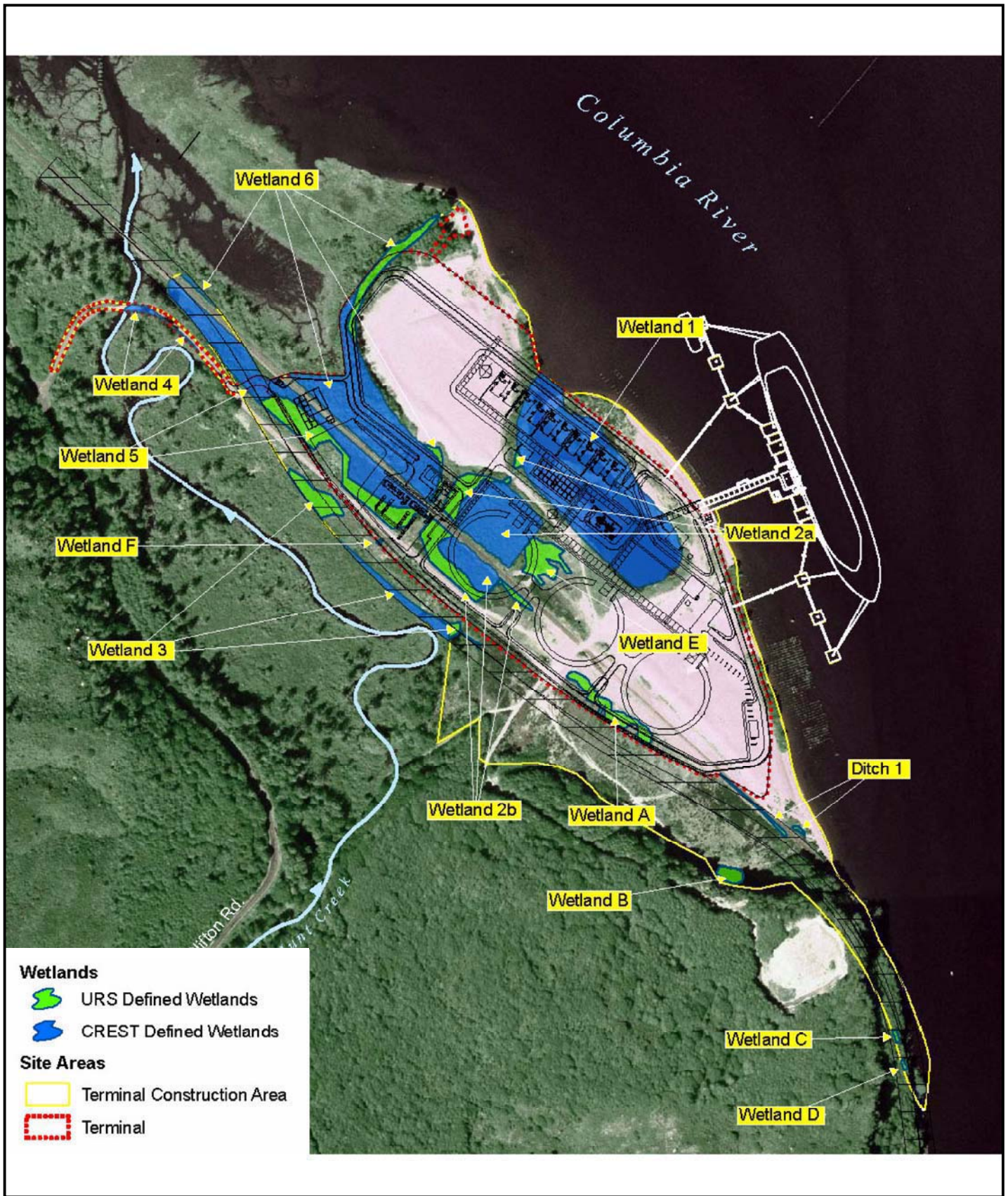


Figure 4.4.1-2
Bradwood Landing Project
 Wetlands Delineated within the LNG Terminal Site

0 300 600
 Feet



TABLE 4.4.1-2			
Wetlands Affected by the Bradwood Landing LNG Terminal			
Wetland ID	Wetland Classification ^a	Temporary Construction Impact (acres) ^b	Permanent Operational Impact (acres) ^c
Wetland A	PEM	0.3	0.3
Wetland B	PSS	0.1	0.0
Wetland C	PFO	0.0	0.0
Wetland D	PFO/PEM	0.0	0.0
Wetland E	PEM	0.4	0.4
Wetland F	PEM	0.0	0.0
Wetland 1	PEM	5.0	5.0
Wetland 2a	PSS	1.6	1.6
Wetland 2b	PSS	1.0	1.0
Wetland 3	PSS	0.6	0.0
Wetland 4	PSS	0.1	0.1
Wetland 5	PSS/PEM	2.8	1.9
Wetland 6	PFO/PEM	2.8	2.6
TOTAL ^d		14.8	12.9
^a Cowardin Classification System: PEM = Palustrine emergent PSS = Palustrine scrub-shrub PFO = Palustrine forested wetland ^b Construction impacts include temporary disturbances related to construction of the LNG terminal and associated facilities. ^c Operational impacts include the permanent loss of wetlands within the footprint of the facility. ^d Sum of addends may not equal total due to rounding.			

Nonjurisdictional facilities associated with the proposed LNG terminal include a 1.5-mile-long power line and three lateral pipelines. As discussed in section 2.2.2, the lateral pipelines would be constructed by entities other than NorthernStar and are tentative at this time. The power line would require a 100-foot-wide right-of-way for construction and operation. A 400-foot-wide corridor centered over the proposed route was examined to allow for some flexibility in the final routing of the power line. Approximately 2.2 acres of wetlands were identified within the 400-foot-wide corridor, including 1.7 acres of forested wetlands, 0.3 acre of scrub-shrub wetlands, and 0.2 acre of emergent wetlands. Table 4.4.1-3 lists the wetlands identified within the 400-foot-wide corridor.

The impacts of project-related construction and operation activities on wetlands would vary depending on the timing of construction, construction techniques used, the sensitivity of the resources disturbed, and the length of time required for wetlands to be restored. Soil disturbance and removal of wetland vegetation within the project area could temporarily affect the capacity of wetlands to buffer flood flows and could increase the potential for erosion. Removal of wetland vegetation could also deprive wildlife of a valuable habitat component and encourage the recruitment of less desirable invasive species. Rutting of soils from construction equipment could result in soil mixing and a disruption of surface water flow, which could also affect the success of post-construction restoration. Uncontrolled surface runoff from adjacent disturbed upland areas could transfer sediment into off-site wetlands. Accidental spills and leaks from construction equipment could also result in wetland contamination and some loss of wetland values/functions as wildlife habitat could be diminished during construction.

The majority of impacts related to the operation of the LNG terminal would be permanent and result in the conversion of wetlands to commercial/industrial uses. NorthernStar would mitigate construction-related impacts by implementing its terminal ESC Plan and our Procedures, and by complying with the COE's section 404 and ODSL's section 401 permit conditions.

TABLE 4.4.1-3		
Wetlands Within the 400-foot-wide Study Area Associated with the Power Line		
Wetland ID	Wetland Classification ^a	Acres within the Study Area ^b
Wetland C	PFO	0.9
Wetland D	PEM	<0.1
Wetland E	PSS	0.1
Wetland F	PEM	<0.1
Wetland G	PEM	0.1
Wetland H	PSS	<0.1
Wetland I	PFO	0.1
Wetland J	PFO	<0.1
Wetland K	PSS	<0.1
Wetland L	PSS	<0.1
Wetland M	PEM	<0.1
Wetland N	PSS	<0.1
Wetland O	PFO	<0.1
Wetland P	PFO	0.1
Wetland Q	PFO	0.1
Wetland R	PFO	0.2
Wetland S	PFO	0.1
Wetland T	PFO	<0.1
Wetland U	PFO	<0.1
Wetland V	PFO	<0.1
Wetland W	PFO	<0.1
Wetland X	PSS	<0.1
Wetland Y	PSS	0.1
Wetland Z	PSS	0.1
Wetland AZ	PFO	0.1
Wetland BZ	PEM	<0.1
Wetland CZ	PEM	<0.1
Wetland DZ	PSS	<0.1
^a	Cowardin Classification System: PEM = Palustrine emergent PSS = Palustrine scrub-shrub PFO = Palustrine forested	
^b	Values represent the acreage of each wetland within the 400-foot-wide study area. The 100-foot-wide power line corridor would be located within the study area.	

In order for the COE to determine whether practicable alternatives have been taken, NorthernStar is required to avoid impacts on wetlands to the maximum extent possible. NorthernStar must also demonstrate that it has taken appropriate and practicable steps to minimize wetland impacts in compliance with the COE's section 404(b)(1) guidelines that restrict discharges of dredged or fill material where a less environmentally damaging alternative exists. When unavoidable wetland impacts are proposed, the COE and ODSL would require that all practicable actions be taken to mitigate those impacts. This is consistent with the CEQ's Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR 1508.20), which defines mitigation to include the following criteria:

- avoiding the impact altogether by not taking a certain action or parts of an action;
- minimizing impacts by limiting the degree or magnitude of the action and its implementation;

- rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
- compensating for the impact by replacing or providing substitute resources or environments.

For any large construction project, there is the potential for spills or leaks of fuels or hazardous materials from storage containers, equipment working in or near wetlands, and fuel transfers to adversely affect wetlands. NorthernStar would minimize the potential for spills by implementing its terminal ESC Plan. Specifically, NorthernStar would limit the refueling of equipment within 100 feet of wetlands, inspect all equipment and vehicles for leaks before entering wetlands, and wash all equipment and vehicles to remove any residual petroleum material before construction within wetlands.

Along the Columbia River shoreline, NorthernStar would implement its *Terminal Site Conceptual Revegetation Plan* that identifies specific revegetation practices within four vegetative zones (i.e., emergent zone, riparian low-shrub zone, riparian shrub zone, and upland herbaceous zone). Shoreline revegetation would include using potted plants, emergent plugs, and broadcast seed mixes to establish native herbaceous and woody species within these zones. The width of the zones would be variable, depending on the distance between the berm and the shoreline. The emergent zone would be located just below the MHHW line where daily tidal inundation occurs and would be planted with low-growing emergent vegetation with mature heights not exceeding 3 feet. The riparian low-shrub zone is located where the berm is nearest the shoreline, near the southern edge of the property. The area between the MHHW line and the toe of the berm would be planted with typical low-growing riparian shrub species, including Columbia River willow and red-osier dogwood, with mature heights of about 10 feet and 16 feet, respectively. The riparian shrub zone would be installed from the MHHW line upslope to approximately 2 feet above the MHHW line. Species planted would consist of typical forested riparian trees and shrubs with mature heights 16 feet and greater. The upland herbaceous zone would be located between the riparian zone and the toe of the berm and would vary in width depending on the distance from the berm to the shoreline. This zone would consist of low-growing native herbaceous species, including lupine species and native grass species with mature heights less than 5 feet. Additional information on the *Terminal Site Conceptual Revegetation Plan* as it relates to upland vegetative communities is included in section 4.4.2.2.

Compensatory Mitigation

NorthernStar has made a commitment that the proposed project would provide an overall significant net benefit to the environment of the lower Columbia River ecosystem. As described in its Compensatory Mitigation Plan, NorthernStar would approach wetland mitigation first through impact avoidance, then minimization, and finally through compensation (i.e., protection, restoration, creation, and enhancement).

Following temporary wetland impacts resulting from construction of the proposed project facilities, habitat and ecosystem function would be restored in place. Permanent impacts on wetlands would be mitigated by restoring habitat with similar ecological function. Mitigation would occur in areas substantially larger than that lost to permanent impacts, and would be restored to a higher level of ecosystem function.

Construction of the proposed LNG terminal would result in permanent and temporary wetland impacts. Temporary impacts within the proposed LNG terminal site would include shoreline impacts

resulting from the construction of the 5-foot containment berm that would surround the perimeter of the facility. Shoreline restoration would occur following construction of the berm and would be maintained until the revegetation areas meet performance standards. Vegetation would be planted during its dormant period to avoid mortality due to heat stress or drought.

Following construction of the LNG terminal, permanent impacts on wetlands would be mitigated through the implementation of NorthernStar's Compensatory Mitigation Plan. The Svensen Island Mitigation Sites would be the primary wetland mitigation sites in Oregon and are located about 14 miles downstream of the proposed Bradwood Landing LNG terminal in Clatsop County, Oregon (see figure 2.1.5-1). In addition, the Hunt Creek Mitigation Site would include preservation of wetland habitats adjacent to the LNG terminal site. This mitigation site is summarized below and discussed in detail in section 4.5.2.1.

The Svensen Island Mitigation Sites must succeed on several levels in order to offset resource impacts resulting from construction of the proposed LNG terminal. Generally, success would be determined by the applicant's ability to establish estuarine wetland conditions that would result in the capacity and opportunity to provide wetland functions at or greater than the capacity that would be lost at the impact site. The successful mitigation sites would restore, create, and/or enhance aquatic and terrestrial habitat; promote native species richness; and preserve existing high quality wetland areas. Factors that could limit the success of the mitigation sites include inaccurate water budget modeling, inaccurate grading elevations, barriers to fish passage, inaccurate plant species selections for the relevant hydrologic regimes, poor water quality, failure to obtain conservation easements or deed restrictions, failed plantings, and/or competition with non-native invasive plant species. A biologist would be present during construction of the mitigation sites to ensure that the sites are built without impacting adjacent fish habitat, to monitor grading activities, and to advise on construction procedures in order to ensure that the sites are constructed to plan. All seed mixes would be certified weed free.

In order to provide mitigation that is recognized as robust relative to the typical regulatory requirements, NorthernStar is proposing preservation and maintenance of an additional wetland area, the Hunt Creek Mitigation Site (see section 4.5.2.1 for a description of this site). This area would qualify as "Conservation in lieu" sites under Oregon DSL's CWM requirements because the site supports substantial populations of federally listed salmonids. Under the CWM program, there is no established ratio of conservation area relative to impact area.

The FERC received numerous comments stating that the mitigation proposed by NorthernStar does not adequately compensate for wetland impacts associated with the project. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. Because NorthernStar's Compensatory Mitigation Plan has not been finalized, we recommended in section 2.1.5 that NorthernStar continue to consult with the COE, NMFS, FWS, ODFW, ODSL, WDE, and other appropriate agencies to finalize its Compensatory Mitigation Plan.

4.4.1.3 Pipeline Facilities

Wetlands within the pipeline project area were delineated in accordance with the 1987 COE Wetland Delineation Manual (Environmental Laboratory, 1987), Oregon State Wetland Delineation Report Guidance (ODSL, 2000), and the Washington State Wetlands Identification and Delineation Manual (WDE, 1997). Between March and June 2006, URS conducted field surveys, where access was allowed, along a 200-foot-wide survey corridor centered over the proposed pipeline to identify wetlands in the project area. In areas where access was not granted, field personnel relied on NWI maps, county soil surveys, and digital topographic maps with a stream overlay to identify wetlands.

Common wetland vegetation identified during the field surveys of the proposed pipeline facilities is presented in table 4.4.1-4.

TABLE 4.4.1-4			
Common Wetland Species Identified in Delineations Within the Bradwood Landing Pipeline Area			
Common Name	Scientific Name	Common Name	Scientific Name
Emergent Wetlands			
Colonial bentgrass	<i>Agrostis capillaries</i>	Perennial ryegrass	<i>Lolium perenne</i>
Ladyfern	<i>Athyrium filix-femina</i>	Bird's-foot trefoil	<i>Lotus corniculatus</i>
Slough sedge	<i>Carex obnupta</i>	Water primrose	<i>Ludwigia palustris</i>
Coontail	<i>Ceratophyllum demersum</i>	Field mint	<i>Mentha arvensis</i>
Ovate spike-rush	<i>Eleocharis ovata</i>	Reed canary-grass	<i>Phalaris arundinacea</i>
Giant horsetail	<i>Equisetum arvense</i>	Kentucky bluegrass	<i>Poa pratensis</i>
Tall fescue	<i>Festuca arundinacea</i>	Water smartweed	<i>Polygonum amphibium</i>
Common velvetgrass	<i>Holcus lanatus</i>	Waterpepper	<i>Polygonum hydropiperoides</i>
Marsh pennywort	<i>Hydrocotyl ranunculoides</i>	Pondweed	<i>Potamogeton natens</i>
Jewel weed	<i>Impatiens noli-tangere</i>	Clasping-leaved pondweed	<i>Potamogeton richardsonii</i>
Common rush	<i>Juncus effuses</i>	Creeping buttercup	<i>Ranunculus repens</i>
Common duckweed	<i>Lemna minor</i>	White clover	<i>Trifolium repens</i>
Scrub-Shrub Wetlands			
Common rush	<i>Juncus effuses</i>	Black cottonwood	<i>Populus balsamifera</i>
Dagger-leaf rush	<i>Juncus ensifolius</i>	Cattail	<i>Typha</i> spp.
Bird's-foot trefoil	<i>Lotus corniculatus</i>	Red huckleberry	<i>Vaccinium parvifolium</i>
Forested Wetlands			
Vine maple	<i>Acer circinatum</i>	Jewel weed	<i>Impatiens noli-tangere</i>
Bigleaf maple	<i>Acer macrophyllum</i>	Common rush	<i>Juncus effuses</i>
Colonial bentgrass	<i>Agrostis capillaries</i>	Water parsely	<i>Oenanthe sarmentosa</i>
Red alder	<i>Alnus rubra</i>	Reed canary-grass	<i>Phalaris arundinacea</i>
Ladyfern	<i>Athyrium filix-femina</i>	Black cottonwood	<i>Populus balsamifera</i>
Slough sedge	<i>Carex obnupta</i>	Himalayan blackberry	<i>Rubus discolor</i>
Red-osier dogwood	<i>Cornus stolonifera</i>	Salmonberry	<i>Rubus spectabilis</i>
Scouring-rush	<i>Equisetum hyemale</i>	Sitka willow	<i>Salix sitchensis</i>
Tall fescue	<i>Festuca arundinacea</i>	Rose spiraea	<i>Spiraea douglasii</i>
Oregon ash	<i>Fraxinus latifolia</i>	Skunk cabbage	<i>Symplocarpus foetidus</i>
Common velvetgrass	<i>Holcus lanatus</i>	Youth-on-age	<i>Tolmiea menziesii</i>

Impacts and Mitigation

A detailed list of wetlands affected by the proposed pipeline facilities is provided in table 4.4.1-5. Table 4.4.1-6 summarizes the impacts associated with the construction and operation of the proposed pipeline facilities on wetlands. Construction of the pipeline facilities would temporarily affect approximately 97.9 acres of wetlands including about 5.0 acres of forested wetlands, 0.4 acre of scrub-shrub wetlands, 49.2 acres of emergent wetlands, and 43.3 acres of area that include multiple wetland types. Operation of the pipeline facilities would permanently affect approximately 14.7 acres of wetlands. Emergent and scrub-shrub wetlands would be allowed to revert to preconstruction conditions following construction. Therefore, operational impacts would consist of the permanent conversion of forested wetlands to other wetland types.

TABLE 4.4.1-5

Wetlands Affected by Construction and Operation of the Proposed Bradwood Landing Pipeline

County, State/MP	Wetland ID	Cowardin Classification ^a	Crossing Length (feet)	Construction Impact (acres) ^b	Operational Impact (acres) ^c
Clatsop County, Oregon					
3.8	B0511	PFO/PSS/PEM	25	<0.1	<0.1
3.8	C0511	PFO/PSS/PEM	143	0.3	0.1
3.9	A0510	PFO/PSS/PEM	30	0.1	<0.1
3.9	A0511	PFO/PSS/PEM	--	<0.1	--
4.5	A0508	PFO/PSS/PEM	517	1.1	0.4
4.8	A0505	PSS	25	<0.1	--
4.9	C0505	PEM	41	0.1	--
5.4	B0608	PFO	9	<0.1	<0.1
5.7	A0608	PFO/PEM/PSS	2,890	6.7	2.0
Clatsop County Totals			3,680	8.3	2.5
Columbia County, Oregon					
6.5	AA0515	PFO/PEM	5,061	11.7	3.5
7.3	AA0509	PEM	2,535	7.0	--
8.0	AA0508	PFO/PEM	4,700	11.8	3.2
8.7	EST-1 ^d	PEM	866	2.0	--
8.9	BB0512	PEM	547	1.5	--
9.0	AA0512	PEM	42	<0.1	--
9.2	EST-2 ^d	PEM	2,256	6.1	--
9.6	BB0511	PEM	2,093	5.6	--
9.9	AA0511	PEM	320	0.7	--
10.2	EST-3 ^d	PEM	2,139	5.8	--
10.6	AA0519	PEM	277	0.8	--
10.8	BB0519	PEM	1,085	2.8	--
10.9	CC0519	PEM	611	0.8	--
11.0	DD0519	PEM	--	0.7	--
11.1	EE0519	PEM	712	1.0	--
11.3	BB0615	PEM	1,315	1.8	--
11.5	AA0615	PFO/PEM	1,257	1.6	0.9
11.9	EST-4 ^d	PEM/PFO	2,514	5.6	1.7
12.3	C0606	PFO	1,787	3.1	1.2
12.7	AA0605	PEM	430	1.1	--
12.7	EST-5 ^d	PEM	366	1.1	--
12.9	A0606	PEM	442	0.9	--
13.0	B0606	PEM	260	0.3	--
13.1	EST-6 ^d	PEM	374	0.9	--
13.5	EST-8 ^d	PFO	80	0.1	0.1
14.8	AA0620	PEM/PSS	187	0.2	--
14.8	BB0620	PEM/PSS	--	<0.1	--
16.4	CC0622	PEM	212	0.2	--
16.6	BB0622	PEM	771	0.9	--
18.0	AA0523	PEM	1,534	2.7	--
18.2	BB0523	PEM	449	1.0	--
18.6	CC0523	PFO/PSS/PEM	1,460	4.0	1.0
19.0	DD0523	PFO/PSS/PEM	--	<0.1	--
Columbia County Totals			36,682	83.8	11.6

TABLE 4.4.1-5 (cont'd)

Wetlands Affected by Construction and Operation of the Proposed Bradwood Landing Pipeline					
County, State/MP	Wetland ID	Cowardin Classification ^a	Crossing Length (feet)	Construction Impact (acres) ^b	Operational Impact (acres) ^c
Cowlitz County, Washington					
21.4	EST-3 ^d	PFO	145	0.3	0.1
23.2	EST-5 ^d	PFO	128	0.2	0.1
23.6	AA0427	PFO	99	<0.1	0.1
24.7	B0414	PFO/PEM	129	0.2	0.1
25.9	D0413	PEM	3	<0.1	--
26.0	C0413	PFO	62	0.1	<0.1
26.1	B0413	PSS	--	<0.1	--
26.2	A0413	PEM	--	<0.1	--
26.6	A0428	PFO	--	<0.1	--
26.7	EST-6 ^d	PFO	402	0.6	0.3
27.5	B0425	PFO	59	0.1	<0.1
27.7	A0425	PFO	--	<0.1	--
27.8	AA0424	PEM	844	2.1	--
28.0	A0424	PEM	238	0.1	--
28.0	EST-7 ^d	PEM	--	0.1	--
30.1	A0510	PFO	29	<0.1	<0.1
30.1	B0510	PFO	--	<0.1	--
30.1	D2-0510	PSS	--	<0.1	--
30.1	E0510	PSS	--	<0.1	--
30.2	B0524	PEM	15	<0.1	--
30.4	C0524	PFO	5	0.1	<0.1
30.4	G0511	PFO	30	<0.1	<0.1
30.4	I0511	PFO	33	<0.1	<0.1
30.7	E0511	PFO	15	<0.1	<0.1
30.7	F0511	PFO	--	<0.1	--
30.8	B0511	PSS	12	<0.1	--
30.8	C0511	PEM	--	<0.1	--
31.3	A0511	PEM	--	<0.1	--
31.5	EST-8 ^d	PFO	48	0.1	<0.1
31.7	EST-9 ^d	PFO	5	<0.1	<0.1
32.4	A0426	PFO	123	0.1	0.1
33.6	C0505	PFO	20	<0.1	<0.1
33.9	A0505	PFO	30	<0.1	<0.1
34.0	C0504	PEM	153	0.2	--
34.2	A0504	PEM	279	0.6	--
34.8	A0517	PEM	60	0.1	--
35.4	DD0426	PEM	289	0.2	--
36.0	CC0426	PSS	27	<0.1	--
36.2	AA0426	PSS	27	0.1	--
36.2	BB0426	PSS	219	0.3	--
Cowlitz County Totals			3,528	5.9	0.6
Pipeline Project Totals			43,890	97.9	14.7

TABLE 4.4.1-5 (cont'd)

Wetlands Affected by Construction and Operation of the Proposed Bradwood Landing Pipeline					
County, State/MP	Wetland ID	Cowardin Classification ^a	Crossing Length (feet)	Construction Impact (acres) ^b	Operational Impact (acres) ^c
<p>Note: The totals shown in this table may not equal the sum of addends due to rounding.</p> <p>^a Cowardin Classification System: PFO = Palustrine forested PEM = Palustrine emergent PSS = Palustrine scrub-shrub</p> <p>^b Construction impacts for the pipeline are based on an 85- to 100-foot-wide right-of-way and additional temporary workspaces.</p> <p>^c Operational impacts are based on the crossing length of the pipeline in all wetlands containing forested wetland areas and a 30-foot-wide permanent right-of-way. This includes a 10-foot-wide strip (centered over the pipeline) that would be permanently maintained as herbaceous wetland during operation of the project. In addition, trees within 15 feet of the pipeline greater than 15 feet in height may be selectively cut and removed from the permanent right-of-way.</p> <p>^d Due to limited access, these wetlands were identified based on NWI maps, county soil surveys, and digital topographic maps with a stream overlay.</p>					

TABLE 4.4.1-6								
Summary of Wetlands Affected by Construction and Operation of the Proposed Bradwood Landing Pipeline								
County	Forested Wetland		Scrub-Shrub Wetland		Emergent Wetland		Multiple Wetland Types	
	Const. (acres) ^a	Oper. (acres) ^b	Const. (acres) ^a	Oper. (acres) ^c	Const. (acres) ^a	Oper. (acres) ^c	Const. (acres) ^a	Oper. (acres) ^b
Clatsop, Oregon	<0.1	<0.1	<0.1	--	0.1	--	8.2	2.5
Columbia, Oregon	3.3	1.3	--	--	45.7	--	34.8	10.3
Cowlitz, Washington	1.7	0.5	0.4	--	3.5	--	0.3	0.1
Total	5.0	1.8	0.4	--	49.2	--	43.3	12.9
^a	Construction impacts for the pipeline are based on an 85- to 100-foot-wide right-of-way and additional temporary workspaces.							
^b	Operational impacts are based on the crossing length of the pipeline in all wetlands containing forested wetland areas and a 30-foot-wide maintained right-of-way. This includes a 10-foot-wide strip (centered over the pipeline) that would be permanently maintained as herbaceous wetland during operation of the project. In addition, trees within 15 feet of the pipeline greater than 15 feet in height may be selectively cut and removed from the permanent right-of-way.							
^c	Operational impacts on scrub-shrub and emergent wetlands would be avoided because herbaceous and scrub-shrub wetland vegetation in the pipeline right-of-way is generally not mowed or otherwise maintained.							

Although our Procedures require that additional temporary workspaces be located at least 50 feet from waterbodies and wetland boundaries, NorthernStar identified 22 locations where additional temporary workspace is proposed to be located entirely or partially within wetlands or within 50 feet of a wetland. The wetland impacts resulting from these workspaces are included in the acreages presented in table 4.4.1-5.

None of the aboveground facilities associated with the proposed pipeline would be located in wetlands. Similarly, the pipe storage and contractor yard in Oregon would not be located in wetlands. However, the pipe and contractor yard in Washington at Longview has a drainage ditch adjacent to the southwestern side of the yard and another ditch runs through the southwestern corner of the property. The yard is an existing industrial site. However, NorthernStar has not filed either wetland delineations for the site or a statement that impacts on the wetlands depicted on figure 2.3.3-2 would be avoided. Therefore, **we recommend that:**

- **Prior to activities within the pipe storage and contractor yard in Washington, wetlands potentially affected by activities within the yard should be fenced. Construction activities should not occur within 50 feet of any wetland without prior review and written approval by the Director of OEP.**

NorthernStar would use existing access roads which would not require modification or improvement and would, therefore, not represent any additional impacts on wetlands.

NorthernStar would cross 21 wetlands along the proposed pipeline route using the HDD method. Clearing within areas crossed using the HDD method would be limited to hand trimming associated with the temporary deployment of HDD guidance (telemetry) cables (see section 4.3.2.4). If a frac-out were to occur, NorthernStar would implement its *HDD Contingency Plan*, which describes procedures and measures to be taken in the event of a frac-out. NorthernStar would station the necessary equipment and supplies to respond to a frac-out upon discovery of loss of drilling fluid at each HDD site. At the time of a frac-out, NorthernStar would stop drilling immediately, contain drilling fluids, and notify appropriate agencies. Appropriate resource experts (e.g., fisheries biologists and wetland scientists) would be on site

to monitor resources and effects of the release. To avoid wetland impacts at these locations during pipeline operation, NorthernStar would not maintain the right-of-way between the HDD entrance and exit locations. However, some of the additional temporary workspaces needed for HDD entry and exit points and pipe stringing could result in temporary impacts on wetlands.

The push-pull construction method is generally used in large wetland areas with suitable hydrology and topography (i.e., flooded or saturated soils and minimal local relief). In push-pull construction, the equipment required to place the pipeline in the trench is generally positioned at either end of the wetland crossing, and the pipeline is “floated” into position using a system of floats and rollers. Push-pull construction generally requires a narrower right-of-way and minimizes the operation of construction equipment within wetlands. As such, this method offers environmental advantages over conventional wetland construction approaches. Because of the potential environmental advantages of the push-pull construction method, this method should be used where sufficient water is present in the trench and other site conditions allow. NorthernStar would utilize the push-pull method where appropriate site-specific conditions are present at the time of construction. However, wetland conditions may preclude the use of the push-pull method.

As discussed in section 4.4.1.2, the impacts of project-related construction and operation activities on wetlands would vary depending on the timing of construction, construction techniques used, the sensitivity of the resources disturbed, and the length of time required for wetlands to be restored. The primary impact of pipeline construction and right-of-way maintenance activities on wetlands would be the temporary and permanent alteration of wetland vegetation. These effects would be greatest during and immediately following construction. In general, wetland impacts would be minimized by avoidance, mitigation of impacts, and compensation in accordance with federal, state, and local regulations. Typical pipeline construction methods when in wetlands are described in section 2.4.2.2. NorthernStar would mitigate construction-related impacts by implementing its *Waterbody and Wetland Construction and Mitigation Procedures Plan*, pipeline ESC Plan and SWPPP, and our Procedures. In addition, NorthernStar would comply with the COE's section 404 and ODSL's and WDE's section 401 permit conditions. As discussed in section 4.4.1.2, NorthernStar is required to avoid impacts on wetlands to the maximum extent possible and must demonstrate that it has taken appropriate and practicable steps to minimize wetland impacts in compliance with the COE's section 404(b)(1) guidelines that restrict discharges of dredged or fill material where a less environmentally damaging alternative exists. This is consistent with the CEQ's Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR 1508.20), as further described in section 4.4.1.2. All necessary federal, state, and local permits described in table 1.3-1 would be obtained prior to the commencement of construction activities.

For any large construction project, there is the potential for spills or leaks of fuels or other hazardous materials from storage containers, equipment working in or near wetlands, and fuel transfers. The introduction of fuels or other hazardous materials as a result of spills or leaking equipment could also adversely affect these wetlands. NorthernStar would minimize the potential for spills by implementing its pipeline ESC Plan, SWPPP, and *Waterbody and Wetland Construction and Mitigation Procedures Plan* as well as our Procedures. Specifically, NorthernStar would limit the refueling of equipment within 100 feet of wetlands, inspect all equipment and vehicles for leaks before entering wetlands, and wash all equipment and vehicles to remove any residual petroleum material before construction within wetlands.

Wetlands temporarily affected by installation of the pipeline would be restored immediately following construction by grading sites back to their original contours with the topsoil replaced above the subsoil. Surface and sub-surface hydrology characteristics, including impermeable soil layers, within the trench would be identified and restored using native on-site material, imported clay, or bentonite during backfilling. To facilitate the restoration of perennial native vegetation in unsaturated wetlands, most vegetation would be replaced by seeding with conservation grasses, legumes, native herbaceous species,

or other standard erosion control/cover species, where required. Saturated wetlands would typically be re-vegetated by salvaging and maintaining appropriate specimens prior to construction for transplanting back into the wetland after construction is complete. The specimens would be maintained at the edge of the construction corridor or in a nearby staging area and kept viable by shading, watering, and mulching during pipeline construction. Upon restoring grade over the new pipeline, the salvaged wetland vegetation would be replanted in appropriate locations. If rare or unusual species are observed within the construction corridor, these would be salvaged and transplanted to restore the natural biodiversity of the impacted wetlands.

Generally, wetland communities would eventually transition back into a community with functionality similar to that of the wetland before construction. The herbaceous vegetation in emergent wetlands would regenerate quickly (typically within 1 to 3 years). Following revegetation, there would be little permanent impact on emergent wetland vegetation in the maintained right-of-way because these areas naturally consist of and would remain as an open and herbaceous community. Herbaceous wetland vegetation in the pipeline right-of-way is not generally mowed or otherwise maintained, although the FERC staff's Procedures allow annual maintenance of a 10-foot-wide strip centered over the pipeline.

Scrub-shrub wetlands could take several years to reach functionality similar to preconstruction conditions, depending on the age and complexity of the system. Forested wetlands would be replanted with in-kind wetland tree specimens (post-construction species composition would be similar to pre-construction composition), with the exception of the portion of the right-of-way within 5 feet of the pipeline (10 feet total), thereby minimizing the extent of disturbance. However, trees planted between 5 and 15 feet from the pipeline would be limited to a maximum height of 15 feet to allow for aerial inspection of the pipeline. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Procedures. The corridor centered on the pipeline would be planted with a native grass seed mix and maintained in an herbaceous state to facilitate maintenance and inspection. Nearly complete canopy coverage over the pipeline would be expected to develop in most areas within approximately 20 years.

FERC Staff's Procedures

To avoid or minimize impacts on wetlands, NorthernStar would implement measures outlined in our Procedures during the construction and operation of the proposed LNG terminal and pipeline facilities. Our Procedures include, but are not limited to, the following requirements:

- Construction equipment operating within the right-of-way would be limited to that equipment necessary for clearing, excavation, pipe installation, backfilling, and restoration activities. All nonessential equipment would use upland access roads to the maximum extent practicable.
- Equipment operating within saturated wetlands would be low-ground-weight equipment or would operate from prefabricated construction mats.
- Temporary erosion and sedimentation control measures would be installed immediately after the initial disturbance of wetland soils and would be inspected and maintained regularly until final stabilization.
- Sedimentation controls would be installed across the construction right-of-way within wetlands to contain trench spoil, as needed.
- Grading and pulling of tree stumps would be limited to the area directly over the trenchline unless additional grading or stump removal is required for worker safety.

- In unsaturated wetlands, the uppermost 12 inches of topsoil along the pipeline trench would be segregated from the underlying subsoil.
- The appropriate land management or state agency should be consulted to develop a project-specific wetland restoration plan. The restoration plan should include measures for re-establishing herbaceous and/or woody species, controlling the invasion and spread of undesirable exotic species, and monitoring the success of revegetation and weed control efforts.

NorthernStar has stated that monitoring of wetlands would be conducted for a minimum of 3 years post-construction to ensure the success of wetland revegetation, if revegetation is not successful after 3 years, a remedial revegetation plan would be developed and implemented. However, comments were received on the draft EIS stating that the proposed duration of wetland monitoring is not adequate to ensure the success of revegetation along the right-of-way. Therefore, to ensure compliance with our Procedures, we have recommended in section 4.3.2.4 that NorthernStar continue to consult with the COE, NMFS, FWS, and appropriate federal and state agencies to finalize its *Waterbody and Wetland Construction and Mitigation Procedures Plan*, including procedures for monitoring the success of the revegetation.

Requested Modifications to the FERC's Staff's Procedures

NorthernStar's ESC Plans, SWPPP, and *Waterbody and Wetland Construction and Mitigation Procedures Plan* integrate the FERC staff's Procedures, with certain exceptions. The intent of the FERC staff's Procedures is to assist applicants by identifying baseline mitigation measures for minimizing the extent and duration of disturbances to soils, wetlands, and waterbodies associated with projects under the FERC's jurisdiction throughout the country. Included below is a description of NorthernStar's proposal to modify certain baseline mitigation measures included in our Procedures.

Construction Right-of-way Width in Wetlands

Item VI.A.3 of our Procedures requires that the construction right-of-way width in wetlands be limited to 75 feet. NorthernStar proposes to use an 85-foot-wide construction right-of-way within all wetlands where the crossing length is less than 100 feet and a 100-foot construction right-of-way where the crossing length is greater than 100 feet. NorthernStar's justification for the wider right-of-way is based on the following site-specific conditions:

- A minimum of 4 inches of concrete coating would be required to maintain negative buoyancy of the 36-inch-diameter pipe in wetlands. When combined with the natural weight of the steel pipe, this poses a challenge even for large side booms (Caterpillar 589s), which would require matting in wetland areas to achieve adequate load bearing capacity.
- Ditch depth would be a minimum of 7 to 7.5 feet to accommodate the pipeline dimensions, including the concrete coating, and minimum soil cover requirements.
- The soils in the project area would naturally slump to a 1:2 or flatter slope, resulting in excessive ditch widths. Once excavated, the soils would have a fluid consistency, resulting in the need for additional workspace to contain the spoil piles.
- Except in saturated wetlands, topsoil would be segregated and stored separately, as required by the Procedures. At least 2 feet of separation between the segregated topsoil and the trench spoil would be required to prevent intermingling.

- The volume of the excavated spoil material is expected to swell 30 percent upon excavation.
- To prevent sloughing of the excavated material back into the trench, excavated materials would be placed at least 4 feet from the edge of the trench, pipe would be strung no closer than 4 feet from the trench, and equipment operation would not occur within 6 feet of the excavated trench for safety.
- Excavated materials would be placed a minimum of 2 feet inside the sediment barriers, which in turn would be placed a minimum of 1 foot inside the construction right-of-way, in an effort to prevent any off right-of-way disturbance.

Based on the information provided by NorthernStar, the proposed 85-foot and 100-foot-wide right-of-way is necessary and justified to allow for safe and efficient construction of the pipeline in wetlands.

Additional Temporary Workspaces within 50 Feet of Wetland Boundaries

Item VI.B.1.a of our Procedures requires that all additional temporary workspaces such as staging areas and additional spoil storage areas be located at least 50 feet from wetland boundaries except where the adjacent upland consists of cropland. However, we have identified 5 additional temporary workspaces that would be within 50 feet of wetland boundaries and 17 additional temporary workspaces that are proposed to be located entirely or partially within wetlands.

Consistent with our Procedures, additional temporary workspaces should be located at least 50 feet outside of wetland boundaries where topographic conditions permit. However, we recognize that certain site-specific conditions may require placing additional temporary workspaces within wetlands or within 50 feet of a wetland boundary. We have reviewed the locations where additional temporary workspaces have been sited in or within 50 feet of a wetland, and our conclusions are provided in table 4.4.1-7. During the comment period on the draft EIS, NorthernStar provided additional information on the temporary workspaces within 50 feet of wetlands that the FERC staff previously did not find acceptable. In review of that new information, the FERC staff found that for all but three remaining locations, NorthernStar had justified why it should be allowed to place the temporary extra workspace within 50 feet of a wetland. However, based on the revised locations provided by NorthernStar in its December 21, 2007 submittal, in three cases the FERC staff was not satisfied, and therefore we recommend that:

- **During construction, NorthernStar should implement the following measures at the three temporary extra workspaces listed below and in table 4.4.1-7 that would be within 50 feet of wetlands.**
 - a. **B0505 – Wetland should be fenced and avoided regardless of the presence of saturated conditions during construction activities.**
 - b. **EST-3 – The pull string section for the Abernathy Creek HDD should avoid this wetland and the waterbody located within the wetland boundaries.**
 - c. **AA0424 – The extra workspace should be relocated and centered on the upland area approximately 250 feet west of the current location.**

TABLE 4.4.1-7

NorthernStar's Request to Locate Additional Temporary Workspaces Within 50 feet of a Wetland			
MP	Wetland ID	Rationale for Additional Temporary Workspace	Conclusion and Approval Status
Additional Temporary Workspace within 50 feet of Wetlands			
3.8	B0511	HDD pipe pull string laydown	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
4.8	B0505	HDD entry pit – Westport Slough	FERC staff recommends additional revisions.
4.9	C0505	HDD entry pit – Westport Slough	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
19.0	DD0523	HDD exit pit – Columbia River	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
36.2	AA0426	Meter Station – End of route	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
Additional Temporary Workspace Located within Wetlands			
5.4	B0608	HDD exit pit – Westport Slough	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
5.5	A0608	HDD pipe pull string laydown – Westport Slough	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
8.4	AA0508	HDD entry pit – Kelli Slough and Woodson Road	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
8.7	EST-1	HDD exit pit and pipe pull string laydown – Kelli Slough and Woodson Road	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
8.9	BB0512	HDD pipe pull string laydown – Kelli Slough and Woodson Road	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
9.9	AA0511	HDD entry pit – Midland Canal	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
10.2	EST-3	HDD exit pit and pipe pull string laydown – Midland Canal	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
13.1	EST-6	HDD entry pit – Clatskanie River	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
18.1	AA0523	HDD pipe string laydown – Columbia River	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
18.1	BB0523	HDD pipe string laydown – Columbia River	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
18.8	CC0523	HDD pipe string laydown – Columbia River	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
18.8	CC0523	Entry Pit – Road bore	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
21.4	EST-3	HDD pipe pull string laydown	FERC staff recommends additional revisions.
28.0	AA0424	Coal Creek Road and Coal Creek crossing	FERC staff recommends additional revisions.
34.2	A0504	HDD entry pit – Cowlitz River and Highway 411	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
34.8	A0517	HDD pipe pull string laydown and HDD exit pit – Interstate 5	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.
35.4	DD0426	HDD entry pit – Interstate 5	Given site-specific construction constraints, the location of this workspace is acceptable to the FERC staff.

Compensatory Mitigation

NorthernStar has made a commitment that the proposed project would provide an overall significant net benefit to the environment of the lower Columbia River ecosystem. As described in its Compensatory Mitigation Plan, NorthernStar would approach wetland mitigation first through impact avoidance, then minimization, and finally through compensation (i.e., protection, restoration, creation, and enhancement).

Following construction of the proposed pipeline, habitat and ecosystem function would be restored in place. Permanent impacts on wetlands would be mitigated by preserving or restoring habitat in the general project area with similar ecological function. Mitigation would occur in areas substantially larger than those lost to permanent impacts, and would be restored to a higher level of ecosystem function. Due to the separate regulatory jurisdictions, wetland impacts would be mitigated separately in Oregon and Washington.

As described in section 4.4.1.2, within Oregon, the Svensen Island Mitigation Sites would be the primary wetland mitigation sites, although the Hunt Creek Mitigation Site would be preserved and also contains wetland habitats. NorthernStar has identified the Delameter Creek Mitigation Site as the primary mitigation site for wetland impacts in Washington.

The FERC received numerous comments stating that the mitigation proposed by NorthernStar does not adequately compensate for wetland impacts associated with the project. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. Because NorthernStar's Compensatory Mitigation Plan has not been finalized, we have recommended that NorthernStar continue to consult with the COE, NMFS, FWS, ODFW, ODSL, WDE, and other appropriate agencies to finalize its Compensatory Mitigation Plan.

4.4.2 Upland Vegetation

The Bradwood Landing Project would be located in the northwestern portion of Oregon and the southwestern portion of Washington. This area falls within portions of three ecoregions, including the Coast Range, Puget Lowland Forest, and Cascades ecoregions (Thorson et al., 2003). The climate in these regions is marine influenced and abundant precipitation occurs during the fall, winter, and spring months. Historically, Sitka spruce (*Picea sitchensis*) and coastal redwood (*Sequoia sempervirens*) forests dominated coastal areas, while a mosaic of western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and seral Douglas-fir (*Pseudotsuga menziesii*) were found in inland areas. Today, Douglas-fir plantations are prevalent on the intensively logged and managed landscape (Thorson et al., 2003). Within these ecoregions, 10 distinct upland vegetative communities have been identified that occur within the project area. These upland communities include the following: coniferous forest, deciduous forest, mixed forest, early seral forest, riparian forest, scrub-shrub, riparian scrub-shrub, agricultural and rangeland, dredged materials and bare ground, and developed areas.

Coniferous forest is comprised primarily of mid-successional (typical) conifer-dominated forest with trees aged between 20 and 80 years that have been planted for commercial timber, and to a lesser extent, late-successional (high-quality) remnant native coniferous forest with mature trees aged greater than 80 years. These forests are comprised of dense, even-aged stands of Douglas-fir, with a few occurrences of other species, including red alder (*Alnus rubra*) and western hemlock. Commercial timberland is present throughout both Oregon and Washington along the lower Columbia River, including the Zones of Concern.

Deciduous forest is comprised of mature cottonwoods (*Populus* spp.), willows (*Salix* spp.), red-osier dogwood, young red alder, and bigleaf maple (*Acer macrophyllum*). Understory species include salmonberry (*Rubus spectabilis*), swordfern (*Polystichum munitum*), vine maple (*Acer circinatum*), beaked hazelnut (*Corylus cornuta*), youth-on-age (*Tomiea menziesii*), and the invasive Himalayan blackberry.

Mixed forests are comprised of both deciduous and coniferous trees, but the dominant species are usually deciduous. Typical species include big-leaf maple, red alder, Douglas-fir, and western red cedar

in the canopy layer with shrubs such as vine maple, beaked hazelnut, and salal (*Gaultheria shallon*) in the understory.

Early seral forest is characterized by clearcut areas that have begun to regenerate with a mixture of native Douglas-fir and red alder seedlings and saplings with a sometimes dense growth of nonnative, weedy species such as Himalayan blackberry. With age, this habitat develops into even-aged stands of Douglas-fir.

Dominant species found within riparian forest communities in the project area include cottonwood, red alder, and big-leaf maple. Typical understory species include vine maple, salmonberry, elderberry (*Sambucus* spp.), swordfern, ladyfern (*Athyrium filix-femina*), oxalis (*Oxalis* spp.), stinging nettle (*Urtica dioica*), and skunk cabbage (*Lysichiton americanum*).

Scrub-shrub communities are often the result of logging or fire and may be composed of native shrubs such as red huckleberry (*Vaccinium parvifolium*) and elderberry, with non-natives like Himalayan blackberry and Scotch broom (*Cytisus scoparius*) often being the dominant species.

Riparian scrub-shrub communities are comprised of cottonwood, Sitka spruce, red-osier dogwood, Sitka willow, and rose spiraea. Other common species include bulrush (*Scirpus* spp.), slough sedge (*Carex obnupta*), skunk cabbage, and cattail (*Typha* spp.).

Agricultural land, including pastures, orchards, and poplar plantations, are low-quality intensively managed areas that occur primarily as open pastures, fallow fields, and commercial poplar plantations. Because they lack vegetative diversity and structural complexity, they generally provide habitat for few species other than those that are edge-adapted.

Dredged spoils and bare ground are noted for their nearly complete lack of vegetation and exposed soils. Shallower areas of dredged sands may support limited vegetation, including nonnative Scotch broom and other weedy species.

Developed areas include buildings, roads, utility corridors, and other developed sites. These areas are usually devoid of vegetation and food resources and lack structural complexity.

4.4.2.1 Waterway for LNG Marine Traffic

Existing Upland Vegetation

The waterway for LNG marine traffic would be located within the Coast Range ecoregion. This ecoregion consists of highly productive, rain-drenched coniferous forests that cover the low mountains of the Coast Range. Timber lands in the area have generally been logged at least once, along with disturbance associated with agricultural and rural residential development. There are limited riparian conservation areas, and what vegetated riparian areas remain are dominated by hardwoods rather than more complex conifer forests, especially the once common “spruce swamp” or old-growth Sitka spruce-dominated wetlands.

Upland vegetative communities along the waterway and within the Zones of Concern include coniferous, deciduous, mixed, and early seral forests; upland and riparian scrub-shrub; agricultural; dredged spoils and bare ground; and developed areas. Typical species composition within these vegetative communities is described in section 4.4.2.

The WDFW has identified and mapped 18 Priority Habitats, which are defined as habitats that exhibit one or more of the following attributes: comparatively high fish and wildlife density or species diversity; important fish and wildlife breeding habitat, seasonal ranges, or movement corridors; limited availability; high vulnerability to habitat alteration; and/or unique or dependent species. Based on WDFW definitions, Priority Habitats include the Columbia River itself as well as estuarine areas between the mouth of the Columbia River and the LNG terminal. Maps detailing sensitive environmental features and habitats along the LNG carrier transit route are depicted in Appendix C.

General Impacts and Mitigation

The addition of 125 LNG carriers per year on the Columbia River would represent a 7 percent increase in commercial ship traffic and 25 percent increase in deep-draft vessel traffic. The wakes produced by an LNG carrier are only slightly larger than those of the large vessels currently using the Columbia River. However, as described in section 4.5.1.1, additional analysis of the potential for increased shoreline erosion due to LNG carrier wakes will be included in the revised BA and EFH Assessment. To minimize the potential for increased shoreline erosion due to LNG carrier transit, we recommended that NorthernStar coordinate with the NMFS to determine appropriate LNG carrier speed, or other applicable measures, to avoid or minimize shoreline erosion.

In the event of a collision or allision of sufficient magnitude to rupture an LNG cargo tank, it is likely that sparks or flames would ignite the flammable vapors at the spill site. In the unlikely event that ignition did not occur, an LNG spill would rapidly vaporize on water and form a potentially flammable cloud. If the flammable vapor cloud encountered an ignition source, the cloud would burn back to the spill site, rather than outward towards shoreline habitats. In the unlikely event of an LNG spill on water, ignition of the LNG vapors could contribute to a forest fire in areas where the Columbia River navigation channel is adjacent to forested areas (e.g., between Altoona and Skamokawa). Given the relatively high precipitation in the region, large forest fires in the area are infrequent, but they can be severe when they do occur. The intensity and extent of a potential forest fire would be highly dependent on a number of variables including available fuel (e.g., woody material), moisture and temperature, fuel composition, wind, and topography. However, as discussed in section 4.11.5, the risk of a release of LNG due to an accident or intentional breach during transit of the LNG carriers is very small and can be managed with safety and security measures described in the WSR (Appendix G). Therefore, the potential impacts on upland vegetative communities would be less than significant.

4.4.2.2 LNG Terminal

Existing Upland Vegetation

Table 4.4.2-1 lists the upland vegetative communities present within the proposed LNG terminal site as well as along of the proposed pipeline route. Based on categories described in the ODFW's HMP, essential deciduous forest, riparian forest, and riparian scrub-shrub habitats occur within the proposed LNG terminal site. Deciduous forests occur along the southern portion of the LNG terminal site as a narrow band between a large dredged material placement area and a patch of palustrine scrub-shrub wetland. Riparian forest occurs in two isolated patches along the Columbia River on the eastern edge of the site, and riparian scrub-shrub communities are limited to the areas adjacent to Hunt Creek.

TABLE 4.4.2-1						
Acres of Upland Vegetative Communities Affected by the Bradwood Landing Project						
Vegetative Community	LNG Terminal Facilities ^{a, b}		Pipeline Facilities ^{c, d}		Total	
	Construction	Operation	Construction	Operation	Construction	Operation
Coniferous forest	8.6	2.4	76.2	22.9	84.8	25.3
Deciduous forest	7.8	3.5	32.1	9.6	39.9	13.1
Mixed forest	0.0	0.0	52.2	15.7	52.2	15.7
Early seral forest	9.1	1.6	16.3	4.9	29.9	6.5
Riparian forest	0.7	0.5	2.9	0.9	3.6	1.4
Scrub-shrub	12.8	2.1	6.9	3.0	19.7	5.1
Riparian scrub-shrub	<0.1	<0.1	0.0	0.0	<0.1	<0.1
Agricultural and rangeland	0.0	0.0	98.6	41.6	98.6	41.6
Dredged materials and bare ground	21.3	19.3	0.6	0.4	21.9	19.7
Developed areas	4.6	3.5	42.7	8.5	47.8	12.0
Total	64.9	32.9	328.5	107.5	398.4	140.4
<p>Note: The totals shown in this table may not equal the sum of addends due to rounding.</p> <p>^a LNG terminal facilities include the Hunt Creek Bridge replacement, reroute of the railroad, and power line.</p> <p>^b Since the issuance of the draft EIS, modifications have been proposed to Clifton and Bradwood Roads and the construction worker parking area. Information quantifying these impacts on vegetative communities has not been provided.</p> <p>^c Acres impacted by construction based on the typical width of the temporary right-of-way being 100 feet and the typical permanent right-of-way width of 50 feet, except when crossing forested communities and most wetlands and streams as described in sections 4.4.2.3, 4.4.1.3, and 4.3.2.4, respectively.</p> <p>^d Estimated impacts on vegetative communities affected by construction and operation of the proposed pipeline do not include areas that would be crossed using the HDD method or existing access roads, as impacts on these areas would be avoided.</p>						

Impacts and Mitigation

Construction of the proposed LNG terminal facilities would affect about 64.9 acres of upland vegetation (see table 4.4.2-1). Specifically, this includes about 47.1 acres of upland vegetation for the LNG terminal and about 17.8 acres for the power line. The upland vegetative communities present on the LNG terminal site are categorized as deciduous and riparian forest, scrub-shrub, riparian scrub-shrub, dredged materials, and developed areas. Also present at the LNG terminal site are about 14.8 acres of wetlands and 63.5 acres of open water, which are discussed in sections 4.4.1.2 and 4.3.2.3, respectively.

LNG Terminal

As described above, 47.1 acres of upland vegetation would be impacted during construction of the LNG terminal. Following construction, 27.9 acres of uplands would be permanently converted to industrial use for operation of the LNG terminal. Currently, this area includes about 19.3 acres of dredged materials, 3.5 acres of developed areas, 2.5 acres of deciduous forest, 2.1 acres of scrub-shrub, 0.5 acre of riparian forest, and less than 0.1 acre of riparian scrub-shrub communities. As discussed above, the dredged material and developed areas include only limited vegetation; therefore, impacts would not be considered significant. Impacts on deciduous forest and scrub-shrub communities would not be significant on a regional scale because areas with similar vegetation characteristics are found on surrounding lands.

The greatest potential impacts on upland vegetation resulting from construction and operation of the LNG terminal would be on riparian forest communities due to their high productivity, species diversity, and contribution to both aquatic and upland ecosystem function (Knutson and Naef, 1997).

Based on concerns raised by the NMFS in its May 11, 2007 letter to the FERC, biologists from NorthernStar and URS surveyed the LNG terminal site in June 2007 to assess the number of cottonwood trees that would be removed within the riparian zone, which is the area within 300 feet of the Columbia River shoreline and adjacent Hunt Creek estuary up to the existing railroad alignment. Cottonwood trees over 20 feet in height were counted within seven discreet patches at the LNG terminal site. All trees less than 20 feet in height were not assessed because they are considered to be riparian scrub-shrub vegetation. Approximately 650 cottonwood trees were counted within the riparian zone. Of these, about 380 trees would be removed during construction of the LNG terminal. The remaining 270 trees would be preserved. Other tree species (i.e., Sitka spruce, red alder, Oregon ash, and bigleaf maple) occur within riparian forested areas at the LNG terminal site; however, they are not abundant (about 65 trees). The majority of the trees to be removed are located along the Hunt Creek estuary, along the northern edge of the proposed construction site boundary. Based on current design plans, NorthernStar proposes to preserve most trees along the Columbia River shoreline. However, trees that occur within 25 feet of the proposed fenceline would be removed for security reasons or topped below 25 feet and left with roots intact in order to provide habitat value (e.g., snags, perches).

The remaining 19.2 acres of uplands, which include 10.6 acres of scrub-shrub communities, 3.5 acres of early seral forest, 2.0 acres of dredged materials, 1.8 acres of deciduous forests, 1.1 acres of developed areas, and 0.2 acre of riparian forest areas would be restored after construction is completed. Restoration at the proposed LNG terminal site would be in accordance with NorthernStar's *Terminal Site Conceptual Revegetation Plan*.¹¹ In addition, NorthernStar would implement additional measures along the shorelines of the Columbia River and Hunt Creek as well as along the railroad right-of-way, as discussed below.

Along the Columbia River shoreline, NorthernStar would implement its *Terminal Site Conceptual Revegetation Plan* that identifies specific revegetation practices within four vegetative zones (i.e., emergent zone, riparian low-shrub zone, riparian shrub zone, and upland herbaceous zone). Shoreline revegetation would include using potted plants, emergent plugs, and broadcast seed mixes to establish native herbaceous and woody species within these zones. The width of the zones would be variable, depending on the distance between the berm and the shoreline. The emergent zone would be located just below the MHHW line where daily tidal inundation occurs and would be planted with low-growing emergent vegetation with mature heights not exceeding 3 feet. The riparian low-shrub zone is located where the berm is nearest the shoreline, near the southern edge of the property. The area between the MHHW line and the toe of the berm would be planted with typical low-growing riparian shrub species, including Columbia River willow and red-osier dogwood, with mature heights of about 10 feet and 16 feet, respectively. The riparian shrub zone would be installed from the MHHW line upslope to approximately 2 feet above the MHHW line. Species planted would consist of typical forested riparian trees and shrubs with mature heights 16 feet and greater. The upland herbaceous zone would be located between the riparian zone and the toe of the berm and would vary in width depending on the distance from the berm to the shoreline. This zone would consist of low-growing native herbaceous species, including lupine species and native grass species with mature heights less than 5 feet.

As described above, federal safety standards require that no trees taller than 25 feet be located within 25 feet of the security fence (located atop the perimeter berm). Therefore, along the northern portion of the shoreline, shrub and tree species with mature heights of less than 15 to 20 feet would be planted (or maintained where possible in areas that would not be cleared) within 25 feet of the security

¹¹ NorthernStar included its *Terminal Site Conceptual Revegetation Plan* as part of its JPA. NorthernStar filed its JPA with the FERC on November 22, 2006, and filed revisions to the JPA on April 5, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

fence. Along the southern portion of the shoreline, where the berm would be closest to the Columbia River, low-growing riparian shrub species would be installed within 25 feet of the security fence.

Adjacent to Hunt Creek, a riparian buffer at least 30 feet wide, as measured from the MHW mark, would be allowed to permanently revegetate in order to retain riparian function. NorthernStar would replace cleared trees at a 5:1 ratio within the LNG terminal site, resulting in about 1,895 trees being planted following construction. The majority of the replacement trees (e.g., cottonwood, Sitka spruce, red alder, Pacific willow, and other native species) would be installed within a 100-foot buffer along the northern edge of the proposed construction boundary. This area would serve as a forested buffer from the terminal site to the adjacent Hunt Creek estuary. The area is currently vegetated with a narrow band of cottonwood trees (part of which is proposed for removal) as well as scrub-shrub and emergent wetland vegetation. Installation of trees within this buffer would provide a visual screen from the terminal site to the adjacent Hunt Creek estuary and would provide habitat for fish and wildlife species.

Following construction, NorthernStar's railroad right-of-way revegetation plan would result in the installation of native vegetation within the realigned railroad right-of-way. The right-of-way would consist of a 100-foot corridor centered on the tracks. A 30- to 40-foot wide strip, centered on the tracks, would be left unvegetated to allow for visibility. The portion of the right-of-way on the north side of the tracks would consist of a concrete facility berm and would not be revegetated. Along the southern side of the tracks, vegetation would be installed in a 30- to 35-foot-wide planting zone which would extend the length of the proposed rail alignment. NorthernStar's railroad right-of-way revegetation plan consists of two vegetative zones. The width of the zones would be variable, depending on the distance from the railroad tracks to Hunt Creek. The majority of the planting zone would be vegetated with low-growing herbaceous species in order to maximize visibility and minimize fire fuel. Low-growing herbaceous species, including lupine species and native grass species, would have a mature height less than 5 feet. Where the railroad right-of-way approaches Hunt Creek, near the center of the rail realignment, upland shrubs would be installed. Upland shrubs would have a mature height of 10 feet and greater. NorthernStar intends to salvage and temporarily replant appropriate native plant species (along with native topsoil) prior to construction for site restoration and landscaping purposes after construction. NorthernStar does not anticipate that vegetative management would be required in the 30- to 35-foot area along the southern portion of the railroad right-of-way.

Maintenance throughout the LNG terminal site would consist of monitoring, removal of tree saplings within 25 feet of the security fence, and noxious weed removal. Monitoring of the site would consist of a walk-through assessment that would be scheduled to occur annually but may be conducted at any time. Additional maintenance and monitoring would be done to ensure survival and to verify that success criteria are met in areas planted for site restoration and compensatory mitigation. NorthernStar's Compensatory Mitigation Plan contains additional details regarding success criteria within mitigation sites.

As described above, NorthernStar would plant shrub and tree species with mature heights of less than 15 to 20 feet within 25 feet of the security fence; therefore, maintenance clearing in revegetated areas is not anticipated. However, in areas not cleared during construction, new tree saplings taller than 25 feet may occur within 25 feet of the security fence. These trees would be flagged for removal and would be topped, rather than grubbed, to allow for development of snags.

With the exception of areas within 25 feet of the security fence, riparian areas outside of the berm would be allowed to permanently revegetate in order to retain riparian function. Areas in need of noxious or invasive species removal would be flagged or marked. Noxious or invasive species would be removed in order to ensure that success criteria of installed native plant communities are met. Populations of noxious weeds and invasive non-native vegetation determined to significantly affect the installed

vegetation would be removed by hand, ensuring that native vegetation is not disturbed. The most effective method for managing some invasive species is manual removal of the entire plant, including its root mass. Removal would occur as soon as possible, before the invasive species goes to seed or develops a substantial root mass, which could increase the effort necessary to remove the plants. NorthernStar has committed to bagging invasive species in plastic and disposing them off site at a permitted landfill. Noxious weeds and other invasive plant species are discussed in detail in section 4.4.2.3.

Since the issuance of the draft EIS, NorthernStar has proposed modifications to Bradwood and Clifton Roads and has revised the proposed location for a construction worker parking lot. NorthernStar has not submitted information to the FERC regarding vegetation or other resource impacts at these locations. Therefore we recommended in section 4.2.2.1 that NorthernStar quantify and file impacts on vegetative communities associated with the modifications to Bradwood and Clifton Roads as well as the new proposed construction worker parking lot prior to construction.

Electric Power Line

Additional impacts on vegetation would occur as a result of construction of the electric power line. Clearing within the 100-foot-wide right-of-way would impact about 17.8 acres of vegetation. Included in this would be 8.6 acres of coniferous forest, 5.6 acres of early seral forest, 3.5 acres of deciduous forest, and 0.1 acre of scrub-shrub. Following construction, the affected area would be replanted with native trees and shrubs and allowed to revegetate. A 15-foot-wide area adjacent to either side of the transmission line would be maintained by PacifiCorp in a grassland/herbaceous cover type, which would result in the permanent conversion of 5.0 acres of forested land (2.4 acres of coniferous forest, 1.6 acres of early seral forest, and 1.0 acre of deciduous forest) to a grassland/herbaceous cover type. As part of their scheduled maintenance, PacifiCorp would also remove trees from within the 100-foot-wide permanent right-of-way that are dead, dying, diseased, deformed, or unstable and that have a high probability of falling.

4.4.2.3 Pipeline Facilities

Existing Upland Vegetation

Table 4.4.2-1 lists the upland vegetative communities present along the proposed pipeline route. Dominant and understory species composition within each of these communities is provided in section 4.4.2. Agriculture and coniferous forests are the most common vegetative communities along the proposed pipeline route, comprising 98.6 acres and 76.2 acres of land affected, respectively. Agricultural vegetative communities occur throughout the areas crossed by the proposed pipeline route and are often characterized by regular landscape patterns and straight borders due to ownership boundaries and multiple crops within a region. This community is diverse and includes several cover types ranging from low-stature annual grasses and row crops less than 3 feet tall at maturity to mature tree farms greater than 60 feet in height. Structural diversity within each cover type (crop) is low. Depending upon management intensity or cultivation method, agricultural communities may vary substantially in structure on an annual basis. Herbaceous agricultural fields and pastures are found scattered along the proposed pipeline route and are closely associated with roads, residential developments, and sometimes industrial developments. Deciduous cottonwood/poplar (*Populus* spp.) farms and coniferous Douglas-fir tree farms are also found along the pipeline route, usually in less-developed areas.

Coniferous forests also occur throughout the proposed pipeline route. The majority of coniferous forests are comprised primarily of trees between 20 and 80 years old that have been planted for commercial timber. However, a narrow band of old-growth coniferous forest occurs parallel to the

Columbia River within the far western portion of the pipeline route near the LNG terminal. These stands are characterized by mature Douglas-fir, with lesser amounts of mature western hemlock and western red cedar. The canopy is fairly open in places due to the presence of large snags as well as a steep basalt bluff that separates the forest from the Columbia River below. Dominant or co-dominant understory species in coniferous forest typically include hemlock and cedar saplings, vine maple, salal, dwarf Oregon grape (*Mahonia nervosa*), elderberry, swordfern, and the invasive Himalayan blackberry. Other forbs and ferns that frequently dominate the understory are bracken fern (*Pteridium aquilinum*), ladyfern, youth-on-age, and stinging nettle.

General Impacts and Mitigation

Pipeline Right-of-way

The primary impact from the pipeline and associated aboveground facilities on vegetative communities would be the cutting, clearing, and/or removal of existing vegetation within the construction work area. The degree of impact would depend on the type and amount of vegetation affected, the rate at which the vegetation would regenerate after construction, and the frequency of vegetation maintenance conducted during operation of the project. The swath of vegetation that would be disturbed during construction would be either 100 or 120 feet wide in upland areas, depending on whether topsoil segregation is required, with the exception of areas crossed using the HDD method. Absent unforeseen events such as inadvertent returns of drilling mud (see section 4.3.2.4), the only potential disturbance in areas crossed using the HDD method would be minor trimming of vegetation using hand tools directly over the pipeline. This minor clearing is required to facilitate the temporary deployment of HDD guidance (telemetry) cables along the ground during construction and to perform a leakage survey after installation and commissioning.

Secondary effects associated with disturbances to upland vegetation could include increased soil erosion (see section 4.2.3.2), increased potential for the introduction and establishment of invasive weedy species (see *Noxious Weeds and Other Invasive Plant Species* below), and a local reduction in available wildlife habitat (see section 4.5.3.3).

To reduce impacts on vegetation within the construction and permanent rights-of-way and improve revegetation potential, NorthernStar would implement its pipeline ESC Plan in Oregon and SWPPP in Washington as well as our Procedures. Following construction, all work areas would be restored, seeded with conservation grasses, legumes, native plant species, or other standard erosion control/cover species, where required, and allowed to naturally revegetate to preconstruction conditions, with the exception of upland forested communities which would be replanted in-kind with trees. The permanent right-of-way would generally be maintained in an herbaceous state following construction. NorthernStar would monitor the success of revegetation efforts and employ reseeding, fertilizing, and other measures until herbaceous vegetative cover and density are similar to the adjacent areas not disturbed by construction. If there are excessive noxious weeds after the first or second growing season, an agronomist would determine the need for additional restoration measures that NorthernStar would implement, as necessary.

NorthernStar's proposed construction right-of-way, temporary extra work areas, and access roads associated with the pipeline would disturb a total of about 328.5 acres of upland vegetation. As described above, NorthernStar would avoid impacts on about 178 acres of upland vegetation by using the HDD method to install the pipeline underneath old-growth coniferous forest and some roads. As described in table 4.4.2-1, the most common vegetative communities occurring along the proposed route are agricultural (98.6 acres), coniferous forest (76.2 acres), and mixed forest (52.2 acres), which account for nearly 70 percent of the vegetation that would be cleared or affected by construction. The next most

common cover types that would be affected are developed areas (42.7 acres) and deciduous forest (32.1 acres).

Agricultural communities would typically regenerate quickly after cleanup and reseeded of the right-of-way. Cultivated areas are regularly disturbed, generally receive ample water through irrigation if necessary, and would quickly reestablish on the right-of-way following replanting by the landowners; however, a small portion of the agricultural cover type (about 4.2 acres) also includes perennial crops associated with orchards, vineyards, tree plantations, and plant nurseries. Impacts on these perennial crops would be long term because of the time needed to establish the crops and, in some cases (i.e., orchards and tree plantations), the impacts would be permanent if the crop is restricted from being grown over the permanent easement. Vegetation would be replanted within the temporary construction right-of-way immediately after construction as part of site-specific plans and agreements with landowners, except large trees and shrubs, which, due to availability, may not be replaceable with specimens of comparable size. Additional information about impacts on and potential mitigation measures for residential areas, including landscaping, is presented in section 4.7.3.3.

Longer-term impacts would occur on upland scrub-shrub communities because these areas would be reseeded only with conservation grasses, legumes, native herbaceous species, or other standard erosion control/cover species, where required, and the shrub species that would recolonize the right-of-way from adjacent areas would require several years to reestablish their woody canopy. Permanent impacts would occur on the scrub-shrub community that is currently present within the permanent easement because the species would not be allowed to regenerate the woody canopy present before construction due to periodic right-of-way maintenance activities. Maintenance of the entire right-of-way would occur no more than once every 3 years. However, to facilitate maintenance and inspection, NorthernStar may clear a 10-foot-wide corridor centered on the pipeline annually.

Similar to scrub-shrub communities, impacts on forested communities (i.e., coniferous, deciduous, mixed, early seral, and riparian forests) would be considered long term because of the time required to restore the woody vegetation to its preconstruction condition. Impacts associated with construction and operation would be greatest on these cover types due to the change in structure and environment caused by the removal of the large tree canopy over the width of the construction right-of-way. The clearing of trees from the construction right-of-way could also affect the remaining trees along the edge of the right-of-way. Trees located on the edge of the right-of-way may be subject to mechanical damage to trunks and branches and root impacts from soil disturbance and compaction, all of which may result in the decreased health and viability of the remaining edge trees. Edge trees that were located within a dense stand of trees before construction may lack stability following removal of adjacent supporting trees, which may result in increased tree failures.

During construction, woody vegetation that has been cleared from the construction workspace would remain within the right-of-way until restoration commences. Woody vegetation would generally be ground in a tub grinder and spread onto the right-of-way as mulch. In areas where timber would be harvested, the trees would be cut and stacked for commercial sale. The logs would be hauled to market and the proceeds of the sale collected by the property owner. NorthernStar has made an agreement with the WDFW regarding the use of certain trees cut down during pipeline construction in Washington. Based on a protocol provided by the WDFW, certain trees would be hauled to a storage area to be utilized as the start of a LWD bank for the State of Washington. Other trees would be used to meet mitigation requirements. No trees, slash, or woody vegetation would be burned during construction of this project.

In upland forested areas, permanent impacts would be greatest over the maintained portion of the right-of-way, totaling about 54 acres. Upland forested communities would be replanted in-kind with trees, with the exception of the portion of the right-of-way within 15 feet of the pipeline (30 feet total),

thereby minimizing the extent of disturbance. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Plan and Procedures. The 30-foot-wide corridor centered on the pipeline would be planted with a native grass seed mix and maintained in an herbaceous state to facilitate maintenance and inspection. As described above for upland scrub-shrub communities, annual clearing for maintenance of the pipeline in forested communities would be limited to the 10-foot corridor centered on the pipeline. Nearly complete canopy coverage over the pipeline would be expected to develop in most areas within approximately 20 years.

Adjacent to waterbodies, a riparian strip at least 25 feet wide, as measured from the waterbody's MHW mark, would be allowed to permanently revegetate with native plant species across the entire right-of-way. As described above, trees greater than 15 feet tall, or deep-rooted shrubs that could damage the pipeline's protective coating, obscure periodic surveillance, or interfere with potential repairs, would not be allowed to grow within 15 feet (30 feet total) of the pipeline.

Vegetation Communities of Special Concern or Value

As described above, the WDFW has identified and mapped 18 Priority Habitats. Vegetation communities of special concern were not specifically identified in Oregon. However, NorthernStar would mitigate for impacts on habitats of varying quality by complying with ODFW's HMP (see section 4.5.2.4).

About 1.8 acres of riparian Priority Habitat would be affected by construction of the Bradwood Landing pipeline in Washington. Of this, about 0.9 acre would be permanently maintained in an herbaceous state. Similar to other forested cover types, impacts on riparian forest would be considered long term because of the time required to restore the habitat to its preconstruction condition. To reduce impacts on riparian vegetation within the construction and permanent rights-of-way, NorthernStar would implement the measures included in its pipeline ESC Plan and SWPPP, as well as utilize the HDD or bore methods at up to 23 waterbody crossings (see section 4.3.2.4). NorthernStar would reduce the size of waterbody crossing staging areas and place these staging areas at least 50 feet from the water's edge whenever topographic conditions permit. Additionally, NorthernStar would allow a riparian buffer at least 25 feet wide, as measured from the waterbody's MHHW mark, to permanently revegetate with native woody plant species across the entire right-of-way; however trees greater than 15 feet tall, or deep-rooted shrubs that could damage the pipeline's protective coating, obscure periodic surveillance, or interfere with potential repairs, would not be allowed to grow within 15 feet (30 feet total) of the pipeline.

Noxious Weeds and Other Invasive Plant Species

Noxious weeds and other invasive plant species are non-native, undesirable native, or introduced species that are able to exclude and out-compete desirable native species, and thereby decrease overall species diversity. Noxious weeds often invade and persist in areas after the vegetation and ground have been disturbed and can hinder restoration.

The Oregon Department of Agriculture has developed the Noxious Weed Control Program. A part of the program's goals are to rate and classify weeds at the state level; to prevent the establishment and spread of noxious weeds; and to encourage and implement the control, containment, or eradication of infestations of designated weed species. The Noxious Weed Control Program places weeds on either "A" or "B" lists in order to prioritize and implement noxious weed control projects. "A" designated weeds either occur in the state in small enough infestations to make eradication or containment possible or are not known to occur, but their presence in neighboring states make future occurrence in Oregon seem imminent. The Oregon Department of Agriculture recommends eradication or intensive control when and where these weeds are found. "B" designated weeds are regionally abundant but may have limited

distribution in some counties. The Oregon Department of Agriculture recommends limited to intensive control at the state, county, or regional level as determined on a case-by-case basis. In addition, the Oregon Department of Agriculture annually develops a target list of weed species that will be the focus for prevention and control by the Noxious Weed Control Program, sanctioned by the Oregon State Weed Board. These weeds are “T” designated and are species selected from either the “A” or “B” lists.

Similarly, Washington has noxious weed laws that require counties and/or local weed districts to develop and oversee local weed management programs to control the spread of noxious weeds according to state laws. The Washington State Noxious Weed Control Board determines which plants are placed on the Washington State Noxious Weed List. Noxious weeds in Washington are placed into one of three categories. Class A weeds are non-native species with a limited distribution in the state and require eradication by state law. Class B weeds are species established in some regions of Washington but are of limited distribution or not present in other regions of the state, and treatment requirements vary between the different regions. Class C weeds are species already widely established in Washington or are of special interest to the state's agricultural industry. Control of Class C weeds may be required if desired by the county.

Biologists conducting field surveys for NorthernStar identified several species of noxious weeds occurring within the project area, including Scotch broom, Himalayan blackberry, reed canary-grass, and purple loosestrife. NorthernStar would consult with the Oregon and Washington Departments of Agriculture and other appropriate agencies to determine the location of other noxious weeds and whether soil-borne plant diseases of significance to agricultural productivity have been identified in the project area. To prevent and mitigate for the distribution of noxious weeds during construction and control noxious weeds that develop after construction, NorthernStar has agreed to implement the following measures, as described in its *Noxious Weeds and Soil-borne Plant Disease Control Plan*:¹²

- Contractors would be required to thoroughly clean each unit of construction equipment with high-pressure washing before the initial move of those units of construction equipment to the general construction site.
- Reasonable efforts would be made to obtain straw bales for erosion control and straw for mulch that are free of noxious and nuisance weed contamination.
- Where additional soil is necessary to restore the original soil contours as a result of the removal of excess rock from the trench backfill, imported soil would be used. NorthernStar would make reasonable efforts to obtain imported soil that is free of noxious weeds.
- When available, Oregon or Washington certified seed or equivalent would be used for revegetation.
- NorthernStar would monitor the revegetation of non-cultivated areas the first and second year after construction. Non-cultivated areas where seedling establishment has failed would be reseeded during the next appropriate seeding period. The revegetation of the construction area would be considered successful when, based on visual observation, the density or cover of well established, herbaceous, non-nuisance vegetation in the construction area is similar to the density or cover of herbaceous vegetation in adjacent

¹² NorthernStar included its *Noxious Weeds and Soil-borne Plant Disease Control Plan* as part of its JPA. NorthernStar filed its JPA with the FERC on November 22, 2006, and filed revisions to the JPA on April 5, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

areas not disturbed by construction. If the herbaceous vegetative cover or density in the construction area is not similar to that in adjacent areas not disturbed by construction, or if there are excessive noxious weeds after the first or second growing season, an agronomist would determine the need for additional restoration measures. NorthernStar would implement additional restoration or mitigation measures, as necessary.

On permanent right-of-way areas where NorthernStar has control of the surface use of the land such as aboveground valve sites and metering stations, weed control would be conducted in a manner that would prevent the spread of weeds to adjacent lands used for agriculture. Herbicide application on such areas would be conducted by an applicator licensed by the State of Oregon or Washington in accordance with our Procedures. Generally, herbicides would only be applied in the space directly over the pipeline and would target only the woody species, leaving the grasses intact to provide stability to the soils, and are applied during the dry part of the growing season when leaves are fully emerged. Herbicide application and other vegetation control near streams would be performed with hand tools. In accordance with our Procedures, herbicides would not be applied within 100 feet of any waterbody, including waterbodies containing federally listed species, designated critical habitat, or EFH.

The FERC received numerous comments relating to the adequacy of NorthernStar's *Noxious Weeds and Soil-borne Plant Disease Control Plan*. In its December 19, 2007 letter, the EPA stated that weed control methods proposed by NorthernStar should be identified. In its December 21, 2007 letter, the U.S. Department of the Interior recommended that all construction equipment be power-washed at a self-contained site before being transported to and/or from the construction right-of-way. Commentors also recommended that clean straw bales and fill be required for erosion control and that Oregon or Washington certified seed or equivalent be required for all revegetation. In addition, the NMFS has requested that specific information on the methods proposed and timing of noxious weed control be submitted as part of the revised BA and EFH Assessment. Therefore, **we recommend that:**

- **NorthernStar should continue to consult with the COE, FWS, NMFS, Oregon and Washington Departments of Agriculture, and other appropriate resource agencies to revise its *Noxious Weeds and Soil-borne Plant Disease Control Plan*. NorthernStar should file the final *Noxious Weeds and Soil-borne Disease Control Plan* along with agency comments on the plan with the Secretary within 30 days after the issuance of the final EIS.**

4.5 WILDLIFE AND AQUATIC RESOURCES

4.5.1 Waterway for LNG Marine Traffic

4.5.1.1 Aquatic Resources

The Columbia River is a highly productive biological environment that is influenced by a variety of complex physical processes. The major short-term processes affecting the area include tides and, secondly, local winds and currents. River flow also has a major seasonal impact, the extent of which depends on the volume of water from snow melt.

Existing Aquatic Resources

Marine Fish

The Columbia River, the estuary, and the offshore waters of the Pacific Ocean provide habitat for a variety of anadromous and resident fish species. Anadromous fish are present in the river throughout the year as adults migrating upstream to spawn, as juveniles rearing in the river and its tributaries, and as juveniles migrating downstream to the ocean. Anadromous salmonids occurring within or near the proposed project area include: Chinook, coho, sockeye, and chum salmon; steelhead; and coastal cutthroat trout. Of these, 13 ESU/DPSs are federally listed and are discussed in sections 4.6.1.1 and 4.6.2. In addition, EFH has been designated for Chinook and coho salmon along the waterway as discussed in section 4.5.1.2. Other anadromous and marine species include green and white sturgeon, eulachon, shad, striped bass, starry flounder, three spine sticklebacks, pea mouth, and Pacific and river lampreys.

Marine fish are present both in the Pacific Ocean and in the estuary of the Columbia River. Estuaries are protected nearshore areas such as bays, sounds, inlets, and river mouths, influenced by both ocean and freshwater. Because of tidal cycles and freshwater runoff, salinity varies within estuaries and results in great diversity, offering freshwater, brackish, and marine habitats within close proximity. Estuaries tend to be shallow, protected, nutrient rich, and are biologically productive, providing important habitat for marine organisms. As discussed in detail in section 4.5.1.2., EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity and has been designated within the Zones of Concern for more than 90 species of groundfish, 5 species of coastal pelagic species, 2 species of salmon, and 13 highly migratory species.

Larval and juvenile marine fish comprise a significant portion of the offshore planktonic communities. Smelt, tomcod, right-eye flounder, and anchovy are commonly found in the offshore communities during the winter and spring. Marine species that enter the estuary are generally confined to the deeper channels where salinity is high. Some species, in particular juveniles of these species, are more tolerant of lower salinity and can be found farther upriver and in the shallower areas associated with the bays. Bays are generally more productive than channel areas and provide feeding and rearing habitat for many marine species. Demersal fish (living near the bottom) are attracted to the bays for this reason. However, demersal fish can also be attracted to channel areas during seasonal periods with abundant benthic and epibenthic species. Pelagic fish (living in surface water to middle depths) are most likely to be found in areas rich in plankton. Fish most often found in the deeper channels of the estuary are white sturgeon, Pacific herring, shad, and surf smelt. Some marine species, such as Pacific herring, use the estuary as a spawning area (COE, 1999).

The estuary also serves as a nursery and rearing area for some species of marine fish, including Pacific tomcod, surfperch, rockfish, sanddabs, smelt, and starry flounder. These species are generally confined to the lower estuary where salinity is higher. However, English sole and Pacific staghorn

sculpin are somewhat tolerant of freshwater and occur as far upriver as Tongue Point. Similarly, starry flounder are known to occur as far upriver as Portland.

The lower Columbia River population of white sturgeon is the largest in the species range, due primarily to access to marine areas, abundant food resources, and consistently favorable hydrologic conditions during the spawning period (DeVore et al., 1995). White sturgeon occur throughout the lower estuary and river during all life history stages. Spawning occurs primarily in the deeper areas just below Bonneville Dam, though spawning is also known to occur in deepwater areas of the lower river. Spawning lasts for 38 to 48 days from late April or early May through June or July. Growth is rapid during the first summer, with young-of-the-year reaching a length of 7 inches by the end of September. Young-of-the-year and juvenile sturgeon are usually found in water deeper than 36 feet (McCabe and Tracy, 1994).

Freshwater Fish

Resident freshwater fish within the lower Columbia River include both coldwater (trout) and warmwater (bass, crappie, and bluegill) species. Fies (1971) conducted gill net surveys within the sloughs of the lower Columbia River to assess the stock of warmwater game fishes. The data from his study indicates that there are at least 16 non-salmonid species commonly occurring within the slough and lower floodplain reaches of streams within the subbasin. Five of these 16 species are native fish and the others are exotic or introduced species.

Several of the exotic fishes are predators of small fish and pose a threat to migrating juvenile salmonids. Northern pikeminnows (a native fish of the Columbia River), white crappie, black crappie, and largemouth bass are all predators and found within the sloughs and floodplain habitats of the Lower Columbia River Subbasin (Fies, 1971).

Fies (1971) found yellow bullhead to be abundant. Other exotic fish may compete with native fish for habitat or food, reducing growth rates of native fish and potentially decreasing survival. A few representative non-ESA listed species, known to occupy the basins and waterbodies containing federally listed salmonids in the project area are discussed in *Commercial and Recreational Fisheries*.

Marine Mammals

Thirty-one species of marine mammals have been recorded within the Northeastern Pacific Ocean, including 7 species of baleen whales; 17 species of toothed whales, dolphins, and porpoises; 5 species of pinnipeds (seals and sea lions); and sea otters (Carretta et al., 2006). Large numbers of Steller sea lions, California sea lions, and Pacific harbor seals can be found utilizing haulout sites along the lower Columbia River. Maps depicting the locations of haulout sites used by Steller sea lions and seals are included in Appendix C. Steller sea lions are federally and state-listed and are discussed in sections 4.6.1.1 and 4.6.2. Eight species of federally and state-listed whales potentially occur off the coasts of Oregon and Washington and are discussed in sections 4.6.1.1 and 4.6.1.2. The remaining marine mammals are protected under the MMPA and are discussed in detail in sections 4.6.1.3, 4.6.2.1, and 4.6.2.2.

Sea Turtles

Four species of sea turtles have been documented off the coasts of Oregon and Washington. These include the green, olive ridley, leatherback, and loggerhead sea turtles. Sea turtles occurring off the coasts of Oregon and Washington are protected under the ESA and are discussed in sections 4.6.1.1 and 4.6.2.1.

Commercial and Recreational Fisheries

The Columbia River, estuary, and Pacific Ocean support a number of valuable commercial fisheries. Major fisheries include Dungeness crab, salmon, steelhead, white and green sturgeon, eulachon, and bottom fish. However, fishing for salmon and bottom fish has declined in the last several years because of declining stocks of these species. As a result, there has been a shift to other fisheries including crab, tuna, and halibut. Recreational fisheries occur throughout the river for salmon, steelhead, sturgeon, and a variety of warmwater game fish.

Commercial salmon fishing is done by gill net in the lower river and occurs in stages: from mid-February to early March and sometimes in May (Chinook salmon), late June (sockeye salmon), June through August (Chinook salmon), and from mid-September to mid-November (Chinook and coho salmon). Commercial fishing for steelhead is done exclusively under treaty rights by Native Americans.

Commercial sturgeon fishing was originally a by-product of the salmon gill net fishery, but has become a major fishery in its own right due to the decline of the salmon fishery. Commercial fishing for sturgeon is done by gill net in the lower Columbia River. The lower Columbia River commercial white sturgeon harvest for 2005 was 8,152 fish (ODFW and WDFW, 2005). Most of the harvest occurs in the fall, although fishing also occurs in the winter, spring, and summer months. Some sturgeon are also caught during the terminal fishery for salmon in Youngs Bay (Norman and King, 1997).

Eulachon fished commercially are used for bait in recreational sturgeon fisheries, but they are also fished commercially and recreationally as food. Mainstem river fishing is done primarily by gill net and to a lesser extent by otter trawl. Fishing in the tributaries is done with dip nets as regulated by the States of Oregon and Washington. Total eulachon landings for the mainstem Columbia River for 2006 were estimated at 13,221 pounds, significantly higher than 2005, which had the lowest annual landings on record (208 pounds) (WDFW, 2006b). Eulachon are currently a candidate for listing in Washington and are discussed further in sections 4.6.1.3 and 4.6.2.

Terminal fisheries for salmon occur in Youngs Bay and Deep River (tributary to Grays Bay) and at several locations in Cathlamet Bay in the lower river. Terminal fisheries involve rearing juvenile salmon in pens and then releasing them to the ocean. When the fish return to the pen area, fishing is allowed in the immediate area to target only returning individuals. This type of fishery was developed to provide fishing opportunities without impacting wild runs.

Recreational fishing for eulachon, sturgeon, and salmon also occurs in the lower Columbia River. Recreational fishing (or dipping) for eulachon occurs in the tributaries using a dip net. Eulachon are used both as food and as sturgeon bait. Recreational harvest records are not kept but can be as high as the commercial landings during periods of high eulachon abundance. A large sturgeon fishery occurs in the estuary in the summer when sturgeon feed on bait fish that move into the estuary. Recreational fisheries for salmon also occur in the ocean and estuary, although this fishery has declined in recent years due to declining stocks. In addition, a fishery for rock and bottom fish occurs off some jetties and piers.

Fisheries of Special Concern

Fisheries resources of special concern occurring along the LNG marine transit route include: 1) fisheries protected by tribal treaty rights; 2) federally designated EFH for coho and Chinook salmon, coastal pelagic species, groundfish, and highly migratory species; 3) species listed federally as threatened, endangered, or candidates under the ESA and their designated or proposed critical habitat; and 4) species listed as threatened or endangered by the States of Oregon or Washington. Potential impacts on tribal fisheries as a result of the proposed project are discussed in section 4.8.2.4. Potential impacts on EFH

along the marine vessel route are discussed in section 4.5.1.2. Potential impacts on listed salmonids and their critical habitat, as well as state-listed threatened and endangered species, are discussed in section 4.6.2.1.

Impacts on Aquatic Resources

LNG marine traffic during operation of the Bradwood Landing Project has the potential to impact aquatic species through fish strandings, increased shoreline erosion, introduction of exotic species, vessel strikes, and releases of LNG. Much of the impact discussion included below applies to fish protected under the ESA, which are described in detail in section 4.6.1.1 and 4.6.2.1, and to EFH designated under the MSA, which is discussed further in section 4.5.1.2. In addition, marine mammals and sea turtles occurring along the waterway for LNG marine traffic are protected under the ESA and/or the MMPA and are described in sections 4.6.1.1 and 4.6.1.3.

Fish Strandings

A series of studies conducted on the lower Columbia River suggest that under certain conditions, deep-draft vessels can produce wakes that strand juvenile fish (Bauersfeld, 1977; Hinton and Emmett, 1994; Ackerman, 2002; Pearson et al., 2006; Entrix, 2008). Stranding can occur when fish become caught in a vessel's wake. The fish are then deposited on shore by the wave generated by the vessel wake. Stranding typically results in mortality unless another wave carries the fish back into the water. The most recent and comprehensive study on wake strandings on the lower Columbia River prepared by Pearson et al. (2006) suggests that the specific mechanisms of strandings are still not completely understood. It appears that no single factor controls fish strandings. Rather, a series of interlinked factors act together to produce stranding during a ship passage. These factors include:

- River-surface elevation – low tides are generally more likely to result in strandings than high tides.
- Beach slope – low-gradient beaches are generally more likely stranding locations than high-gradient ones.
- Wake characteristics – ship wakes that result in both the greatest drawn-down and run-up on the beach are generally most likely to result in strandings. Wake characteristics are influenced by a number of dynamics including vessel size and hull form (“short and fat” vessels have a greater displacement effect and generate larger wakes than “long and thin” vessels); vessel draught (the smaller the under-keel clearance, the larger the wakes; thus, loaded vessels are more likely to result in strandings than unloaded vessels); vessel speed (fast moving vessels generate larger wakes than slow vessels); the distance between the passing vessel and the beach (strandings are generally more likely at beaches close to the shipping channel than more distant beaches). Fish strandings were observed as a result of four types of vessel passages including: oil tankers, container ships, car carriers, and bulk carriers (in order of the vessels observed to cause the highest to lowest stranding frequency).
- Various biological factors – for example, the larger number of sub-yearling salmon that are present near the shoreline, the more fish that are likely to be stranded; salmon that are larger and relatively strong swimmers are generally less prone to stranding.

All of these factors can vary simultaneously, making it difficult to predict the location and to what degree strandings may occur. It is important to note that not all ship wakes strand fish. The Pearson

et al. (2006) study examined the statistical probability of strandings associated with deep-draft vessels transiting the lower Columbia River as part of the review of the Columbia River Channel Improvement Project. Pearson et al. (2006) specifically chose beaches along the lower Columbia River based on the following characteristics:

- all sites are known to have previously had juvenile salmon stranding (Bauersfeld, 1977);
- all sites have a gently sloping beach (previous work indicated that these beaches are prone to fish strandings);
- all beaches are exposed to ship wakes from the navigation channel; and
- all sites have evidence of fairly stable beach morphology.

The study looked at 126 vessel passages in three locations (County Line Park at CRM 51, Barlow Point at CRM 62, and Sauvie Island at CRM 97).

The three sites chosen for the Pearson et al. (2006) study are located upstream of Bradwood and the portion of the river LNG carriers would transit to the proposed LNG terminal. Reported strandings are greater upriver of the proposed LNG terminal compared to down river. Stranding events occurred in 46 of the 126 vessel passages observed. Of the fish that were stranded, the smaller fish of a cohort group tended to strand at a greater rate than larger fish from the same cohort group (Ackerman, 2002; Pearson et al., 2006). There is only one record of wake stranding (on Tenasillahe Island at about CRM 37) in the portion of the river downstream of the proposed LNG terminal site. There appear to be important differences in the lowermost 38 miles of the Columbia River compared with the portions of the river above the proposed LNG terminal site. The lower part of the river is broader and distances from the navigation channel to beaches are generally greater than in the upriver segment. The sampled densities of juvenile salmon are lower in the lower Columbia River shallows. Further, the effects of tides, currents, and winds may be more variable in the lower Columbia River.

Recognizing the limitations of the Pearson et al. (2006) stranding model for estimating stranding at sites other than the three beaches where the model was calibrated, Entrix (2008) developed a process model to identify regionally significant risk factors for stranding. Entrix (2008) then used bathymetric, aerial photographic, and other data sources to determine which beaches have the necessary risk factors.

Six risk factors for wake stranding were identified by the Entrix (2008) study:

- A confined channel – The type of long-period waves that have been observed to strand fish do not develop in unconfined channels.
- Distance from sailing line – Stranding has previously been encountered along the lower Columbia River on beaches up to 853 feet from the edge of the ship channel.
- Shielding features – Stranding is not observed on beaches that lack a “line of sight” to the navigational channel, so such beaches are presumably not at risk for stranding. Stranding risk is assumed to be low if a “line of sight” exists, but an intervening sand bar or the flows of a major tributary stream would disrupt the passage of a ship wake.
- Beach slope – Stranding is most often observed on beaches that have a very low slope. Stranding risk was assessed as high on beaches with a slope less than 2.5 percent, moderate on beaches with a 2.5 to 5 percent slope, low on beaches with a 5 to 10 percent slope, and minimal on beaches with a steeper slope.

- Presence of a berm – A berm is a break in bottom slope such that a shallow-water shelf exists offshore of the beach. Ship wakes propagate very effectively where there is a berm in water less than 18 feet deep, so much so that the presence of a berm is nearly a prerequisite for stranding to occur. Stranding risk increases as the berm becomes shallower; a high risk exists for berms less than 6 feet deep (CRD), a moderate risk exists for berms 6 to 12 feet deep, and a low risk exists for berms 12 to 18 feet deep.
- Fine-scale beach features – Certain beach features, such as riprap or vegetation, affect stranding risk. Aerial photography was reviewed to identify the occurrence of such features.

LNG carriers transiting the lower Columbia River over the operation life of the LNG terminal are likely to result in the stranding of some sub-yearling fish. Based on reasonably available information, we are not able to predict the level of fish strandings that would be directly associated with the Bradwood Landing Project. The quantitative results on the level of fish strandings from the stranding studies conducted to date cannot be extrapolated to other areas on the Columbia River because of the study designs and the varying forces that affect the important variables from one location to another. The FERC staff continues to study this issue in consultation with the NMFS, ODFW, and WDFW. The process model developed by Entrix (2008) will be expanded upon by conducting field analysis to groundtruth berms associated with beaches designated as high risk or greater. Additionally, a model will be developed to generate estimates of the number of fish expected to be impacted by LNG carrier activities. The new model will build from the Entrix (2008) process model described above by incorporating potential stranding risk, LNG carrier frequency and timing, juvenile salmonid run timing, and juvenile salmonid densities. These additional analyses regarding wake stranding effects on fish will be included in the revised BA and EFH Assessment.

Shoreline Erosion and Prop Wash

Prop wash from LNG carriers associated with the project, as well as ship wakes breaking on shore could cause increased erosion along the shoreline and resuspend the eroded material within the water column. Increased erosion and suspended sediment levels can adversely affect fish eggs and fish survival, benthic community diversity and health, and spawning habitat. At high concentrations, suspended sediments can affect oxygen exchange over the gills, resulting in weakened individuals or mortality.

Numerous comments were received on the draft EIS regarding the potential impacts on aquatic resources due to increased erosion and suspended sediment levels within the Columbia River. As described in section 4.1.2.3, LNG carrier wakes and tug propeller wash could impact shorelines along the route and contribute to erosion at a number of locations where the channel is narrow relative to vessel size, vessel speed remains high, shorelines are in close proximity to the sailing line, and banks already have suffered erosion from similar causes. Additional analysis of the potential impacts on salmonids from increased shoreline erosion due to LNG carrier wakes will be included in the revised BA and EFH Assessment. To minimize the potential for impacts on aquatic resources due to LNG carrier transit, **we recommend that:**

- **NorthernStar should coordinate with the NMFS to determine appropriate LNG carrier speed, or other applicable measures, to avoid or minimize impacts on juvenile fish from wake stranding and shoreline erosion due to LNG carrier transit along the waterway. Results of modeling and coordination, including any specific measures to be implemented, should be filed with the Secretary, within 30 days after issuance of the final EIS.**

Introduction of Exotic Species

LNG carriers in transit to and from the LNG terminal could import exotic species on their hulls and exterior equipment. The LNG carriers would come from the other side of the Pacific Ocean on a voyage taking approximately 3 weeks. Operators of commercial vessels have a significant economic interest in maintaining underwater body hull platings in a clean condition. Fouling of bottom platings would result in increased fuel costs for voyages and could also reduce the vessel's maximum transit speed. To prevent fouling and the associated economic costs, operators aggressively and conscientiously apply hull plating preservation and maintenance programs. Furthermore, failure to preserve and maintain hull plating not only raises short-term operation costs but also sets the stage for increased long-term hull maintenance costs. There is a particular sensitivity to this engineering and economic reality regarding commercial vessels operating at the higher end of the sailing rates schedule, as is the case for LNG carriers.

In addition to the antifouling program measures, fluid dynamics plays a practical role as a barrier to the introduction of invasive species in the manner described. The amount of water that passes over the hull and through the seachest is a massively large volume. The velocity of the seawater, abrasive by nature, along the hull would be expected to "waterblast" off anything that is not affixed to the hull (e.g., a barnacle). Normal ballast exchange requires only three changes of water through the ballast tanks to purge out any loading port organisms before arrival at the unloading port. These exchanges are done at sea and the exchanges occur at relatively low velocity. By contrast, the hull and seachest would have the equivalent of untold multiples of seawater exchange such that an organism on the hull or in the seachest would be flushed off with much more velocity and volume of water than the accepted international ballast exchange procedure.

The Coast Guard has developed responses to exotic/invasive organisms associated with foreign vessels. The Coast Guard Office of Operating and Environmental Standards developed *Mandatory Practices for All Vessels with Ballast Tanks on All Waters of the United States*. The mandatory practices include requirements to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin and remove fouling organisms from hull, piping, and tanks on a regular basis and dispose of any removed substances in accordance with local, state, and federal regulations.

In addition, ships must have onboard and adhere to a Ballast Water Management Plan and must maintain a Ballast Water Record Book to record the intake and discharge of ballast water (IMO, 2004). As part of the International Convention for the Control and Management of Ships' Ballast Water and Sediments, the IMO may institute more stringent requirements for the control of invasive organisms in ballast water, provided the convention is ratified by at least 30 member states (only 8 have currently ratified it). Under the 2004 convention, all ships with ballast water capacity more than 5,000 m³ (which would include all LNG carriers) would be required to follow Ballast Water Exchange and/or Performance Standards, which include testing to demonstrate that potentially harmful organisms either are not present or are present in very small quantities. On September 2006, a federal district court ruled that by September 30, 2008, the EPA needs to take specific action to ensure that shipping companies comply with the intent of the CWA and restrict the discharge of ballast water into United States waters (Buck, 2006). While EPA has not developed specific actions, operation of the proposed project would be required to comply with any future EPA discharge requirements.

Based on above descriptions of hull plating surface treatments, the fluid dynamics along the LNG carrier's underwater body, and mandatory practices required by the Coast Guard and IMO, LNG carriers would not likely introduce exotic or invasive species into the lower Columbia River system.

Vessel Strikes

The addition of 125 vessel trips per year on the Columbia River and off the coasts of Oregon and Washington has the potential to result in collisions between LNG carriers and sea turtles and/or marine mammals. Although sea turtles and whales would not likely occur in the immediate vicinity of the LNG terminal, they could be affected by vessels transiting from areas located throughout the Pacific Basin. The potential for vessel strikes to affect sea turtles and/or marine mammals is discussed in detail in section 4.6.2.1. The potential also exists for vessel strikes to pinnipeds, as further discussed in section 4.6.2.1.

Release of LNG or Fuel

The potential exists for an LNG spill and associated fire during transit of the LNG carriers to the LNG terminal that could affect aquatic species occurring in the immediate vicinity of the spill. As described in section 4.11.5.3, the released LNG would vaporize rapidly upon contact with the air and water. Because LNG is not soluble in water and the LNG would completely vaporize shortly after being spilled, there would be no liquid left that could mix and/or contaminate the water. However, the greatest threat to aquatic species from an LNG spill would be thermal stress from the rapid change in water temperature due to contact with the cryogenic liquid (before the LNG vaporizes) or the fire associated with the ignited vapors. Any aquatic species in the immediate vicinity of the LNG or the fire would probably experience a sudden thermal shock that would be lethal. Aquatic species in the general area of a spill would most likely detect the temperature change and avoid the area. With implementation of the mitigation measures described in the Coast Guard's WSR (Appendix G), an LNG release would be highly unlikely, and therefore, the potential impacts on aquatic resources would be less than significant.

Fuel (e.g., diesel) used for vessel propulsion or auxiliary/emergency generators could potentially spill or leak. However, fuel on each ship is protected by the vessel's double hull. Furthermore, each LNG carrier would maintain a SOPEP which would contain measures to be implemented in the event of a petroleum release (see section 4.3.2.2).

4.5.1.2 Essential Fish Habitat

The MSA (Public Law 94-265 as amended through October 11, 1996) was established, along with other goals, to promote the protection of EFH in the review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. EFH is defined in the MSA as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

Federal agencies that authorize, fund, or undertake activities that may adversely impact EFH must consult with the NMFS. Although absolute criteria have not been established for conducting EFH consultations, the NMFS recommends consolidated EFH consultations with interagency coordination procedures required by other statutes, such as NEPA, the Fish and Wildlife Coordination Act, the ESA, and the Federal Power Act in order to reduce duplication and improve efficiency (50 CFR 600.920(e)). Generally, the EFH consultation process includes the following steps:

- 1) Notification – The action agency should clearly state the process being used for EFH consultations (e.g., incorporating EFH consultation into an EIS, section 10 permit).
- 2) EFH Assessment – The action agency should prepare an EFH Assessment that includes both identification of affected EFH and an assessment of impacts. Specifically, the EFH should include:

- a description of the proposed action;
 - an analysis of the effects (including cumulative effects) of the proposed action on EFH, the managed fish species, and major prey species;
 - the federal agency's views regarding the effects of the action on EFH; and
 - proposed mitigation, if applicable.
- 3) EFH Conservation Recommendations – After reviewing the EFH Assessment, the NMFS should provide recommendations to the action agency regarding measures that can be taken by that agency to conserve EFH.
 - 4) Agency Response – Within 30 days of receiving the recommendations, the action agency must respond to the NMFS. The action agency may notify the NMFS that a full response to the conservation recommendations will be provided by a specified completion date agreeable to all parties. The response must include a description of measures proposed by the agency to avoid, mitigate, or offset the impact of the activity on EFH.

We consolidated EFH consultations for the Bradwood Landing Project with the consultations required under the ESA. As such, we have prepared a BA and EFH Assessment for the Bradwood Landing Project and submitted it to the FWS and NMFS with a request to initiate the formal consultation process. The BA and EFH Assessment details the environmental baseline for EFH, federally listed species, and critical habitat; direct, indirect, interdependent and interrelated, and cumulative effects; proposed conservation measures; and determinations of effect. Based on comments from the FWS and NMFS, the FERC staff is currently revising the BA and EFH Assessment; upon completion, the BA and EFH Assessment will be resubmitted to the agencies with a request to initiate consultation.

Identification of Essential Fish Habitat along the Waterway for LNG Marine Traffic

EFH potentially affected by the proposed project was identified through written communication with the NMFS Portland Office (NMFS, 2006a). LNG carriers would transit from the proposed LNG terminal along the mainstem Columbia River to the mouth of the Columbia River and out to the edge of the EEZ. EFH in the Zones of Concern is shown on figure 4.5.1-1 and includes habitat for more than 90 species of groundfish, 5 species of coastal pelagic species, 2 species of salmon, and 13 highly migratory species.

Groundfish EFH

Based on the current *Fishery Management Plan* (FMP) for groundfish at the time of this writing, the overall extent of groundfish EFH for all fishery management unit species is identified as: 1) all waters and substrate within waters less than or equal to about 11,500 feet in relation to MHHW, or the upriver extent of saltwater intrusion (near Harrington Point at CRM 23); 2) seamounts in depths greater than about 11,500 feet as mapped in the EFH Assessment; and 3) areas designated as habitat areas of particular concern that are not already identified by the above criteria (PFMC, 2006a). However, the PFMC notes that these EFH designations are precautionary because they are based on the currently known maximum depth distribution of all life stages of groundfish (PFMC, 2006a).

The Pacific Coast groundfish FMP manages more than 90 species over a large and ecologically diverse area. Of these, spiny dogfish, big skate, Pacific herring, Pacific hake, black rockfish, kelp greenling, lingcod, cabezon, Pacific sanddab, butter sole, English sole, starry flounder, and sand sole are known to occur within the Columbia River estuary.

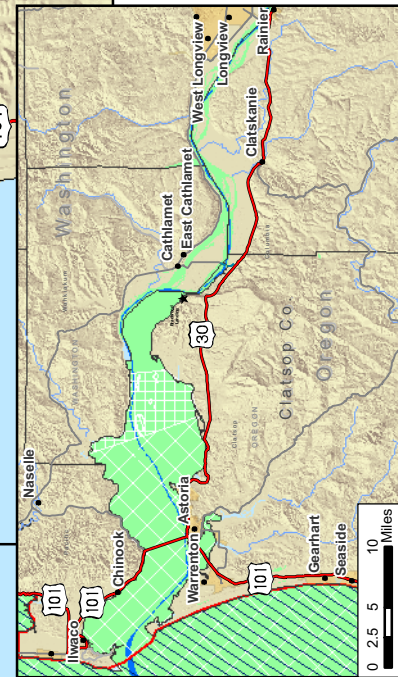
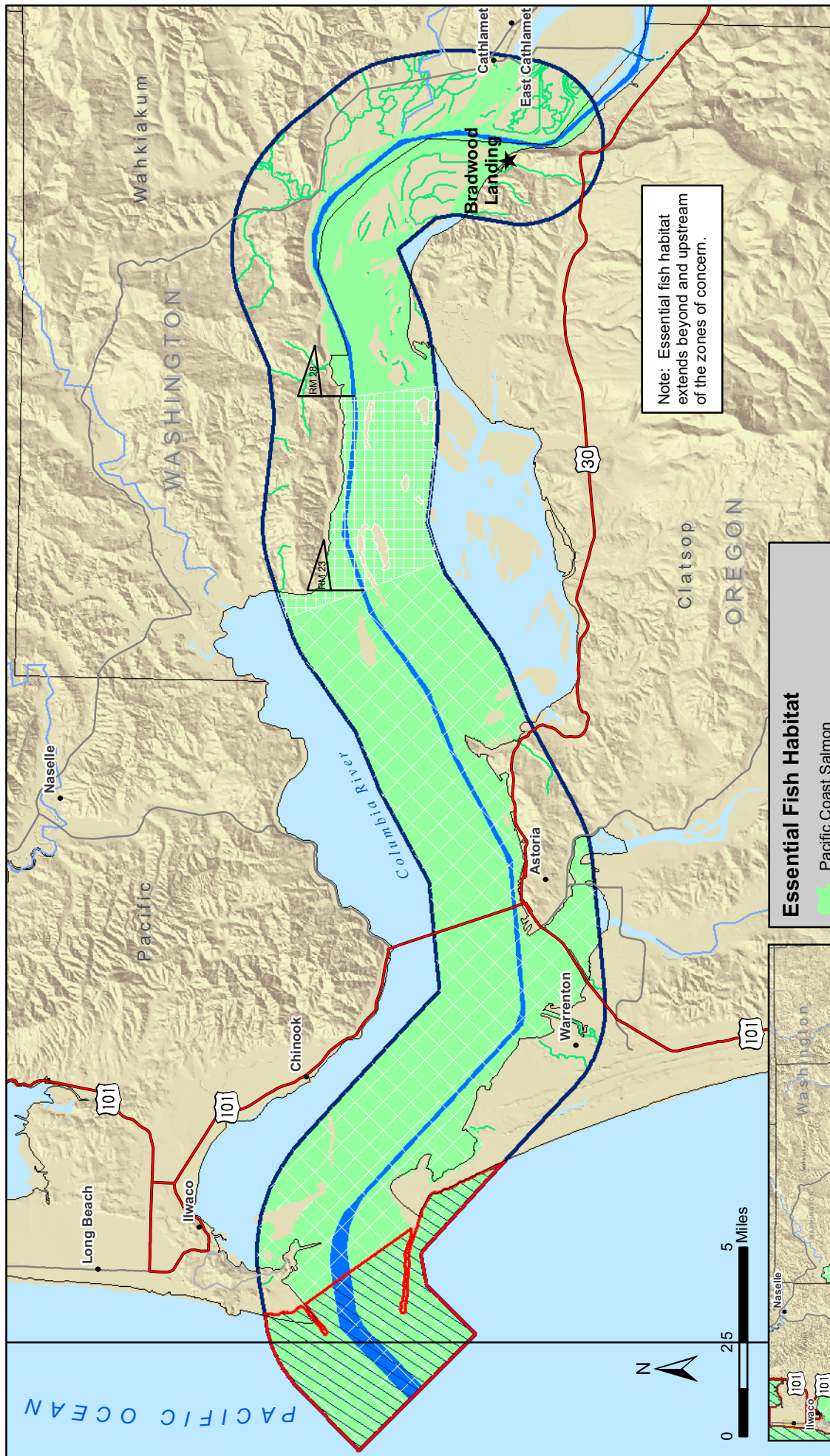


Figure 4.5.1-1
Bradwood Landing Project
Essential Fish Habitat
in Zones of Concern

Coastal Pelagic Species EFH

The EFH for coastal pelagics is defined by the species' temperature and geographic range during all life stages in the past, present, and where they could occur in the future. In addition to all marine and estuarine waters off the Pacific Coast to the limits of the EEZ, EFH for coastal pelagic species also includes portions of the water column where sea surface temperatures range between 50 °F (near the United States/Mexico maritime boundary) and 79 °F (seasonally and annually variable) (PFMC, 2006b).

The coastal pelagic species FMP includes five species: Northern anchovy, Pacific sardine, Pacific (chub) mackerel, jack mackerel, and market squid. Of these, two species (market squid and Pacific sardine) are known to occur in estuaries (PFMC, 1998).

Pacific Coast Salmon EFH

Pacific coast salmon EFH includes those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem. In addition to all marine and estuarine waters off the Pacific coast to the limits of the EEZ, EFH for the Pacific coast salmon fishery includes all streams, lakes, ponds, wetlands, and other currently viable waterbodies and most habitat historically accessible to salmon. Excluded are some areas upstream of certain impassable man-made barriers (e.g., dams as identified by the PFMC in Appendix A of *Amendment 14 to the Pacific Coast Salmon Plan*), and longstanding, naturally impassable barriers (e.g., natural waterfalls in existence for several hundred years) (PFMC, 2000).

Based on available life history information, freshwater EFH for Pacific coast salmon consists of four major components:

- spawning and incubation habitats;
- juvenile rearing habitat;
- juvenile migration corridors; and
- adult migration corridors and holding habitat (Roni et al., 1999).

Important features of habitat for spawning, rearing, and migration include:

- substrate composition;
- water quality (i.e., dissolved oxygen, nutrients, temperature);
- water quantity, depth, and velocity;
- channel gradient and stability;
- food availability;
- cover and habitat complexity (e.g., LWD, pools, channel complexity, aquatic vegetation);
- space (habitat area);
- access and passage; and
- floodplain and habitat complexity.

Highly Migratory Species EFH

The EFH for highly migratory species is defined by the species' temperature and geographic range during all life stages in the past, present, and where they could occur in the future. In addition to all marine and estuarine waters off the Pacific coast to the limits of the EEZ, EFH has been designated for individual species due to their highly variable life histories. In general, species are found in temperate

waters with varying distributions and abundance based on oceanic environmental conditions including water temperature, current patterns, and the availability of prey (PFMC, 2003).

The highly migratory species FMP includes five species of tuna (north Pacific albacore, yellowfin, bigeye, skipjack, and northern bluefin), five species of shark (common thresher, pelagic thresher, bigeye thresher, shortfin mako, and blue), two billfish/swordfish (striped marlin and Pacific swordfish), and dorado (also known as dolphinfish and mahi-mahi). Five additional species (great white shark, megamouth shark, basking shark, Pacific halibut, and Pacific salmon) are included in the highly migratory species FMP for monitoring. Highly migratory species are pelagic and generally occur in the open ocean. Although they may spend part of their life cycle in nearshore waters, these species are not associated with estuaries (PFMC, 2003; PFMC, 2007).

Impacts on EFH

The PFMC (2000) identified potential sources of impacts on salmon EFH from non-fishing related activities. These include habitat modification or loss by actions that involve dredging, placement of fill, bank stabilization, removal of shoreline vegetation, waterway crossings for pipelines and conduits, removal of riparian vegetation, channel realignment, and the construction of docks and piers. In addition, construction adjacent to EFH could increase run-off of sediment, excess nutrients, chemicals, and petroleum products, all of which can adversely affect EFH (PFMC, 2006b). Potential adverse impacts on groundfish, coastal pelagic species, salmon, and highly migratory species are listed in table 4.5.1-1 and are discussed below.

TABLE 4.5.1-1 Potential Impacts on EFH Due to LNG Marine Traffic			
EFH	Description of EFH	Project Action with Potential Impacts on EFH	Determination of Effect
Coastal Pelagic Species	All marine and estuarine waters from the coast to the limits of the EEZ and above the thermocline where sea surface temperatures range between 50 °F and 79 °F.	Accidental spill or leak of hazardous materials.	Minimal adverse effect or less than substantial adverse effect on EFH (see section 4.5.1.1 for a discussion of mitigation measures).
Groundfish	Aquatic habitat from the extent of saltwater intrusion in river mouths to the boundary of the EEZ.	Accidental spill or leak of hazardous materials.	Minimal adverse effect or less than substantial adverse effect on groundfish EFH (see section 4.5.1.1 for a discussion of mitigation measures).
Pacific Coast Salmon	All streams, lakes, ponds, wetlands, and other waterbodies currently and historically accessible to salmon.	Accidental spill or leak of hazardous materials.	Substantial adverse effect on Pacific Coast salmon EFH (see section 4.5.1.1 for a discussion of mitigation measures).
Highly Migratory Species	All marine waters from the coast to the limits of the EEZ.	Accidental spill or leak of hazardous materials.	Minimal adverse effect or less than substantial adverse effect on EFH (see section 4.5.1.1 for a discussion of mitigation measures).

Source: Pacific Fishery Management Council, 2006b.

Aspects of LNG marine traffic with the potential to adversely affect designated EFH along the LNG carrier transit route would be limited to accidental spills or leaks of hazardous materials. A discussion of measures that would be implemented to avoid or minimize impacts on aquatic resources (which includes EFH) due to an accidental spill or leak of hazardous materials is presented in section 4.5.1.1. As noted previously, the FERC staff is currently revising its BA and EFH Assessment for the Bradwood Landing Project, which will be resubmitted to the NMFS with a request to initiate formal

consultation in compliance with section 7 of the ESA and the MSA. The FERC will respond to any EFH Conservation Recommendations issued by the NMFS through the EFH/ESA consultation process.¹³

4.5.1.3 Terrestrial Wildlife

As described in section 4.4.2, nine upland vegetative communities occur within the Zones of Concern along the waterway. These communities provide nesting, cover, dispersal, and/or foraging habitat for a variety of wildlife. Open water and wetland habitats also provide these functions for wildlife species. Potential impacts on these habitats are described and quantified in sections 4.3.2.2 and 4.4.1.1, respectively.

Wildlife species that commonly occur in the communities along the waterway are described in table 4.5.1-2. The most prevalent upland habitats within the Zones of Concern along the waterway are forest (i.e., coniferous, deciduous, mixed, early seral, and riparian forests) and wetlands (i.e., estuarine intertidal and submerged and palustrine emergent, scrub-shrub, forested, and multiple wetland types). Forest habitats provide the greatest vertical structure and support diverse faunal assemblages. Wetland habitats support diverse floral species and provide foraging and dispersal habitat for a wide variety of wildlife species. A portion of the forest and wetland habitats would also be considered riparian habitat. Similar to the other forest habitats, riparian forest provides significant vertical structure, and generally supports the most diverse faunal assemblages of the affected habitats.

General Impacts on Terrestrial Wildlife

Potential impacts from LNG carrier transit along the waterway on terrestrial wildlife species and their habitats would generally be limited to increased shoreline erosion resulting from LNG marine traffic along the Columbia River and an accidental or intentional release of LNG during transit of the LNG carriers. As discussed in detail in section 4.1.2.3, the proposed project would increase deep-draft vessel traffic by about 25 percent. The LNG carriers would be larger than most of the deep-draft ships currently using the Columbia River; although larger ships are expected to transit the Columbia River once the Columbia River Channel Improvement Project is completed. Because the blockage ratio of the LNG carriers would be greater than that of most deep-draft ships currently traveling the Columbia River, the LNG carriers could produce slightly larger waves than most of the current ships operating at the same speed. LNG carriers would travel at speeds between 8 and 12 knots while on the Columbia River. The degree to which current ship traffic affects shorelines along the waterway is difficult to quantify due to the various other factors which contribute to shoreline erosion and accretion processes. A detailed analysis of the potential for increased shoreline erosion due to LNG carrier wakes will be included in the revised BA and EFH Assessment. However, we have also recommended in section 4.1.2.3 that NorthernStar coordinate with the NMFS to determine appropriate restrictions on LNG carrier speed, or other applicable measures, to avoid or minimize shoreline erosion due to LNG carrier transit along the waterway.

¹³ Records of communications between the FERC and NMFS related to the consultation process for this project are available through <http://www.ferc.gov/docs-filing/elibrary.asp>.

TABLE 4.5.1-2

**Wildlife Species Occurring within the Vegetative Communities along the Waterway and in the Vicinity of the
Bradwood Landing LNG Terminal**

Vegetative Communities	Typical Wildlife Found within the Vegetative Communities
Forest ^a	<p>Amphibians: northwestern salamander, western red-backed salamander, roughskinned newt, western toad, Pacific treefrog, red-legged frog, bullfrog ^d.</p> <p>Reptiles: rubber boa, common garter snake, northwestern garter snake.</p> <p>Mammals: beaver, big brown bat, black bear, black-tailed deer, bobcat, bushy-tailed woodrat, California myotis, Columbian white-tailed deer, cougar, coyote, deer mouse, Douglas squirrel, elk, forest deer mouse, hoary bat, little brown myotis, long-eared myotis, long-legged myotis, mink, mountain beaver, porcupine, raccoon, red fox, Roosevelt elk, silver-haired bat, striped skunk, Townsend's chipmunk, vagrant shrew, western gray squirrel, Yuma myotis.</p> <p>Birds: American robin, bald eagle, barred owl, belted kingfisher, blue grouse, black-capped chickadee, dark-eyed junco, downy woodpecker, great blue heron, great-horned owl, hairy woodpecker, northern flicker, olive-sided flycatcher, osprey, peregrine falcon, red-breasted nuthatch, red-tailed hawk, ruby-crowned kinglet, ruffed grouse, rufous hummingbird, song sparrow, spotted towhee, Steller's jay, Swainson's thrush, varied thrush, willow flycatcher, winter wren, and yellow-rumped warbler.</p>
Scrub-Shrub ^b	<p>Amphibians: Pacific treefrog, red-legged frog, bullfrog ^d.</p> <p>Reptiles: rubber boa, northwestern garter snake, common garter snake.</p> <p>Mammals: beaver, big brown bat, black-tailed deer, California myotis, Columbian white-tailed deer, coyote, deer mouse, hoary bat, little brown myotis, long-eared myotis, long-legged myotis, mink, nutria ^d, raccoon, red fox, Townsend's vole, Yuma myotis.</p> <p>Birds: American kestrel, American robin, Bewick's wren, dark-eyed junco, great blue heron, marsh wren, song sparrow, red-winged blackbird, red-tailed hawk, rufous hummingbird, white-crowned sparrow, wood duck.</p>
Wetlands ^c	<p>Amphibians: northwestern salamander, western toad, Pacific tree frog, red-legged frog, bullfrog ^d, Oregon spotted frog.</p> <p>Reptiles: western painted turtle, northwestern pond turtle, common garter snake.</p> <p>Mammals: beaver, big brown bat, black bear, California myotis, coyote, hoary bat, little brown myotis, long-eared myotis, long-legged myotis, mink, muskrat, northern river otter, nutria ^d, raccoon, striped skunk, silver-haired bat, Townsend's big-eared bat, vagrant shrew, Yuma myotis.</p> <p>Birds: American coot, belted kingfisher, Bewick's wren, black-bellied plover, black-capped chickadee, Canada goose, cinnamon teal, cliff swallow, common snipe, dunlin, great blue heron, greater yellowlegs, mallard, marsh wren, northern harrier, northern pintail, northern shoveler, peregrine falcon, pied-billed grebe, purple finch, red-winged blackbird, short-billed dowitchers, song sparrow, sora, tree swallow, violet-green swallow, Virginia rail, western sandpiper.</p>
Streams and Ponds	<p>Amphibians: long-toed salamander, northwestern salamander, Pacific giant salamander, western toad, Pacific tree frog, red-legged frog, bullfrog ^d, Oregon spotted frog, tailed frog.</p> <p>Reptiles: western painted turtle, northwestern pond turtle, common garter snake, rubber boa.</p> <p>Mammals: beaver, big brown bat, black bear, California myotis, coyote, hoary bat, little brown myotis, long-eared myotis, mink, muskrat, nutria ^d, raccoon, silver-haired bat, Townsend's big-eared bat, Yuma myotis.</p> <p>Birds: Bewick's wren, black swift, black-capped chickadee, black-throated gray warbler, common yellowthroat, olive-sided flycatcher, peregrine falcon, rufous hummingbird, song sparrow, spotted towhee, yellow warbler, American dipper, band-tailed pigeon, barn swallow, belted kingfisher, Bullock's oriole, common merganser, great blue heron, green heron, hooded merganser, mallard, mourning dove, red-eyed vireo, ruffed grouse, spotted sandpiper, warbling vireo, willow/alder flycatcher, Wilson's warbler, wood duck, yellow-breasted chat.</p>
Nearshore	<p>Mammals: beaver, big brown bat, black bear, California myotis, Pacific harbor seal, hoary bat, little brown myotis, long-eared myotis, long-legged myotis, mink, muskrat, northern river otter, nutria ^d, raccoon, silver-haired bat, Steller sea lion, Townsend's big-eared bat, Yuma myotis.</p> <p>Birds: American dipper, bald eagle, bufflehead, California gull, Canada goose, Caspian tern, common goldeneye, cormorants, great blue heron, greater scaup, lesser scaup, mallard, northern rough-winged swallow, osprey, peregrine falcon, purple martin, red-winged blackbird, ring-billed gull, rock dove ^d, western grebe.</p>
Dredged Materials and Bare Ground	<p>Reptiles: common garter snake, northwestern garter snake.</p> <p>Mammals: black-tailed deer, deer mouse, raccoon.</p> <p>Birds: American Crow, house sparrow ^d, killdeer, mourning dove, rock dove ^d, song sparrow, spotted towhee.</p>

^a Forested communities include coniferous, deciduous, mixed, early seral, and riparian forests.

^b Scrub-shrub communities include both upland scrub-shrub and riparian scrub-shrub.

^c Wetland communities include estuarine intertidal and submerged as well as palustrine emergent, scrub-shrub, forested, and multiple wetland types.

^d Non-native species or invasive species occurring along the waterway or at the LNG terminal site.

In the unlikely event of a collision or allision of sufficient magnitude to rupture an LNG cargo tank, it is likely that sparks or flames would ignite the flammable vapors at the spill site. If that ignition did not occur, an LNG spill would rapidly vaporize on water and form a potentially flammable cloud. If the flammable vapor cloud encountered an ignition source, the cloud would burn back to the spill site, rather than outward towards shoreline habitats. However, it is possible that ignition of the LNG vapors could contribute to a forest fire in areas where the Columbia River navigation channel is adjacent to forested areas (e.g., between Altoona and Skamokawa). Given the relatively high precipitation in the region, large forest fires in the area are infrequent but they can be severe when they do occur. The intensity and extent of a potential forest fire would be highly dependent on a number of variables including available fuel (e.g., woody material), moisture and temperature, fuel composition, wind, and topography. With implementation of the mitigation measures described in the Coast Guard's WSR (Appendix G), an LNG release would be highly unlikely, and therefore, the potential impacts on terrestrial wildlife would be less than significant.

Unique or Sensitive Wildlife Habitats

Julia Butler Hansen National Wildlife Refuge

The JBHNR is located between CRMs 33.5 and 39 and includes the Hunting Islands and Price Island in Washington as well as Tenasillahe Island, portions of Crims Island, Wallace Island, and several mainland parcels in Oregon. It contains approximately 6,100 acres of pasture, forested tidal swamp, brushy woodlots, marshes and sloughs along the Columbia River, including nearly 4,800 acres of diked floodplain and undiked islands. As described in section 4.6.1.1, the JBHNR supports three subpopulations of Columbian white-tailed deer, which are federally listed as endangered under the ESA. During transit along the waterway, LNG carriers within the navigation channel would be adjacent to JBHNR refuge lands between CRM 33.5 and the proposed LNG terminal. Although potential impacts on the JBHNR resulting from LNG marine traffic associated with the proposed project would be limited to increased shoreline erosion and an accidental or intentional release of LNG during transit of the LNG carriers, these impacts could negatively influence management and recovery activities within the JBHNR as discussed below.

As discussed above and in section 4.1.2.3, the proposed project would increase deep-draft vessel traffic by about 25 percent. The degree to which current ship traffic affects shorelines along the waterway is difficult to quantify due to the various other factors which contribute to shoreline erosion and accretion processes. Therefore, it is difficult to determine what additional impacts on the shorelines of the JBHNR would occur as a result of increased LNG marine traffic. However, we have recommended in section 4.1.2.3 that NorthernStar coordinate with the NMFS to determine appropriate restrictions on LNG carrier speed, or other applicable measures, to avoid or minimize shoreline erosion due to LNG carrier transit along the waterway. In addition, NorthernStar prepared a *Shoreline Monitoring Plan*, which is described in section 4.1.3.3 that includes measures to reduce erosion of downstream banks should such erosion increase as a result of the project. The FERC staff continues to study this issue and additional analysis regarding shoreline erosion will be included in the revised BA and EFH Assessment.

Potential impacts on the JBHNR from a release of LNG and associated fire include habitat modification as well as injury or mortality of species occurring within the JBHNR. In its December 21, 2007 letter on the draft EIS, the U.S. Department of the Interior stated that Tenasillahe Island and the Mainland Refuge Unit would be especially vulnerable to adverse effects associated with the release of LNG and associated fire. In the event of a collision or allision of sufficient magnitude to rupture an LNG cargo tank, it is likely that sparks or flames would ignite the flammable vapors at the spill site. In the unlikely event that ignition did not occur, an LNG spill would rapidly vaporize on water and form a potentially flammable vapor cloud. If the flammable vapor cloud encountered an ignition source, the

LNG vapors could contribute to a forest fire within the JBHNR. Given the relatively high precipitation in the region, large forest fires in the area are infrequent but they can be severe when they do occur. The intensity and extent of a potential forest fire and the resulting damage to the JBHNR would be highly dependent on a number of variables including the extent of the LNG spill, available fuel (e.g., woody material), moisture and temperature, fuel composition, wind, and topography. Approximately 5,000 acres of the JBHNR are within the Zones of Concern, a portion of which could be affected if an accidental or intentional breach of an LNG carrier were to occur during transit. However, as discussed in section 4.11.5.3, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G). Potential impacts on the Columbian white-tailed deer as a result of an LNG release are discussed in section 4.6.1.4.

Lewis and Clark National Wildlife Refuge

The LCNWR is located between CRMs 18.5 and 35 and includes 35,000 acres of islands, bars, mud flats, and tidal marshes in the Columbia River estuary. The eastern boundary of the refuge is located immediately west of the JBHNR on Welch Island. The refuge is the largest marsh in western Oregon and was established to preserve wetland habitats in the lower Columbia River estuary and serve as a wintering area for migratory waterfowl and shorebirds. The LCNWR provides resting habitat for peak populations of 1,000 tundra swans, 5,000 Canada geese, and 50,000 ducks in February and March before the northward migration. Between 30 and 35 active bald eagle nests occur within the refuge. In addition, estuarine waters within the refuge provide foraging habitat for juvenile salmonids before entering the Pacific Ocean. Other fish species using the estuary include shad, smelt, perch, starry flounder, bass, catfish, and Pacific lamprey. Pacific harbor seals use sandbars and mud flats as resting sites at low tides, while seals and California sea lions feed on fish in the estuary. Beaver, raccoon, weasel, mink, muskrat, and river otter also live on the islands. Potential impacts on the LCNWR resulting from LNG marine traffic associated with the proposed project would be limited to increased shoreline erosion and an accidental or intentional release of LNG during transit of the LNG carriers. The potential for increased shoreline erosion at the LCNWR would be similar to that described above for the JBHNR.

The islands composing the LCNWR occupy approximately 21,800 acres within the Zones of Concern, a portion of which could be affected if an accidental or intentional breach of an LNG carrier were to occur during transit. Potential impacts on the LCNWR from a release of LNG and associated fire would be similar to those described above for the JBHNR and include habitat modification as well as injury or mortality of species occurring within the LCNWR. The intensity and extent of a potential forest fire and the resulting damage to the LCNWR would be highly dependent on a number of variables including the extent of the LNG spill, available fuel (e.g., woody material), moisture and temperature, fuel composition, wind, and topography. Similarly, injury and mortality to species would also be dependent on the time of year that the incident occurred as well as the mobility of the species.

Fort Stevens State Park

Fort Stevens State Park comprises approximately 4,300 acres and is located west of Warrenton, Oregon. According to the *Oregon Estuary Plan Book* (ODLCD, 2007), this state park contains some significant wildlife habitat. Two islands north of Fort Stevens State Park within the Columbia River also contain significant habitat. Potential impacts on Fort Stevens State Park resulting from the proposed project would be similar to those described above for the JBHNR and LCNWR.

Mitigation Measures

As part of its Compensatory Mitigation Plan, NorthernStar would restore areas along the shoreline of the lower Columbia River at Svensen Island and preserve habitat at the mouth of Hunt Creek. However, the existing version of the Compensatory Mitigation Plan does not include a discussion of potential impacts on habitat due to LNG carrier traffic. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. To ensure that the proposed mitigation adequately compensates for project-related impacts, including impacts on downstream habitats from shoreline erosion, we recommended that NorthernStar continue to consult with the appropriate natural resource agencies to finalize its Compensatory Mitigation Plan. The final Compensatory Mitigation Plan would be filed along with agency comments and applicable approvals with the Secretary prior to construction of the project.

4.5.2 LNG Terminal

4.5.2.1 Aquatic Resources

The Bradwood Landing LNG terminal, which would be located at CRM 38, is upstream of the extent of saltwater intrusion (near Grassy Island at CRM 30) and is near the upriver estuarine boundary at CRM 38 (downstream edge of Puget Island) (Fox et al., 1984). The Columbia River near the LNG terminal site provides habitat for a variety of anadromous and resident fish species and is discussed below. A detailed discussion of aquatic species that have designated EFH in the vicinity of the LNG terminal or are listed as endangered or threatened is included in sections 4.5.2.2 and 4.6.1.1, respectively.

Existing Aquatic Resources

Marine Fish

Because the LNG terminal would be located near the upriver estuarine boundary of the Columbia River, with the exception of the starry flounder, marine species are not likely to occur at the proposed site. The starry flounder has been known to swim greater than 75 miles up major rivers but does not follow any migratory trend (NMFS, 2006e). All life stages (eggs, larvae, juveniles, and adults) of the starry flounder are present in estuaries; however, only juveniles and adults occur in freshwater. The starry flounder is discussed in detail in section 4.5.2.2.

The Columbia River near the LNG terminal site provides habitat for both anadromous and resident fish species. These species are described under the waterway for LNG marine traffic in section 4.5.1.1.

Freshwater Fish

Resident freshwater fish within the project area include both coldwater (trout) and warmwater (bass, crappie, and bluegill) species. These species are described in section 4.5.1.1.

Marine Mammals

Steller sea lions, California sea lions, and Pacific harbor seals use haulout sites along the lower Columbia River and may occur in the vicinity of the proposed LNG terminal (Appendix C). These species and other marine mammals are protected by the Marine Mammal Protection Act of 1972 and are described further in section 4.6.1.3. In addition to protection under the Marine Mammal Protection Act, Steller sea lions are federally and state-listed and are described in section 4.6.1.1.

Commercial and Recreational Fisheries

Commercial and recreational fisheries of the lower Columbia River are described in section 4.5.1.1.

Fisheries of Special Concern

Fisheries resources of special concern occurring in the vicinity of the LNG terminal include: 1) federally designated EFH for coho and Chinook salmon, as well as starry flounder; 2) species listed federally as threatened, endangered, or candidates for listing under the ESA and their designated or proposed critical habitat; and 3) species listed as threatened or endangered by the State of Oregon. Potential impacts on EFH at the LNG terminal are discussed in section 4.5.2.2. Potential impacts on federally and state-listed species and their critical habitat are discussed in section 4.6.2.2.

Impacts on Aquatic Resources

General project activities associated with the proposed LNG terminal that could potentially impact aquatic resources include in-water construction activities, habitat modification, water appropriations, artificial lighting, accidental spills or leaks of hazardous materials, and operation of the LNG terminal. Much of the impact discussion included below applies to fish protected under the ESA, which are described in detail in sections 4.6.1.1 and 4.6.2.2, and to EFH designated under the MSA, which is discussed further in section 4.5.2.2. As described above, Steller sea lions occurring within the vicinity of the proposed LNG terminal are protected under the ESA and the Marine Mammal Protection Act and are discussed in detail in sections 4.6.1.1 and 4.6.2.2.

In-Water Construction Activities

Fish, marine mammals, and other aquatic resources could be impacted by in-water construction activities including dredging, development of the river shoreline, pile driving, and filling of the log pond at the LNG terminal site. Direct impacts of in-water construction activities on aquatic resources would include the displacement of aquatic resources within the affected area and direct mortality of some individuals. During construction activities, mobile species, such as fish and marine mammals, would be expected to leave the vicinity of the project area. Animals displaced by construction activities may relocate into similar habitats nearby; however, the lack of adequate territorial space could force some animals into suboptimal habitats. The influx and increased density of animals in some undisturbed areas caused by these dislocations could increase inter- and intra-species competition and also reduce the reproductive success of animals that are not displaced by construction. The loss of these individuals could result in a decrease in the food stock available for predators of these species.

Comments were received on the draft EIS regarding impacts on shallow water habitat due to construction of the LNG terminal facilities. As described in section 4.4.1.1, shallow water habitat is defined as being between elevations slightly above MLLW and 6 feet below MLLW. Medium depth water is between 6 and 18 feet below MLLW, while deep water is defined as 18 feet and deeper (LCFRB, 2004). However, shallow water habitat as it relates to fish habitat generally refers to waters less than 20 feet deep. Therefore, the discussion of shallow water habitat that follows includes the shallow and medium depth water as defined by the LCFRB. Based on the description of the maneuvering area and berth in section 2.1.3, in-water construction activities impacting shallow water habitat would be limited to the driving of piles associated with the berth, which would occupy less than 0.1 acre of habitat. It is important to note that the ship berth and maneuvering area would be located approximately 300 feet from the shore. Therefore, direct impacts on shallow water habitat as a result of dredging are not anticipated.

The degree of impacts on aquatic resources associated with construction activities would depend on the timing of in-water construction. Construction during periods of sensitive fish activity (i.e., spawning, juvenile rearing, and migration) can have a greater impact on fish than construction during other periods. To minimize impacts on fish in the Columbia River, NorthernStar would limit dredging and other in-water activities to the November 1 through February 28 in-water work window recommended by the NMFS (NMFS, 2005a). Similarly, in-water activities at Hunt Creek would be limited to the July 1 through September 15 in-water work window recommended by the ODFW (ODFW, 2000).

Dredging

The water column and substrate in the vicinity of the proposed LNG terminal provides habitat for spawning, breeding, feeding, growth, migration, and shelter to numerous species of fish. Additionally, prey species occur within the water column and sediments within the ship berth and maneuvering area.

As discussed in section 2.4.1.2, NorthernStar proposes to dredge the LNG carrier berth and maneuvering area using a hydraulic cutterhead dredge with a 30-inch discharge pipe and a 4,950 horsepower pump. Dredging equipment would operate 24 hours per day, 7 days per week, pending any restrictions specified in the permits necessary for these activities. The exact time needed for dredging would depend on a number of variables that cannot be predicted, such as weather and river conditions; however, NorthernStar estimates that the dredging would be accomplished in about 48 to 72 days. Construction of the berth would require the removal of 700,000 cubic yards of sediments, increasing the water depth from an average of -33 feet CRD to -42 feet CRD with a 1-foot overdredge allowance. Dredging activities have the potential to impact aquatic resources through habitat alteration, temporary increases in suspended sediment and turbidity levels, removal of benthic organisms, resuspension of contaminated sediments, entrainment, increased noise, and alterations to sediment transport and deposition.

Habitat Alteration. Dredging of the berth and maneuvering area would result in permanent modification of aquatic habitats. Removing sediment from the river bottom, increasing the water depth an average of approximately 9 feet, and constructing over-water structures could potentially affect use of the project area by aquatic species. The removal of sediment from the river bottom is discussed in section 4.2.2.2. Increasing the water depth an average of approximately 9 feet could potentially result in reduced use of the area by juvenile fish. However, NorthernStar would mitigate for reduced habitat quality at the berth and maneuvering area through restoration and/or preservation of several times as much area of high quality habitat at the Svensen Island and Hunt Creek Mitigation Sites (see *Mitigation Measures*, below). Impacts on aquatic species from construction of over-water structures is discussed below (see *Habitat Modification, Over-water Structures*).

Increased Suspended Sediment and Turbidity Levels. Both anadromous and resident fish populations could be impacted by increased concentrations of suspended sediments as a result of dredging activities. This increase, known as a sediment plume, may delay or divert migratory passage and, in some instances, could cause total avoidance of an area by fish. Increased sedimentation can also adversely affect fish eggs and juvenile fish survival, benthic community diversity and health, foraging success, and suitability of spawning habitat. Suspended particles and sediment can result in increased turbidity, reducing in-water visibility that can affect the ability of sight-feeders to locate prey. In sufficient quantities, increased turbidity levels can affect oxygen exchange over the gills in aquatic species, resulting in weakened individuals or mortality. Additionally, sediments in the water column can be redeposited on downstream substrates, which could bury aquatic macroinvertebrates (an important food source for many species of fish). These potential effects could be exacerbated if the fish are in generally poor condition and under stress by other factors (i.e., increased water temperature).

The size and duration of the sediment plume is highly dependent upon the grain size of the material being dredged. As described in section 4.2.2.2, SWCA conducted a sediment analysis of the material which would be dredged as part of the proposed project. Within the dredge footprint, the substrate is almost exclusively sand, with very low silt and clay components (SWCA, 2006). Sand settles rapidly in the water column. In addition, WEST (2006) conducted hydraulic and sediment transport analyses using a combination of the RMA2 hydrodynamic model and the SED2D-WES sediment transport model (WEST, 2006). Based on its modeling, WEST concluded that the maximum sediment concentration would occur within 10 feet of the cutterhead. WEST's hydrodynamic modeling predicts project-related suspended sediment loads would be a maximum of 1 mg/L at the dredge site and diminish to 0.1mg/L before reaching Tenasillahe Island. By comparison, background measurements of TSS during the field program were on the order of 10 mg/L. Therefore, even assuming a considerable level of uncertainty in any of the model parameters, the impacts of the dredging operation would be very small and confined to an area immediately surrounding the proposed facility. The combined background and project-related suspended sediment concentrations are well below the lethal level for fish (WEST, 2006; Newcombe and MacDonald, 1991).

Background levels of turbidity in the Columbia River range from 3 to 8 NTUs. As discussed in section 4.3.2.3, WEST concluded that turbidity plumes from cutterhead dredging similar to the proposed dredging at Bradwood would return to within 1 NTU of background levels within 1 minute after suspension (WEST, 2006). Servizi and Martens (1992) found that 37 NTUs is the threshold for avoidance by juvenile coho and steelhead. Although the WEST report does not provide the maximum turbidity levels expected during dredging activities, the predicted suspended solid concentrations provided above indicate that turbidity levels from dredging activities would be well below the 37 NTU threshold. Therefore, impacts on aquatic species from increased turbidity levels would not be significant.

Removal of Benthic Organisms. Dredging may adversely affect prey species at the LNG terminal site by directly removing or burying immobile invertebrates. Species of aquatic organisms that exist on or within the bottom sediments include the sand shrimp (*Crangon* spp.), daphnia (*Daphnia* spp.), and copepods. These are all important prey organisms for the fish species present in the estuary (Bottom and Jones, 1990). Recolonization varies considerably with geographic location, sediment composition and types of organisms inhabiting the area (Kennish, 1997). Rates of recovery range from several months to as much as 2 to 3 years based on substrate type and currents in the affected area (NMFS, 2003).

Resuspension of Contaminated Sediments. SWCA (2006; 2007) conducted sediment sampling and analysis to determine the presence of contaminants within the proposed dredged materials and leave surface. As discussed in section 4.2.2.2, no elevated contaminant concentrations were detected. Comments were received on the draft EIS related to the potential for bioaccumulation of contaminants to occur due to dredging activities. The long-term bioaccumulative effects of pollutants on aquatic resources resulting from construction and operation of the proposed project cannot be characterized with the best available science. Bioaccumulative effects can result from a variety of physical, chemical, and biological processes. However, the concentration of contaminant levels reported in section 4.2.2.2 of the EIS does not indicate a likely significant biological effect.

Entrainment. Some fish may be susceptible to entrainment during dredging operations. Entrainment occurs when small fish (such as juvenile salmonids), eggs, and larvae are drawn through the screens of water intakes and cannot escape. Adult fish of medium to large species (such as salmonids) have sufficient swimming ability to avoid entrainment by dredging if they are present in the vicinity of dredges. NorthernStar would minimize fish entrainment during dredging activities by keeping the cutterhead within 3 feet of the river bottom and conducting dredging activities during specified in-water work window when the densities of fish in the project area is lowest.

Increased Noise. Dredging activities associated with construction and operation of the project would generate underwater sound pressure levels that could elicit responses in some fish, marine mammals, and other aquatic organisms (Richardson et al., 1995). Unfortunately, relatively little is known about the effects from exposure to underwater sound on most aquatic organisms, particularly fish (Hastings and Popper, 2005). Even in cases where data are available, most experts recommend extreme caution in attempting to extrapolate between species (Hastings and Popper, 2005). The intensity of the sound pressure levels from dredging activities can be quite variable. However, sound pressure levels are generally in the range of 112 to 160 decibels (dB) (re: 1 microPascal (μ Pa)), intensities that may influence organism behaviors or perceptions, but are unlikely to cause physiological damage (Richardson et al., 1995; Hanson et al., 2003). As described in section 4.6.2.2, it is possible that marine mammals could be adversely impacted by dredging activities. NorthernStar proposes to implement protective measures including the establishment of Safety, Buffer, and Impact Zones to protect the Steller sea lion during construction activities at the LNG terminal. To provide similar protections to other pinnipeds potentially occurring in the project area, we have recommended that NorthernStar expand the protective measures that would be used to avoid or minimize impacts on Steller sea lions during construction of the LNG terminal (i.e., Safety, Buffer, and Impact Zones) to include all pinnipeds (see section 4.6.2.2).

Alterations to Sediment Transport and Deposition. In addition to impacts on aquatic resources during dredging activities, dredging the berth and maneuvering area would result in long-term impacts on sediment transport and deposition. As discussed in section 4.2.2.2, modeling conducted by WEST analyzed potential impacts on sediment transport and deposition at low flow (125,000 cfs), normal flow (210,000 cfs), high flow (545,000 cfs), and extremely high flow conditions (864,000 cfs). Based on the WEST model, the proposed project would cause a reduction in stream flow through the Clifton Channel, resulting in a reduction of the water surface profile, shear stresses, and flow velocities through the channel. As a result of this, deposition may occur during high flows along the Clifton Channel. However, the results do not show significant changes to the overall bed conditions in the Clifton Channel for the range of flows modeled. Although the results of the WEST model did not indicate that significant changes to Clifton Channel would be anticipated, the small changes in the hydraulic characteristics associated with the proposed project could result in changes to existing fish habitats within other portions of the lower Columbia River.

As described in section 4.2.2.2, numerous comments were received on the draft EIS regarding the adequacy of the WEST modeling. As it relates to potential impacts on aquatic resources, the model does not address long-term alterations to sediment transport and deposition within Clifton Channel and/or the lower Columbia River, which could alter biological function and value for aquatic resources. Impacts on aquatic resources (including salmonids) attributed to changes in sediment transport and deposition may occur as a result of the proposed project. Additional analysis of potential impacts on salmonids from alterations to sediment transport and deposition will be included in the revised BA and EFH Assessment.

The biological impacts on aquatic resources from these changes would depend upon their location. For the fish in the Clifton Channel, there would be little impact. Fish in the main channel during flood flows would be affected by the increased size of the sediment plume from Puget Island. However, during high flows it is unlikely that fish would be present within the main channel. Salmonids and other fish tend to seek sheltered, off-channel locations during high flows. Although detailed data on fish distribution in the area during flood events is not available, the literature supports the idea that fish would avoid the main channel during periods of high flow in favor of Clifton Channel.

Development of the River Shoreline

Development of the river shoreline and has the potential to cause siltation at the water's edge and temporarily increase suspended sediment and turbidity levels in the water column that would affect

downstream habitat, fish health, and feeding behavior in the affected area (see *Dredging*). NorthernStar would implement BMPs from its terminal ESC Plan during construction of the LNG terminal, which would minimize impacts on aquatic resources by controlling erosion along the shoreline and lessen sediment movement.

Pile Driving

Tubular steel piles would be installed as part of the construction of the marine terminal (i.e., for breasting/mooring dolphins and unloading platforms/trestles) over a period of approximately 4 months. The actual number of days when pile driving would occur during this 4-month period depends on a number of variables such as weather and river conditions; however, NorthernStar estimates that about 60 days of pile driving would be required. Those days could be spread throughout the 4-month period. Studies have shown that the sound waves from pile driving may be intense enough to result in injury or trauma to fish, sea turtles, and other animals with gas-filled cavities, such as swim bladders, lungs, sinuses, and hearing structures (Hastings and Popper, 2005; Abbott and Bing-Sawyer, 2002).

Although the effects of pile driving are poorly studied and there appears to be substantial variation in a species' response to sound, intense sound pressure waves can change fish behavior or injure/kill fish through rupturing swim bladders or causing internal hemorrhaging (Hastings and Popper, 2005). The degree to which an individual fish exposed to sound waves would be affected is dependent upon variables such as the peak sound pressure level and frequency as well as the species, size, and condition of a fish (e.g., small fish appear to be more susceptible to injury by intense sound waves than are larger fish of the same species). The presence of predators can also influence how a fish might be affected by pile driving (e.g., fish stunned by pile-driving activities may be more susceptible to predators). In any case, forms of impact on marine organisms that could result from underwater sound levels include:

- Behavioral – interruption of normal behaviors (e.g., feeding, breeding, and/or nursing) and displacement;
- Perceptual – masking biologically important sounds (e.g., communication, predator/prey recognition); and
- Physiological – damage to body tissue.

In discussing the impacts of sound on aquatic resources it is important to note the difference in sound intensity in air versus water. Sound intensity in air uses a standard of 20 microPascals (μPa), while sound intensity measured in water uses a standard level of 1 μPa . There is a difference of 26 dB when converting air to water sound pressure levels. Therefore, if pile driving emits 201 dB in air, the underwater sound would be 227 dB re: 1 μPa . The NMFS' current noise thresholds for fish are a peak pressure of 180 dB re: 1 μPa for physical harm and an impulse pressure, or root mean square (rms), of 150 dB_{rms} re: 1 μPa for behavioral disruption (NMFS, 2007a).

The intensity of the sound pressure levels produced during pile driving depends on a variety of factors including, but not limited to, the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water, and the type and size of the pile-driving hammer. Driving hollow steel piles with impact hammers can produce sharp spikes of sound that are intense enough to injure fish. For example, driving 96-inch-diameter steel piles using an impact hammer has been shown to generate peak sound pressure levels of up to 227 dB re: 1 μPa at 16 feet (Hastings and Popper, 2005). Close to piles, the impulse pressure is typically about 10 to 15 dB lower than the peak pressure. This level, however, is dependent not only on the pile and hammer characteristics, but also on the geometry

and boundaries of the surrounding underwater environment (Hastings and Popper, 2005). In some cases, fish may be startled by the first few strikes of an impact hammer. However, this response can wane and the fish may remain in the area (NMFS, 2001). As such, the potential effect on fish from impact hammers could be magnified because fish would not only be exposed to intense sound waves but may not avoid pile-driving activities, which would prolong their exposure to the potentially harmful sounds and increase their risk of injury or death. In a review of studies documenting fish kills associated with pile driving, the NMFS reported that all have occurred during use of an impact hammer on hollow steel piles (Hanson et al., 2003). On the other hand, the rapid repetitions of vibratory hammers produce relatively low intensity sound waves. Evidence also suggests that fish consistently display an avoidance response to sound from a vibratory hammer, even after repeated exposure (Dolat, 1997; Knudsen et al., 1997).

In addition to fish, Steller sea lions, California sea lions, and Pacific harbor seals may occur in the vicinity of the LNG terminal. Steller sea lions are described in detail in section 4.6.1.1. California sea lions occur along the lower Columbia River during the winter and spring using navigation buoys, jetties, and log booms (Jeffries et al., 2000). In addition, Pacific harbor seals occupy haulout sites on intertidal mudflats and sand bars along the northeast side of Welsh Island and the east end of Puget Island (Jeffries et al., 2000). In the event that a Steller sea lion or other marine mammal happens to be transiting the area during pile driving activities, it would be expected to avoid the immediate area in response to a higher level of human activity and noise associated with construction.

To minimize impacts on aquatic species as a result of pile driving, NorthernStar proposes to implement the following measures:

- observe in-water work windows – NorthernStar indicated that pile driving would only occur during the in-water work window established by the ODFW and the NMFS (November 1 through February 28) in order to minimize the number of fish exposed to high underwater noise levels.
- install 48-inch, 54-inch, 84-inch, and 96-inch diameter steel piles – NorthernStar proposes to install larger than normal steel pilings to minimize the number of piles and allow all piles to be installed vertically so that each pile can be driven with a caisson filled with bubbles to do the maximum possible to minimize acoustic impacts on aquatic resources (see reduction of peak sound pressure levels). Additional details regarding the number, length, and size of the piles as well as water depth is provided in table 2.1.3-1.
- utilize vibratory pile driving as conditions allow – NorthernStar would use vibratory pile driving equipment to install piles for the LNG carrier dock and mooring dolphins to the maximum extent possible before impact hammers would be used. Vibratory drivers tend to produce lower noise and vibration levels for most applications than impact pile drivers.
- reduction of peak sound pressure levels – NorthernStar would use two alternative measures to reduce peak in-water sound pressure levels:
 - Air bubble curtains have been used in a variety of pile driving applications to reduce underwater noise levels. NorthernStar would use a bubble curtain system that is contained within a caisson surrounding the driven piling. An attempt would be made to remove the water between the caisson and the pile to maximize the noise attenuation. If the water could not be removed, performance standards would be established which would specify a rate and distribution of bubbles. Prior to pile driving, the bubbler apparatus would be tested in similar water depths without the caisson to allow visual inspection of the bubble distribution by

divers and video cameras. If the bubbles are not uniform from bottom to surface, additional distribution rings may be added. For each pile installation, the bubble curtain would be activated before the initial vibratory pile driver stage to verify the performance of the bubble curtain. When properly deployed and operated, unconstrained bubble curtains can provide from 15 to 30+ dB of sound level reduction, even in currents on the order of 2 miles per hour (Hardyniec and Skeen, 2005; Jones, 2003). A noise reduction value of 25 dB for air bubble curtains is estimated.

- NorthernStar would also use a pile cap between the hammer and the pile during impact pile driving to further reduce underwater noise levels if monitoring indicates the bubble cushion within the caisson is not achieving the desired sound pressure reduction. The potential noise reduction provided by pile caps is not well documented in technical literature. However, Laughlin (2006) measured sound levels resulting from driving a 12-inch-diameter standard steel pile using bubble curtains and different pile cap materials. The results of the study indicated that using wood as a pile cap may provide a noise reduction value of 11 to 26 dB; however, wood compressed easily or caught on fire and therefore does not warrant regular use. Conbest™ (a canvas based laminate used in conjunction with a special Aluminum alloy) provided a noise reduction value of 7 to 8 dB, nylon provided a noise reduction value of 4 to 5 dB, and Micarta provided a noise reduction value of 1 to 5 dB.

The NMFS has raised concerns regarding the use of wood blocks during impact pile driving because of the potential for fire when used on large piles. Based on these concerns, NorthernStar has agreed to either eliminate the use of wood blocks, use wood blocks only during pile proofing, or to use a different material for a pile cap.

With the implementation of the above measures (25 dB of noise reduction from the caisson/air curtain and 5 dB of noise reduction from the cap) underwater sound pressure levels would not exceed 190 dB re: 1 µPa farther than about 33 feet from the pile and would not exceed 155 dB re: 1 µPa farther than approximately 7,053 feet from the pile when using the following equation:

$$L_r = L_s - 15 \log (D_1/D_2)$$

Where: L_r is received noise level in dB re: 1 µPa;
 L_s is the noise source at a specified distance;
 D_1 is the radial distance; and
 D_2 is the source level distance.

This formula generally provides for a spreading loss of 4.5 dB per doubling of distance. Cylindrical spreading occurs when sound energy spreads outward in a cylindrical fashion bounded by the bottom sediment and water surface (i.e., shallow water), resulting in a spreading loss of 3 dB per doubling distance. Spherical spreading occurs when the when the source encounters little to no refraction or reflection from boundaries (i.e., deep water), resulting in a 6 dB reduction per doubling of distance. Because all pile driving would occur in a depth of 40 feet or less, the practical spreading loss of 4.5 dB per doubling of distance is appropriate.

As previously discussed, in-water monitoring would be completed to document that the appropriate noise attenuation procedures are being used to attenuate the pile driving noise and minimize

the distance to the NMFS' current noise thresholds for fish of 180 dB re: 1 μ Pa peak pressure for physical harm and 150 dB_{rms} re: 1 μ Pa impulse pressure for behavioral disruption (NMFS, 2007a).

The NMFS raised concerns in its May 11, 2007 letter to the FERC regarding the method of noise monitoring proposed by NorthernStar and the efficacy of bubble curtains during pile driving activities. NorthernStar proposes to use a qualified underwater acoustic monitor to record sound pressure levels once pile driving has begun. As described above, bubble curtains would be used to attenuate noise from pile driving activities and minimize potential impacts on aquatic resources. If bubble curtains did not function properly or were found to be ineffective, adverse impacts on sensitive aquatic resources could occur. Thus, **we recommend that:**

- **NorthernStar should consult with the appropriate federal and state agencies to develop a revised Bubble Curtain Contingency Plan that establishes a performance standard to assess whether or not bubble curtains are adequately working. The plan should describe specific noise attenuation methods to be implemented if monitoring indicates poor noise attenuation performance. The plan, including agency comments on the plan, should be filed with the Secretary for the review and written approval of the Director of OEP prior to beginning offshore pile driving activities at the LNG terminal.**

As described in section 4.6.2.2, it is possible that marine mammals could be adversely impacted by pile driving. NorthernStar proposes to implement protective measures including the establishment of Safety, Buffer, and Impact Zones to protect the Steller sea lion during construction activities at the LNG terminal. To provide similar protections to other pinnipeds potentially occurring in the project area, we have recommended that NorthernStar expand the protective measures that would be used to avoid or minimize impacts on Steller sea lions during construction of the LNG terminal (e.g., Safety, Buffer, and Impact Zones) to include all pinnipeds (see section 4.6.2.2).

Log Pond Filling

Filling the log pond at the LNG terminal site would result in a permanent loss of suitable off-channel refugia and rearing habitat that is used by various species of fish. The log pond potentially provides at least seasonal refugia during high flow for both rearing salmonids as well as resident and anadromous estuarine species. The primary salmonids expected to occur in the log pond include Chinook and coho salmon; however, the pond serves as designated critical habitat for 12 federally listed endangered or threatened salmonid ESU/DPSs. Based on constraints of site construction, filling the log pond is unavoidable. The pond would be filled entirely by material dredged from the ship berth and maneuvering area. As discussed in the *Fish Salvage Plan*, before and during filling of the log pond, NorthernStar would capture and remove fish using a trap, seine, electrofishing, or other methods to minimize risk of injury to fish. As soon as possible after having been identified, counted by age class to the extent practicable, and recorded, fish would be released into a safe release site within Hunt Creek just downstream of the entrance to the log pond outlet. To minimize re-entry of individuals into the log pond during collection efforts, **we recommend that:**

- **During fish collection efforts at the former mill log pond at the LNG terminal, NorthernStar should place nets at the outlet of the log pond that only allow emigration from the pond (e.g., winged fyke net without collection chamber attached or two disconnected block nets oriented outward from the pond).**

All fish capture work would be performed or supervised by qualified fisheries biologists and would operate under the NMFS's and ODFW's fish salvage guidelines. In addition, all work would be

performed under an ODFW/NMFS scientific collection permit and resource agency personnel would be invited to participate in or oversee the operations. Although all fish capture work would occur during the recommended in-water work window for the Columbia River, direct handling may adversely impact individual fish. NorthernStar would mitigate for impacts on fish and the permanent loss of habitat from filling the log pond by developing high quality replacement habitat in consultation with the NMFS and ODFW.

Habitat Modification

Fish, marine mammals, and other aquatic resources could be impacted indirectly by activities that alter terrestrial and riparian habitat including construction of the LNG terminal, the Hunt Creek Bridge replacement, realignment of the railroad tracks, and construction of the power line. In addition, during operation of the LNG terminal, over-water structures would result in habitat modification for aquatic resources. A discussion of potential impacts on aquatic resources as a result of these activities is provided below.

LNG Terminal

Fish and other aquatic resources could be impacted indirectly by activities that alter terrestrial and riparian habitats at the LNG terminal site during construction. The clearing of vegetation and grading activities during construction could increase water temperatures as well as erosion and suspended sediment levels in the Columbia River and Hunt Creek.

Vegetative clearing at the LNG terminal would remove about 14.8 acres of wetlands and 43.5 acres of upland scrub-shrub and forested habitats, which would expose the land to increased sunlight and result in indirect increases in water temperatures as water flows over the warmer land surface and eventually reaches the Columbia River or Hunt Creek (Beschta and Taylor, 1988). As described in section 4.3.2.1, the Columbia River is currently out of compliance for water temperature (ODEQ, 2007; WDE, 2006b). The effects of water temperature on the life stages of salmonids have been extensively reviewed by McCullough (1999). Maximum water temperatures ranging from 71.6 °F to 75.2 °F limit the distribution of many salmonids. For example, the optimum temperature for growth for the spring Chinook salmon is 60.1 °F; higher temperatures during summer could reduce growth and lead to increased mortality rates (McCullough, 1999). In some cases, higher temperatures and increased light can lead to increased production of in-stream microorganisms, algae, fungi, and macroinvertebrates, thereby boosting food availability for salmonids and in turn increasing salmonid production. Warmer stream temperatures may also accelerate fry emergence and extend the growing season, thereby enhancing fish growth. However, these potential positive effects generally occur in the summer and are often offset by fish losses because of reduced protective cover from LWD (Murphy et al., 1986; Hicks et al., 1991). Elevated water temperatures may also favor production of fish species that can out-compete salmonids in some situations (Bisson et al., 1992).

Alteration of the natural drainage ways or compaction of soils by heavy equipment near streambanks during construction may accelerate erosion of the banks, runoff, and the transportation of sediments into waterbodies. NorthernStar would minimize potential impacts on waterbodies during construction by implementing the procedures in its pipeline ESC Plan for Oregon and SWPPP for Washington. To avoid impacts on water quality during operation of the LNG terminal, riparian areas outside of the berm would be allowed to permanently revegetate. As described in section 4.4.2.2, a riparian buffer at least 30 feet wide, as measured from the MHW mark, would be allowed to permanently revegetate adjacent to Hunt Creek. NorthernStar would replace cleared trees at a 5:1 ratio within the LNG terminal site, resulting in about 1,895 trees being planted following construction. The majority of the replacement trees (e.g., cottonwood, Sitka spruce, red alder, Pacific willow, and other native species) would be installed within a 100-foot buffer along the northern edge of the proposed construction

boundary. This area would serve as a forested buffer from the terminal site to the adjacent Hunt Creek estuary. NorthernStar has developed a monitoring plan and performance standards to measure successful revegetation of the site. If necessary, NorthernStar would take steps to control and remove noxious and invasive species in accordance with our Procedures. Noxious weeds and other invasive plant species are discussed in detail in section 4.4.2.3.

Power Line Construction

Construction of the power line could potentially impact aquatic resources in the vicinity of the LNG terminal. The nine streams crossed by the 1.5-mile-long power line are relatively narrow and steep, and are not believed to provide habitat for fish. The clearing and grading of vegetation during construction could increase erosion along streambanks and turbidity levels in the waterbodies. Because the downstream distances between the waterbodies crossed by the power line and Hunt Creek are over 0.5 mile, impacts on fish would not be anticipated. The overland distance between these waterbodies and the Columbia River ranges between 0.1 mile and 0.3 mile; however, the relief of the area is such that sediment movement into the Columbia River would not be anticipated. The power line would be owned and operated by PacifiCorp. Proposed measures to avoid impacts on aquatic resources would include revegetation, implementation of BMPs, and other measures specified in permits obtained by PacifiCorp.

Access Roads and Hunt Creek Bridge Replacement

The modifications to access roads and the replacement of Hunt Creek Bridge could potentially impact salmonids in lower Hunt Creek through increased siltation and turbidity caused by the introduction of sediments into the stream. Construction methods are summarized in section 2.4.1.1 and activities potentially impacting water quality are discussed in detail in section 4.3.2.3. Potential impacts on aquatic resources due to the road modifications and bridge replacement include the following:

- direct impacts on fish during salvage activities due to handling and electrofishing, if required at the bridge site;
- displacement of fish during demolition and construction; and
- increased turbidity and suspended sediment levels during pile removal and abutment construction;
- accidental spills or leaks of toxic materials (e.g., uncured concrete, demolition debris, equipment lubricants or fuel) during demolition and construction.

To minimize potential impacts on fish during salvage activities, if required, all salvage activities would occur within the in-water work window and would be performed or supervised by qualified fisheries biologists and would operate under the NMFS's and ODFW's fish salvage guidelines. In addition, all work would be performed under an ODFW/NMFS scientific collection permit and resource agency personnel would be invited to participate or oversee the operations.

Potential impacts on aquatic resources due to displacement during construction activities are described in section 4.5.2.1. The potential for increased turbidity and suspended sediment levels as well as accidental spills or leaks associated with road modifications and bridge replacement would be minimized through implementation of NorthernStar's terminal ESC Plan and the bridge demolition and construction BMPs described in section 4.3.2.3.

Railroad Realignment

As described in section 2.4.1.1, NorthernStar would remove a 4,200-foot-long portion of the existing PWR line and construct a new segment outside the boundary of the proposed LNG terminal. The realigned railroad tracks would be constructed parallel to Hunt Creek for approximately 2,000 feet. After realignment of the railroad tracks, the creek and the edge of the railroad right-of-way would be between 50 and 400 feet apart for most of the 2,000 feet; however, for about 50 feet, the edge of the railroad right-of-way and Hunt Creek would be less than 50 feet apart. NorthernStar expects that a minimum 30-foot undeveloped buffer between the railroad right-of-way and the creek could be maintained in this area. Realignment of the railroad tracks could potentially impact salmonids and other aquatic resources in lower Hunt Creek through increased siltation and turbidity caused by the introduction of sediments into the stream. However, to avoid or minimize impacts on aquatic resources within Hunt Creek resulting from realignment of the railroad tracks, NorthernStar would restore the natural upland vegetative community by installing native vegetation within the railroad right-of-way as described in section 4.4.2.2 and by implementing its terminal ESC Plan.

Over-water Structures

As described in section 2.3, over-water structures associated with the marine berth would occupy approximately 1.0 acre over the Columbia River. Of this, structures would be located over approximately 0.5 acre of shallow water habitat. These structures have the potential to impact aquatic resources through changes in species behavior and the associated increased vulnerability of sensitive species to predation. In addition, the marine berth could indirectly impact aquatic resources through alterations to water quality, including changes in light, temperature, and nutrient levels directly beneath the docks.

An assessment of over 60 studies by Simenstad et al. (1999) found evidence that juvenile salmon react to shadows and other artifacts in the shoreline environment created by over-water structures. While changes in light from over-water structures have been shown to affect migration behavior in juvenile salmon, quantitative information on the significance of these behavioral responses is not available (Simenstad et al., 1999; Carrasquero, 2001).

Because juvenile salmonids (especially Chinook salmon) tend to migrate through shallow-water habitats along shorelines, over-water structures can impact migration through and use of potential habitat. Simenstad et al. (1999) found that juvenile salmon use both natural refuge and shaded areas as refuge, but they generally migrate along the edges of these areas, rather than entering them. However, in response to predators, they will seek refuge within shaded areas. Juvenile salmon have been observed to become “confused” upon encountering over-water structures due to the conflict between their preference to migrate through nearshore habitats and their avoidance of shaded areas. This confusion results in behavioral changes including splitting into smaller schools and seeking alternate pathways, which can ultimately cause a delay in migration (Simenstad, et al., 1999).

Recognized predators of juvenile salmonids in the lower Columbia River include bass, shad, lampreys, northern pikeminnow, and birds. Although numerous studies and anecdotal information from sport fisherman have suggested that docks and piers attract fish, studies have not been conducted to determine whether over-water structures actually increase the concentration of predatory fish, birds, or marine mammals (Simenstad et al., 1999; Carrasquero, 2001).

Changes in water quality within the shaded area created by the marine berth could reduce habitat quality for aquatic resources by altering the rate of photosynthesis, plant distribution, and indirectly by altering prey species composition and survival (Thom et al., 1997; Olson et al., 1996; Thom and Shreffler, 1996). NorthernStar would mitigate for reduced habitat quality at the berth and maneuvering area

through restoration of several times as much area of high quality habitat at the Svensen Island and Hunt Creek Mitigation Sites (see *Mitigation Measures*, below).

Water Appropriation and Discharge

During construction and operation of the proposed LNG terminal, NorthernStar would appropriate water from the Columbia River for multiple uses. Table 4.3.1-1 describes the proposed water appropriations and discharges associated with the proposed project. Potential impacts associated with water appropriation include entrainment and impingement of fish and reduced downstream flows. Potential impacts on aquatic resources due to discharges would be limited to changes in water quality.

Entrainment and Impingement

NorthernStar proposes to obtain water from the Columbia River through the terminal's permanent surface water intake for hydrostatic testing of the LNG storage tanks and pipeline, soil compaction and ground improvements, fire suppression system testing, and personal/sanitary use (see figure 2.1.3-3). NorthernStar would acquire the necessary permits from the ODWR before withdrawing water, including specific approvals from applicable resource agencies. Impacts on fish associated with surface water withdrawal would be minimized by using modern fish screening technology, which has been used within much of the Columbia River since the 1970s.

All intakes at the proposed LNG terminal that withdraw water from the Columbia River would be screened to minimize the likelihood of entrainment and impingement of juvenile fish in accordance with the ODFW and NMFS regulations and fish design criteria. The screen designs proposed by NorthernStar have been reviewed and approved by the NMFS. The fish screen criteria proposed for the temporary water intake is based on the NMFS, Juvenile Fish Screen Criteria and addendum as well as the Fish Screening Criteria for Anadromous Salmon (NMFS, 1995a; 1996; 1997). All the criteria specify the approach velocity and screen mesh opening sizes and considers both the presence and absence of fry-sized salmonids.

There are two locations proposed for water intake. The first location is the temporary surface water intake and pump that would be used to supply water for vibroflotation activities. A diesel-powered pump would divert water from the Columbia River at a maximum rate of 100 gpm (0.36 cfs). The temporary water intake would be located approximately 100 feet offshore, at a depth of 2 feet or more, meeting NMFS criteria. It would be equipped with a passive fish screen that complies with the ODFW regulations and NMFS fish screen design criteria. The fish screen would be designed to exclude salmonid fry; per the criteria, the screen mesh openings would not exceed 3/32 inch (2.38 mm) for a woven wire or perforated plate screen, or 0.0689 inch (1.75 mm) for a profile wire screen, with a minimum 27 percent open area. The screen would be mounted parallel with flow in the river and aligned with the adjacent bankline. The maximum approach velocity at the screen would be 0.2 ft/s. The proposed system meets the criteria for using a passive screen, including oversizing the screen to eliminate debris impingement (the effective screen area of NorthernStar's proposed M-L130 Pump-Rite model is nearly five times the required effective screen size). If debris is collected on the screen itself, debris would be physically removed by construction staff over the 3- to 4-month time frame the intake would be in use.

The second water withdrawal location would be the LNG terminal's permanent surface water intake and firewater pumping station, which would be used during construction to supply water for the hydrostatic testing of the LNG storage tanks. Construction of the LNG terminal would be scheduled so that the permanent water intake and pumping station would be online early enough in the construction period for use as a temporary water withdrawal location for hydrostatic testing of the LNG tanks. The firewater pumps would be mounted on the dock several feet below the mean low water elevation. The pumping station would be equipped with two 400 horsepower pumps, an electric primary pump, and a

diesel backup pump. The pumps would not operate simultaneously. The maximum rate of discharge of either pump would be 4,400 gpm (9.8 cfs) (GSI, 2006b).

The second water withdrawal location (permanent water intake), would be equipped with active (self-cleaning) fish screens that comply with the ODFW regulations and NMFS fish screen design criteria. The fish screen would be designed to exclude salmonid fry; per the criteria, the screen mesh openings would not exceed 3/32 inch (2.38 mm) for a woven wire or perforated plate screen, or 0.0689 inch (1.75 mm) for a profile wire screen, with a minimum 27 percent open area. The intake would be mounted parallel with flow in the river and aligned with the adjacent bankline. The current intake design assumes a maximum approach velocity at the screen of 0.33 ft/s. The proposed intake system would use an active, self-cleaning air backwash system (called Hydroburst) to clean debris and scour growth from the screens. The frequency with which the air backwash is used would depend on the debris load in the water column and the growth rate of algae and other sessile organisms.

In its May 11, 2007 letter to the FERC, the NMFS stated that flows need to be mapped post-construction to verify that screen velocities are acceptable. To ensure that screen velocities would comply with ODFW and NMFS fish screen criteria, **we recommend that:**

- **NorthernStar should conduct post-installation water flow mapping through all intake screens at the LNG terminal, and develop and implement a monitoring program to assess the effects of impingement and entrainment from use of the screened water supply system on juvenile salmonids during terminal operations. The monitoring program and water flow mapping plans should be developed in consultation with the NMFS and ODFW and, as appropriate, incorporate adaptive management strategies to identify and mitigate any adverse effects specifically associated with the project. The final monitoring program and water flow mapping results, as well as any agency comments, should be filed with the Secretary for the review and written approval of the Director of OEP prior to operation of the screens. In addition, NorthernStar should provide annual reports to both the FERC and NMFS regarding the efficacy of the screened water intake system, which would identify any problems and address how such problems would be rectified.**

In addition, water would be appropriated by LNG carriers during unloading as ballast and to cool the engines generating power for the offloading pumps and other onboard systems (see section 2.1.1.5). To minimize entrainment and impingement of juvenile fish during ballast and cooling water intake, NorthernStar would construct a system capable of delivering filtered water to the LNG carrier. NorthernStar would offer contract incentives to the LNG suppliers to retrofit LNG carriers to connect with the wharf filtered water supply so that all water withdrawn from the Columbia River would be done via screened intakes constructed by NorthernStar at the LNG terminal. Water supplied to the carriers via this intake system would be first used to cool the engines and then used to fill the ballast tanks to minimize the total intake and avoid discharging warm water into the Columbia River. In rare instances when ballast tanks fill before the need for shore-based cooling water is over, the ballast water would be circulated through the engines for cooling after the shore-based water supply is turned off and until the ship is ready to leave the wharf. NorthernStar would design the filtered water system to minimize entrainment and impingement of juvenile fish.

To ensure that impacts associated with entrainment and impingement are minimized, we recommended in the draft EIS that NorthernStar prepare a plan to ensure that only LNG carriers that have been retrofitted to use the screened water supply system at the berth are allowed to unload cargo at the Bradwood Landing LNG terminal. As discussed in section 4.3.2.3, NorthernStar has stated that due to changes in market conditions since issuance of the draft EIS, LNG carriers may arrive at the terminal without the necessary retrofitting in place to allow the use of the screened water supply system. The

FERC received numerous comments on the draft EIS related to potential impacts on aquatic resources in the event that the screened water intake system is not functional or would not be used for a period of time. We conducted a preliminary analysis of the number of out-migrating juvenile salmonids that would be entrained by LNG carriers at the wharf without the use of the filtered water supply system and NMFS-approved screens. The preliminary analysis, discussed below, indicates that a substantial number of migrating juvenile salmonids could be entrained, particularly during peak out-migrating periods (i.e., March through August).

Our preliminary analysis included: 1) a determination of the area near the intake which would be subject to velocities likely to result in impingement or entrainment of juvenile salmonids, and consideration of how that area relates to the terminal and LNG carrier's water intake locations; 2) an investigation of the widely varying migration behaviors of juvenile salmonids by species, which result in an array of spatial and temporal distributions; 3) an estimation of the number of juvenile salmonids out-migrating by species and season; and 4) a breakdown of the frequency with which LNG carriers would be expected to operate their intakes. We assumed that fish with swimming speeds greater than the intake velocity can avoid impingement. Swimming speed is estimated to be about 0.5 body length per second (Durbin et al., 1981). Thus, a fish 7-inches-long or larger would be able to avoid impingement or entrainment. However, smaller sized juveniles and non-motile larvae and eggs may not be able to avoid the intake, and thus are more susceptible to entrainment. Entrained organisms would be subjected to physical stress and pressure changes as a result of abrasion or contact with screens and pump impellers. Physical damage has not been well documented, but is assumed to injure entrained ichthyoplankton (Cada, 1990; Mayhew et al., 2000) and other water column organisms. Pressure changes, such as a sudden decrease in ambient pressure of 40 percent or more of the acclimation pressure, might burst swim bladders, thus resulting in the mortality of fish larvae that have developed swim bladders (Cada, 1990).

The preliminary analysis provided a rough estimate of the potential impacts on juvenile fish associated with cooling and ballast water intakes, and the estimates generated to this point require further refinement prior to incorporation into the FERC's revised BA and EFH Assessment. Future analysis may consider a variety of other factors that could widely influence the final values, including: 1) fish behaviors such as avoidance or attraction, diurnal peaks in migration; 2) fish movements lateral to stream flow; 3) migration patterns around Puget Island; 4) an account of all watersheds contributing juvenile salmonids that migrate past the wharf; 5) ESU and DPS specific migratory quantities and characteristics; and 6) velocities occurring near the LNG carrier intakes for different designs of LNG carriers.

NorthernStar has stated that it would continue to offer incentive-based contractual agreements for carriers to accommodate the screened water supply system, but it could not guarantee 100 percent use of the proposed system. Instead, NorthernStar proposes to develop a performance standard for the temperature of all cooling water discharges at the wharf and a performance standard for entrainment of juvenile fish at the wharf. Both performance standards would have a monitoring component. To date, we have not been provided any information on these potential performance standards. To ensure impacts to water quality are minimized, we are recommending in section 4.3.2.3 that NorthernStar develop performance standards for water temperature impacts and biocide use associated with LNG carrier water intakes and discharges. However, a performance standard for entrainment and impingement impacts could not appropriately mitigate the routine removal of 20 to 50 million gallons of unscreened water per LNG carrier visit at the Bradwood Landing terminal.

We compared NorthernStar's potential entrainment and impingement impacts to baseline conditions to analyze the potential for significant cumulative impacts. We estimated that roughly 1,800 commercial ships dock at various lower Columbia River ports annually. We note that no screening of water intakes to protect aquatic resources is currently conducted for any ships docked at Columbia River ports. About 50 percent of the commercial marine traffic on the Columbia River stops at Portland,

Oregon, 18 percent at Vancouver, Washington, and 10 percent at Longview, Washington (Merchant Exchange of Portland, 2007 Annual Report). Considering the ballast requirements of the various sized ships calling on those ports (e.g., container types, oil tankers, bulk carriers) and assuming that each commercial marine vessel is taking on ballast water, the combined withdrawal could reach 10.4 billion gallons of ballast water per year. We also considered the subset of larger container and oil tankers which are most comparable in size to the typical LNG carrier, which make up about 16 percent of the marine traffic on the lower Columbia River. We estimated that these carriers withdraw up to a total of 3.2 billion gallons for ballast per year. In comparison, the typical LNG carriers berthed at the Bradwood Landing terminal would intake approximately 3.1 billion gallons of ballast water per year. Therefore, in comparison to baseline conditions, we estimate that the Bradwood Landing Project could result in a roughly 30 percent increase in total ballast water withdrawals compared to current commercial shipping on the Columbia River, and would nearly double current ballast water withdrawals by large container ships and tankers. We were unable to find any relevant data for the amount of water that commercial ships currently operating in the Columbia River take on for engine cooling water, for comparative purposes.

We conclude that impacts on sensitive aquatic resources would not be adequately mitigated to a less than significant level without a screening mechanism that minimizes entrainment and impingement of sensitive species of juvenile fish. To ensure that impacts on sensitive aquatic resources from LNG carrier water appropriations and discharges at the LNG terminal would be appropriately mitigated, **we recommend that:**

- **Within 30 days after the issuance of the final EIS, NorthernStar should:**
 - a. **prepare a plan that outlines how NorthernStar would ensure only LNG carriers that are retrofitted to use the proposed screened water supply system at the wharf are allowed to unload cargo at the Bradwood Landing terminal. The plan should include a method of certifying to the FERC, in advance of a LNG carrier's initial call to the Bradwood Landing terminal, that the LNG carrier has been retrofitted to utilize NorthernStar's screened water intake system; or**
 - b. **develop a plan for delivering screened engine cooling and ballast water to LNG carriers at the Bradwood Landing terminal that does not require carrier retrofitting.**

The proposed screened water supply system design plan should include monitoring, reporting, and adaptive management strategies to assure the system's efficacy at minimizing entrainment and impingement of sensitive species of juvenile fish.

The screened water system design and performance measures would be vetted during the formal consultation process and continuing consultations with the NMFS, ODFW, and other appropriate resource agencies. **We recommend that:**

- **Prior to initial site preparation at the LNG terminal, NorthernStar should file the final screened water system design plans and performance standards, along with NMFS comments on the plans and standards, with the Secretary for review and written approval by the Director of OEP.**

Reduced Downstream Flows

River flows are crucial to the migration of anadromous fish on their journey from spawning areas to the ocean. Historically, the Columbia River provided higher flow during the spring and fall, which coincided with juvenile salmon migration periods. The increased flow helped juvenile salmon migrate downstream and out into the ocean. Over time, the addition of dams, impoundments, and water diversions along the Columbia River has led to a more constant flow pattern throughout the entire year by limiting the high and low flows below the dams.

The USGS maintains a gauging station at Beaver Army Terminal, located at CRM 53.8. Data obtained from this station is available for the period between 1992 and 2003. During this period, the average annual mean streamflow was 233,575 cfs, with a high of 329,700 cfs in 1997, and a low of 145,200 cfs in 2001 (USGS, 2006). Water withdrawals associated with construction and operation of the LNG terminal would be a fraction of these rates (i.e., less than 80 cfs). Although reduced downstream flows as a result of the proposed project are expected, the reduction would not be significant.

Changes in Water Quality Associated with Discharge

Following hydrostatic testing of the LNG storage tanks, water would be discharged at about 5,000 gpm to the Columbia River at the LNG terminal site. This discharge has the potential to impact aquatic species due to localized erosion and temporary changes in the chemical characteristics of water near the outfall. Construction impacts associated with increased erosion and suspended sediment levels would be minimized by discharging water through a temporary outfall located about 300 feet offshore that would be diffused or armored to avoid localized erosion. Changes in the chemical characteristics in the vicinity of the outfall could occur if chlorinated water is discharged to the Columbia River. Water appropriated for hydrostatic testing of the LNG storage tanks would be tested for bacteria before use. If bacteria levels are high enough to cause corrosion in the tanks, the water would be chlorinated before testing. To prevent chlorinated water from entering the Columbia River, all hydrostatic test water would be sampled and analyzed before discharge and dechlorinated as necessary.

Water appropriated for hydrostatic testing of the pipeline would be discharged to an upland area near the pipeline crossing of the Columbia River using appropriate filtering techniques. The water would be discharged at an approximate rate of 1,000 gpm and would not be chemically treated. All discharges would be in compliance with NorthernStar's ODEQ water discharge permit and would not be expected to impact fish.

During operation of the facility, water appropriated for testing of the fire suppression system would be discharged to the Columbia River via elevated fire monitors at the end of the dock. We do not anticipate any scour as a result of this testing because the elevated fire monitors would be located over 300 feet from the shoreline and would discharge in an area with an approximate water depth of 42 feet. Fire suppression test water would not come in contact with any source of contamination onsite prior to discharge.

While LNG carriers are docked at the LNG terminal wharf, they may discharge cooling water if they are not modified to discharge cooling water into the ballast tanks. As discussed in section 4.3.2.3, engine cooling water discharged to the Columbia River could initially be 19.4 °F higher than ambient water temperatures (ranging between 42 °F and 68 °F in Astoria, Oregon). Maximum water temperatures ranging from 71.6 °F to 75.2 °F limit the distribution of many salmonids. Potential impacts on aquatic resources due to temperature increases are discussed further above (see *Habitat Modification, LNG Terminal*). In addition, cooling water for the LNG carriers may be injected with a low dose of biocide (expected to be sodium hypochlorite) to prevent the growth of marine organisms. Discharge of the

residual chlorine concentration is not expected to affect aquatic resources outside of the mixing zone because of the relatively low concentration of sodium hypochlorite that may be present in the discharge, and mixing upon discharge would occur rapidly due to the volume of water in Columbia River and mixing by the tides and currents. However, due to the presence of federally listed species at the LNG terminal site, we have recommended in section 4.3.2.3 (see *Entrainment and Impingement*) that NorthernStar conduct additional modeling and develop mandatory performance standards for water temperature and biocide use at the LNG carrier wharf. The performance standards and resulting impacts on federally listed species and EFH at the LNG terminal wharf would be further analyzed in our revised BA and EFH Assessment.

LNG Terminal Lighting

Construction

The Bradwood Landing Project would necessitate the installation of temporary lighting to facilitate construction activities during evening hours as well as permanent lighting to meet operational safety and security requirements. The response of fish to artificial lights can be quite variable depending on a number of factors. Specific responses by fish to light seem dependent on the intensity of the light as well as the species and age-class of the fish (Hoar et al., 1957). Schools of juvenile chum salmon show a marked preference for light while juvenile sockeye retreat to darker areas. Juvenile coho are indifferent to light of moderately high intensities but become inactive in light of very low intensities. While the responses of fish to light are sometimes based on innate behaviors, in other cases, these responses may be based on the presence of prey items. For example, artificial lighting is documented to decrease the daily vertical migration of zooplankton that come to the surface to feed on algae under the cover of darkness.

To avoid and minimize lighting effects during construction, lights would be shielded and directed as needed to illuminate the work areas and meet safety requirements, but to avoid extending off site unnecessarily. Safety, security, and maintenance of the construction schedule would be the primary considerations for construction lighting. Due to the very dynamic nature of large-scale construction and limitations on dictating equipment to contractors, NorthernStar has not defined specific lighting plans for construction. However, it has stated that lights would be unlikely to shine directly at the water for any longer than brief moments during construction.

Operation

Based on NorthernStar's *Lighting Plan for the Bradwood Landing LNG Terminal* (Lighting Plan), lighting sources at the LNG terminal would be designed to provide a minimum of 22 Lux of light intensity on all illuminated areas from sunset to sunrise.¹⁴ Minimum light intensities were determined by NorthernStar in accordance with the state-of-practice industry standards as specified in ANSI/IESNA RP-07-01. General lighting of outdoor open areas, roads and access ways, and the berth would be provided by pulse-start metal halide lights, high pressure sodium lamps, or compact fluorescent lamps in fixtures that use multiple lamps. The fixtures would be mounted on masts or off structural supports. All lighting fittings would be supplied with integral control gear. Before mitigation, metal halide lights would contribute more to the total light levels than high pressure sodium lamps or compact fluorescent lamps. However, because metal halides can be shielded with hoods and shields, stray light could be significantly reduced. Operational lighting impacts on aquatic species would be similar to construction lighting impacts described above, but would occur year-round for the life of the project.

¹⁴ NorthernStar submitted its Lighting Plan for the Bradwood Landing Terminal as part of its response to the NMFS' May 11, 2007 request for additional information to the FERC on July 6, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

To minimize the potential impact on salmonids and other aquatic species from operational lighting, NorthernStar's Lighting Plan includes the use of directed lighting, diffusers, lenses, and shields where appropriate to reduce glare and light pollution. For example, tilted lights (e.g., bracket and stanchion mounted lights) would be directed toward the center of the facility to minimize stray light. In addition, hoods would be specified where possible for lights on the facility exterior (except for navigation aids and security lights) in order to focus light where needed for operational purposes, while minimizing stray light.

To address concerns raised by the NMFS, NorthernStar is conducting additional analysis of the impacts of terminal lighting on salmonids as part of the consultation process. Due to the presence of high-quality habitats and both federally and state-listed species in the vicinity of the LNG terminal, additional measures are necessary to minimize impacts from terminal lighting on wildlife and aquatic resources. Therefore, **we recommend that:**

- **NorthernStar should continue to consult with the NMFS, FWS, ODFW, and other appropriate agencies regarding revisions to its Lighting Plan. NorthernStar should file its final Lighting Plan along with agency comments with the Secretary for review and written approval by the Director of OEP, prior to operation of the LNG terminal.**

Blasting

Blasting may occur during construction of the LNG terminal at the quarry near the southwest corner of the site approximately 800 feet from the Columbia River. The location of the quarry is shown on figure 2.3.2-1. Potential impacts on aquatic resources from blasting at the LNG terminal would be similar to those described as a result of pile driving and include changes in behavior, decreased perception, and damage to body tissue. Published blasting data (Leonard Charles and Associates, 2005) recorded blasting noise similar to what would be expected at the Bradwood Landing site as 118 dB at a distance of 550 feet from the blast site. Using logarithmic spreading, the sound pressure level would attenuate to 100 dB at a distance of 4,370 feet from the source, or to 115 dB 800 feet northeast of the quarry at the Columbia River. Therefore, we estimate the area experiencing 100 dB blast overpressure would encompass the Columbia River. Special blasting techniques, such as charge weight control, blast pattern design, use of stemming material, depth of the charge, and cover material are typically used to control the blasting noise.

As previously discussed, the estimated noise in air at the shore of the Columbia River from blasting at the quarry would be 115 dB. As described above (see *In-water Construction, Pile Driving*), the equivalent underwater noise would be 141 dB re: 1 μ Pa. Blasting generally emits low frequency sound waves lasting 300 to 1,000 milliseconds (Aggregate Industries, 2005). Although this would generally not be considered impulse noise, the corresponding impulse pressure values would be expected to be less than 141 dB_{rms}. Therefore we do not anticipate that the noise thresholds for pinnipeds and salmonids (160dB_{rms} and 150 dB_{rms}, respectively) would be exceeded as a result of the blasting at the LNG terminal site.

Seal bombs, which have historically been used to prevent pinnipeds from feeding around fishing gear, create explosions in the range of 220 dB re 1 μ Pa (peak) (Richardson et al., 1995). The estimated maximum underwater noise exposure to pinnipeds from blasting at the Bradwood quarry would be less than such explosions. Although pinnipeds moving through the area would detect the blast noise and may avoid the area, after continued exposure to the blasting, the avoidance would be expected to wane (Richardson et al., 1995). Blasting at the quarry is not expected to result in adverse impacts on either pinnipeds or salmonids in the Columbia River and Clifton Channel. No underwater blasting is planned for this site.

Accidental Spills or Leaks of Hazardous Materials

For any large construction project, there is the potential for spills or leaks of fuels or hazardous materials from storage containers, equipment working in or near streams, and fuel transfers. Any spill of fuel or hazardous liquid that reaches a waterbody would be detrimental to water quality. The chemicals released during spills could have acute, direct effects on fish, or could have indirect effects such as altered behavior, changes in physiological processes, or changes in food sources. Fish could also be killed if a large volume of fuel or hazardous liquid is spilled into a waterbody. Ingestion of large numbers of contaminated fish could affect primary and secondary fish predators in the food chain.

To minimize the potential for spills, NorthernStar prepared a terminal ESC Plan that includes spill prevention and response procedures. NorthernStar's implementation of this plan would minimize the potential for and the impacts of any spill near surface waters. Specific measures in this plan include prohibiting liquid transfer, vehicle and equipment washing, and refueling within 100 feet of waterbodies and specific steps to be followed to control, contain, and clean up any spill that occurs.

LNG Terminal Operations

Additional terminal operations activities that could potentially impact fish and fish habitat include stormwater runoff, maintenance dredging, the routine discharge of condensate water from the SCVs, and increased noise.

Stormwater Runoff

About 40 percent (16 acres) of the LNG terminal site would be comprised of impervious surface (roadway, rooftop, enclosed structures, and LNG facilities). The remainder of the site would either be landscaping or a loosely packed gravel surface overlying dredged materials. As described in NorthernStar's *Stormwater Management Plan for Removal/Fill Permit Applications* (see section 4.3.1.3), soils at the site have high infiltration rates (at least 14 inches per hour), which would result in rain infiltrating directly into the ground except during major storms. Stormwater runoff that does not infiltrate directly into the ground would be routed to two drainage basins within the LNG terminal site. Rain falling on roofs and paved areas would also be conveyed to the drainage basins that would have capacity to hold runoff from at least a 100-year storm event. NorthernStar expects that all stormwater would be managed on site via infiltration. Therefore, adverse impacts on aquatic resources resulting from stormwater runoff are not anticipated.

Maintenance Dredging

As described in section 2.7.2, NorthernStar expects to dredge about 80,000 cubic yards of material from the ship berth and maneuvering area approximately every 2 to 4 years. NorthernStar proposes to place material from maintenance dredging at the Wahkiakum County Sand Pit site. A specific model has not been run to determine the anticipated turbidity levels resulting from placement of dredged materials at the Wahkiakum County Sand Pit site. However, as described in section 4.3.2.3, given the large grain size of the sediments, the materials are expected to rapidly settle out of the water and water quality impacts would be similar to that at the LNG terminal site during dredging operations. Maintenance dredging impacts on aquatic species would be similar to the dredging of the ship berth and maneuvering area, but would occur intermittently during the operation of the LNG terminal. Based on the recolonization rates described above (see *Dredging, Removal of Benthic Organisms*), the frequency of maintenance dredging may result in permanent alterations in the benthic community within the berth and maneuvering area.

Routine Discharge of Condensate Water from the SCVs

Water is produced as a by-product in the LNG vaporization process proposed by NorthernStar. As discussed in section 4.3.2.3, the SCVs would generate up to 160 gpm of condensate water during operation of the LNG terminal. NorthernStar proposes to discharge the SCV water to the Columbia River under an NPDES permit. Fish could be affected by this discharge due to temporary changes in water quality including increased acidity, increased temperature, and increased dissolved solids.

The pH of the water bath in an SCV is typically maintained at 5.6 standard units and the temperature of the bath is maintained between 55 °F and 65 °F. Before discharge, the pH of the SCV discharge water would be increased in a neutralization tank. An allowable discharge pH would be established during the NPDES permit review process, thereby mitigating potential impacts on aquatic resources.

The average water temperature in the Columbia River measured in Astoria between December 2005 and 2006 was 54.4 °F, ranging between 42 °F and 68 °F, depending on the season (NOAA National Oceanographic Data Center, 2006). The SCV discharge water would be 68 °F, which is generally warmer than the ambient water temperatures but would not exceed the temperature standard of 68 °F for fish rearing and migration (ODEQ, 2003). Plumes of warmer water can directly impact fish that come into contact with the water. Biological processes for coldwater fish tend to speed up and sensory processes slow down as water temperatures increase; immune systems may become compromised, and warmer waters may have reduced levels of dissolved oxygen, among other effects (Bjornn and Reiser, 1991). Warmwater plumes may also cause avoidance, requiring fish to move to other locations and exposing them to predation and additional consumption of their energy resources (NMFS, 2005a). Studies have found that adult survival rates in Columbia River salmonids are correlated with smolt weight at ocean migration. Since smolt weight is a function of energy used versus energy consumed, the less energy needed to survive, the more is available to build fat and energy reserves (Fresh et al., 2004). As described in detail in section 4.3.2.3, given the volume of SCV discharge in relation to the volume of flow in the river, we anticipate that water temperatures near the outfall would rapidly return to ambient conditions, thereby limiting the potential to adversely impact aquatic species.

The total dissolved solids content of condensate would be about 10 times the concentration in the river (there is a guideline standard of 500 mg/L). Because the SCV water would be discharged using an outfall/diffuser system mounted below the water level near the eastern end of the dock to take advantage of better water circulation in the mainstem of the Columbia River, it is expected that the discharge would not have a measurable effect on the total dissolved solids content outside a mixing zone that extends about 10 feet from the diffuser. Through proper management of SCV water discharges, potential impacts on aquatic resources due to increased dissolved solids would be minimal.

Operational Acoustic Effects

Maintenance dredging activities and LNG carrier and tug operations along the LNG carrier transit route and at the LNG terminal would generate underwater sounds pressure levels that could elicit responses in marine organisms. The intensity of the sound pressure levels from vessel traffic and dredging activities can be quite variable. However, sound pressure levels are generally in the range of 112 to 160 dB (re: 1 µPa), intensities that may influence organism behaviors or perceptions but are not great enough to cause physiological damage (Richardson et al., 1995; NMFS, 2005a).

Operational acoustic impacts would depend upon the specific schedule, duration, and type of vessel traffic and the timing and extent of maintenance dredging. Generally, these impacts would be

behavioral and perceptual, and not physiological in nature as fish would tend to avoid the area during periods of high noise output.

Mitigation Measures

Project design, construction, and operation plans have been modified to avoid or minimize impacts on aquatic resources. These efforts would be ongoing during construction in order to capitalize on avoidance and minimization opportunities that cannot be predicted. However, both direct and indirect impacts on aquatic resources would result from construction and operation of the proposed project.

Following construction of the LNG terminal, habitat and ecosystem function would be restored in place. Permanent impacts on aquatic resources would be mitigated by restoring habitat with similar ecological function in areas substantially larger than that lost to permanent impacts. However, although compensatory mitigation actions would restore habitat and have long-term benefits to wetlands, estuarine ecosystems, and habitat for salmonids in general, there would be short-term adverse effects and longer term adverse effects on some non-target species. In terms of overall ecosystem health, these trade-offs are considered appropriate and valuable enough to more than balance the cost of the adverse effects.

NorthernStar identified a number of sites in the general project area that would be set aside and/or developed as compensatory mitigation. Mitigation for impacts on aquatic resources at the Svensen Island and Hunt Creek Mitigation Sites are summarized below. In addition, the Peterson Point Mitigation Site would include restoration of riparian habitats, thereby providing additional benefits to aquatic resources. This mitigation site is discussed in section 4.5.2.3. NorthernStar has also developed an SEI that would be implemented throughout the life of the project. The SEI is described in detail in section 4.6.2.2.

The FERC received numerous comments stating that the mitigation proposed by NorthernStar does not adequately compensate for impacts on aquatic resources associated with the project. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. To ensure that the mitigation proposed for the Bradwood Landing Project adequately compensates for project-related impacts, we have recommended that NorthernStar continue to consult with the appropriate natural resource agencies to finalize its Compensatory Mitigation Plan. The final Compensatory Mitigation Plan should be filed along with agency comments and applicable approvals with the Secretary prior to construction of the project.

Svensen Island Mitigation Sites

As discussed in section 4.4.1.2, the Svensen Island Mitigation Sites would be the primary wetland mitigation sites in Oregon and are located about 14 miles downstream of the proposed Bradwood Landing LNG terminal in Clatsop County, Oregon (see figure 2.1.5-1). For over 100 years, Svensen Island has been protected and separated from the Columbia River by a surrounding dike (an 1868 map shows the dike). The area inside the dike has been agricultural land since the dikes were constructed. Two cross dikes divide the island into three distinct areas. NorthernStar proposes to provide mitigation at two of the three areas, lower Svensen Island and middle Svensen Island. Existing conditions and a list of mitigation measures that would be implemented at these two areas are discussed in the following sections.

Lower Svensen Island

The westernmost section of the island (lower Svensen Island, which includes more than half of the island acreage) was flooded when the dike breached at the northwestern tip of the island in December 2003. Since then, twice daily high tides flood about 170 acres inside the dike, and tidal marsh has reestablished itself. A high percentage of the flooded area is now occupied by a diverse array of marsh species, mostly native, and is a fish and wildlife haven. Since the location is upriver of the area of

saltwater intrusion into the river, the marsh is a freshwater marsh. In addition to the main channel now bisecting the site, many smaller remnant channels exist. New channels stemming from the main channel also appear to be forming. At low tide, the eastern portion of the site is saturated, but only certain areas maintain standing water. A culvert in the northeastern part of the site prevents water from draining properly, and may strand fish at low tide.

Tidal marshes are the most productive fish habitats of the lower Columbia River estuary. Marsh vegetation, such as that found within the lower Svensen Island area, may produce an average annual standing crop of 5 tons per hectare. The resulting plant detritus can sustain a large and diverse population of invertebrates. Some of these small crustaceans and aquatic insects are an important food source for juvenile salmon. The tidal marsh includes dendritic channels that provide excellent fish habitat. Large numbers of juvenile Chinook and chum salmon are present within tidal channels of the marsh, and other species, such as starry flounder, likely use these areas as well. Chinook fry may rear in the marsh for up to a month. During that time, Chinook fry would nearly double in size and quadruple their weight as they feed on the abundant invertebrates. The protected and turbid water of the lower Svensen Island marsh also offers a certain amount of protection against predators. At present, fish have access to the site through the channel at the northwestern breach location and at the culvert that lost its tidegate. The site serves as a protected area for salmon rearing and may serve as a refuge from storm flows.

Wildlife observed at the site includes numerous shorebirds and waterfowl, in addition to raptors. Also, there have been recent reports of hundreds of red-legged frogs and thousands of Pacific chorus frogs during the spring and early summer. This provides some indication that common predators, such as bass and bullfrogs, are not prevalent within the lower Svensen Island area.

To mitigate for impacts on aquatic resources and wetlands due to the proposed project, NorthernStar has proposed to preserve lower Svensen Island and would also implement the following restoration activities:

- control invasive weeds;
- add anchored LWD at tidal channels as fish habitat features;
- further restore fish accessibility by removing two remaining tidegates from existing culverts;
- further restore fish habitat value by removing several (up to eight) remaining culverts on former farm roads that block fish escape with receding tides;
- further restore wetland and riparian habitat by removing remaining buildings and facilities so that plants can grow (possibly adding soil); and
- remove remaining fuel tanks that might pose a risk to aquatic organisms.

Middle Svensen Island

Middle Svensen Island includes both uplands and wetlands dominated by a mix of pasture grasses and invasive herbaceous species with shrubs (such as Himalayan blackberry and red elderberry) along some of the ditch spoil piles and the dikes. Because middle Svensen Island is generally isolated from the river and lower Svensen Island, it currently provides no habitat for fish. The area has seasonally saturated wetlands that have no surface water interconnection with the Columbia River except through tidegates on drainage ditches that preclude fish passage.

To mitigate for impacts on aquatic resources and wetlands due to the proposed project, NorthernStar has proposed implementing the following mitigation measures at middle Svensen Island:

- remove three tidegates on the south side of the island;
- breach the northern dike near the cross-dike between middle and lower Svensen Island (the above actions would flood about 65 acres at normal high tide);
- provide a large culvert connection through the cross-dike to facilitate wetland vegetation seed transport from lower to middle Svensen Island to speed wetland establishment;
- fill or reconfigure existing drainage ditches;
- excavate new low-tide channels;
- place some excavated material along selected dike areas to facilitate growth of shrubs and trees to be planted;
- add anchored LWD at tidal channels as fish habitat features; and
- control invasive weeds.

NorthernStar has an exclusive option to purchase a majority of Svensen Island. The habitat values would be maintained under a stewardship agreement with a land trust, which would be funded by NorthernStar.

Hunt Creek Mitigation Site

The Hunt Creek Mitigation Site is located adjacent to the proposed LNG terminal (see figure 2.1.5-1). The portion of Hunt Creek adjacent to the LNG terminal is designated EFH and provides spawning and rearing habitat for the Lower Columbia River coho salmon ESU. In addition, the confluence of Hunt Creek with Clifton Channel is designated critical habitat and provides rearing habitat for the same ESU/DPSs as the log pond that would be filled at the LNG terminal (see section 4.6.2.2). The Hunt Creek Mitigation Site would be a preservation area. The only active management proposed is the control of invasive weeds (e.g., purple loosestrife) to prevent a reduction of wetland and habitat functions.

The primary goal of the Hunt Creek Mitigation Site would be to assure protection and preservation of the tidal wetlands and stream habitat associated with the portion of Hunt Creek that would be located within the property owned by NorthernStar by placing a conservation easement on the title. Preservation of the Hunt Creek Mitigation Site would provide ongoing benefits to salmonids and other aquatic resources within the Columbia River estuary.

Monitoring and Adaptive Management

NorthernStar has committed to monitor fisheries at the Svensen Island Mitigation Sites semiannually for the first five years of the project. Following this period, monitoring would be conducted annually throughout the life of the project. Monitoring would include surveying and recording of the quality and extent of fisheries habitat present; taking depth measurements at various locations during both low and high tides to capture the extent of tidal function; observing fish directly to define patterns of access and utilization of the mitigation sites; and determining function of LWD. Due to proposed

activities at the Hunt Creek Mitigation Site being limited to noxious weed control, monitoring is not currently proposed.

The Svensen Island Mitigation Sites are considered new mitigation sites. Therefore, adaptive management would be needed. A number of corrections in management may be required to keep the mitigation site accessible to fish, grow appropriate vegetation, and maintain a properly functioning hydrologic regime. Working from the monitoring reports, management would be adjusted to ensure that mitigation objectives would be met despite obstacles that may occur.

4.5.2.2 Essential Fish Habitat

EFH is described in detail in section 4.5.1.2. Construction and operation of the proposed LNG terminal has the potential to impact one species of groundfish (starry flounder) and two species of Pacific coast salmon (Chinook and coho). These species are discussed below.

Of the 90 species managed by the groundfish FMP, only the starry flounder has been documented in freshwater habitat, such as at the proposed LNG terminal site. As described in section 4.5.1.2, starry flounder have been documented as residents in the lower Columbia River (Bottom and Jones, 1990). All life stages of the starry flounder are present in estuaries; however, only juveniles and adults occur in freshwater. Juvenile starry flounder prefer habitat with sandy to muddy substrates and adults prefer habitat with sandy to coarse substrates. Both of these substrate types occur at the proposed LNG terminal site, thus making it potential habitat for starry flounder. EFH for eggs, parr, smolt, and adult Chinook and coho salmon occur at the proposed LNG terminal site.

General project activities potentially impacting EFH include dredging of the berth and maneuvering area, filling of the log pond, shoreline development, pile driving, water withdrawals and discharges, railroad realignment, Hunt Creek Bridge replacement, and accidental spills or leaks of hazardous materials.

Potential impacts on aquatic resources (which include EFH) from construction of the proposed LNG terminal and maintenance dredging of the ship berth and maneuvering area are discussed in detail in section 4.5.2.1. As shown in table 4.5.2-1, dredging of the ship berth and maneuvering area, removal of riparian vegetation, shoreline development, pile driving, and water withdrawals and discharges would result in a substantial adverse effect on EFH for eggs, parr, smolt, and adult Chinook and coho salmon as well as juvenile and adult starry flounder. In addition, filling of the log pond and wetlands at the LNG terminal site, realignment of the railroad, and replacement of the Hunt Creek Bridge would result in substantial adverse impacts on Pacific coast salmon EFH. Construction adjacent to EFH could also result in increased stormwater runoff and/or an inadvertent spill of hazardous materials, either of which could result in substantial adverse effects on EFH. Construction and maintenance of the power line would result in impacts on the waterbodies crossed by the power line, which are unnamed tributaries to Hunt Creek. However, these tributaries are located upstream of Hunt Creek falls; therefore, because there is no fish passage above the falls and the tributaries are at least 5,700 feet from Hunt Creek falls and at least 2,500 feet from the Columbia River, impacts on EFH would not be expected to occur. A detailed discussion of measures that would be implemented to avoid or minimize impacts on aquatic resources (which include EFH) is presented in section 4.5.2.1.

TABLE 4.5.2-1			
Potential Impacts on EFH Due to the Bradwood Landing LNG Terminal			
EFH	Description of EFH	Project Action with Potential Impacts on EFH	Determination of Effect
Groundfish	Aquatic habitat from the extent of saltwater intrusion in river mouths to the boundary of the EEZ.	Accidental spill or leak of hazardous materials. Dredging of the berth and maneuvering area. Removal of riparian vegetation. Shoreline development. Pile driving. Water withdrawals and discharges.	Substantial adverse effect on starry flounder EFH (see section 4.5.2.1 for a discussion of mitigation measures).
Pacific Coast Salmon	All streams, lakes, ponds, wetlands, and other waterbodies currently and historically accessible to salmon.	Accidental spill or leak of hazardous materials. Dredging of the berth and maneuvering area. Removal of riparian vegetation. Shoreline development. Pile driving. Water withdrawals and discharges. Filling of the log pond. Railroad realignment. Hunt Creek Bridge replacement.	Substantial adverse effect on Pacific Coast salmon EFH (see section 4.5.2.1 for a discussion of mitigation measures).
Source: Pacific Fishery Management Council, 2006b.			

4.5.2.3 Terrestrial Wildlife

As described in section 4.4.2.2, the Bradwood Landing LNG terminal site comprises eight distinct upland vegetation cover types. These vegetative communities provide nesting, cover, and/or foraging habitat for a variety of wildlife. Open water and wetland habitats also provide these functions for wildlife species. Potential impacts on these habitats are described and quantified in sections 4.3.2.3 and 4.4.1.2, respectively. The wildlife habitats that would be impacted by the proposed LNG terminal are shown in table 4.5.2-2.

TABLE 4.5.2-2		
Acreages of Wildlife Habitats Impacted by the Bradwood Landing LNG Terminal		
Habitat	LNG Terminal ^a	
	Construction	Operation
Coniferous forest	8.6	8.6
Deciduous forest	7.8	6.0
Early seral forest	8.6	5.6
Riparian forest	0.7	0.5
Scrub-shrub	12.8	2.2
Riparian scrub-shrub	<0.1	<0.1
Palustrine emergent wetland	5.7	5.7
Palustrine scrub-shrub wetland	3.4	2.7
Multiple wetland types	5.6	4.5
Open water	63.5	59.0
Dredged materials/bare ground	21.3	19.3
Developed and roads	5.1	2.0
Total	143.2	116.1
Note: The totals shown in this table may not equal the sum of addends due to rounding		
^a	The LNG terminal includes terminal facilities, Hunt Creek Bridge replacement, and power line.	
^b	Since the issuance of the draft EIS, modifications have been proposed to Clifton and Bradwood Roads and the construction worker parking area. Information quantifying these impacts on wildlife habitats has not been provided.	

Table 4.5.1-2 identifies some of the wildlife species that are common to these habitats. The most prevalent habitats are open water, forest (i.e., coniferous, deciduous, mixed, early seral, and riparian forests), and wetlands (i.e., palustrine emergent, scrub-shrub, and multiple wetland types). Open water habitats account for approximately 44.3 percent of the wildlife habitat affected. Impacts on wildlife occurring in open water habitats are discussed in section 4.5.2.1. As described in section 4.5.1.3, forest habitats provide the greatest vertical structure and support diverse faunal assemblages. Wetland habitats support diverse floral species and provide foraging and dispersal habitat for a wide variety of wildlife species. These habitats account for about 17.9 and 10.2 percent, respectively, of the wildlife habitat that would be affected by construction of the proposed LNG terminal. A portion of the forest and wetland habitats would also be considered riparian habitat. Similar to the other forest habitats, riparian forest provides significant vertical structure, and generally supports the most diverse faunal assemblages of the affected habitats. The least prominent habitats that would be affected are, in descending order of prevalence, dredged materials and bare ground (14.8 percent), upland scrub-shrub (8.9 percent), developed (3.6 percent), and riparian scrub-shrub (less than 0.1 percent).

General Impacts on Terrestrial Wildlife

The impact of the project on terrestrial wildlife species and their habitats would vary depending on the requirements of each species and the existing habitat present within the project area. Construction of the proposed LNG terminal would affect 143.2 acres of wildlife habitat, and would permanently convert approximately 32.1 acres of land to industrial use. Direct impacts of construction on wildlife would include the displacement of wildlife within the project area and direct mortality of some individuals. Potential impacts on terrestrial wildlife from construction and operation of the proposed LNG terminal are discussed below.

During construction activities, mobile wildlife, such as birds and larger mammals, would be expected to leave the vicinity of the project area. Noise associated with construction could also disrupt bird courting or nesting and breeding of other wildlife in the vicinity of the proposed project. Impacts on migratory birds and proposed minimization measures are described in section 4.6.2.2. Animals displaced by construction activities may relocate into similar habitats nearby; however, the lack of adequate territorial space could force some animals into suboptimal habitats. The influx and increased density of animals in some undisturbed areas caused by these dislocations could increase inter- and intra-specific competition and also reduce the reproductive success of animals that are not displaced by construction. The loss of these individuals could result in a decrease in the food stock available for predators of these species. Additionally, some smaller, less mobile wildlife, such as small mammals and burrowing species (e.g., mice, voles, weasels, and beaver), amphibians, and reptiles, could be crushed by construction equipment or trapped in trenches. However, these effects would cease after construction and wildlife would return to the newly disturbed areas and adjacent, undisturbed habitats after restoration is completed.

As discussed in table 4.5.2-2, about 25.7 acres of upland forested habitat would be affected by construction of the LNG terminal and associated power line. Forested habitats affected by the LNG terminal would include 8.6 acres of coniferous forest, 7.8 acres of deciduous forest, 8.6 acres of early seral forest, and 0.7 acres of riparian forest. The greatest impact would be on sensitive species such as the olive-sided flycatcher, bald eagle, and other species associated with remnant mature coniferous forests that might have used this habitat for nesting or other activities (see section 4.6.2.2). The loss of some trees in this already small patch of habitat would decrease the proportion of habitat that is insulated from the edge, thus making the habitat less attractive to some species.

The scrub-shrub habitat (12.8 acres) impacts would be shorter term than the impacts on forest lands, but regeneration of these areas could still take up to 3 years. Although the structural component of

scrub-shrub habitats would recover slowly, successful restoration of non-woody vegetation may improve the value of forage for some wildlife within a relatively short time.

A total of about 0.7 and 14.8 acres of riparian forest and wetland habitats, respectively, would be affected by construction of the LNG terminal. These areas are important habitats for a number of resident wildlife species. Disturbance to these habitats would be minimized through implementation of NorthernStar's terminal ESC Plan.

Substrate disturbance associated with dredging and LNG carrier transit, especially in nearshore areas of the Columbia River, may temporarily reduce the availability of prey for many bird species. However, impacts would be temporary, as use of these habitats would resume upon the completion of construction.

Impacts on wildlife and their habitats from construction and operation of the LNG terminal would be mitigated for in accordance with recommendations from the FWS, ODFW, and WDFW as described in NorthernStar's preliminary Compensatory Mitigation Plan, which is being developed in coordination with the FWS and the ODFW. Potential impacts on wildlife due to terminal lighting, terminal fencing, and the electric power line are discussed below.

Terminal Lighting

As discussed in section 4.5.2.1, construction of the LNG terminal would require the installation of temporary lighting to facilitate some construction activities and permanent operational lighting. Glare from terminal lighting can affect foraging, reproduction, communication, and other critical wildlife behaviors. In some cases, these behavioral changes can lead to alterations in population or community dynamics (e.g., changes to inter-specific competition and/or predation).

One of the most pervasive effects of night lighting is on behaviors controlling orientation (Wada et al., 1987; Witherington, 1997; and Evans and Ogden, 1996). Sometimes, artificial lighting may disorient organisms used to navigating in dark environments. For example, songbirds can confuse lights on buildings and communication towers for stars that provide navigational cues during migration. This disorientation can lead to birds striking buildings and towers or colliding with one another, especially under overcast or foggy weather conditions (Evans and Ogden, 1996; Evans and Rosenberg, 1999). Conversely, increased illumination may extend diurnal or crepuscular behaviors into the nighttime by improving an animal's ability to orient itself (Longcore and Rich, 2004). This can be beneficial to some individual animals by allowing them to extend the length of activities such as foraging or mating.

Behavioral changes associated with increased lighting can affect activity levels, foraging behavior, habitat use, and mating (Wolfe and Summerlin, 1989; Yurk and Trites, 2000; Bird et al., 2004). In a study conducted by Buchanan (1993), the ability of frogs to detect and consume prey was significantly reduced under increased lighting. Many frogs exhibit a narrow range of environmental illumination in which they are active; within this range, frogs exhibit certain behaviors (such as calling, breeding, and foraging) only at very specific light levels. Bird et al., (2004) found that mice used fewer patches of food and ate less in areas with artificial lighting, indicating that the perceived risk of predation increases with increased lighting (Lima and Dill, 1990). Alternatively, certain species of bats are attracted to and congregate around lit areas, presumably to feed on insects also attracted by the light (Blake et al., 1994; Rydell and Baagøe, 1996). Although outdoor lighting has been shown to affect flight, navigation, vision, migration, dispersal, oviposition, mating, feeding and has lead to increased predation in some moth species, many moth species appear unaffected by outdoor lighting (Frank, 1988). Large mammals, such as mountain lions, strongly avoid lit areas, which can alter their movement patterns and potentially increase habitat fragmentation (Longcore and Rich, 2004).

Artificial lighting could positively and negatively affect wildlife in the vicinity of the proposed LNG terminal. The specific impacts of artificial lighting on individual organisms, populations, or communities are difficult to predict. To minimize the positive and negative impacts of lighting on wildlife, the FWS has developed the *Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning*. These guidelines, which NorthernStar has agreed to implement, can be applied to facilities other than communication towers and include recommendations to reduce the number and intensity of security lights to the minimum required and to use down-shielding lights. To avoid and minimize construction lighting effects during construction, lights would be shielded and directed as needed to illuminate the work areas and meet safety requirements, but to avoid extending off-site unnecessarily. Researchers speculate that in rural locations, down-shielding would have an even greater effect than in urban areas because there is less illumination from other lit structures (Reed et al., 1985). While potential project impacts from artificial lighting cannot be completely eliminated, implementation of the FWS's guidelines related to facility lighting would minimize the potential for terminal lighting to adversely affect wildlife in the project area.

Due to the presence of high-quality habitats that are frequently used by shorebirds, waterfowl, and other waterbirds migrating along the Pacific Flyway and the potential presence of sensitive wildlife species, additional measures are necessary to minimize impacts from terminal lighting on wildlife in the vicinity of the proposed project. Therefore, we have recommended in section 4.5.2.1 that NorthernStar continue to consult with the NMFS, FWS, ODFW, and other applicable agencies to finalize its Lighting Plan.

Terminal Fencing

Comments were received during the scoping process regarding the potential impacts of fencing on wildlife movement patterns. For security purposes, fencing would be constructed around the LNG terminal. The fencing that would surround the proposed LNG terminal would be 8-foot-high woven wire and topped with barbed wire, which would potentially change wildlife movement patterns. At this height, the fence would effectively preclude most if not all wildlife from jumping over the fence (Montana State University, Extension Service, 2000), thus minimizing or eliminating the risk of wildlife being trapped within the LNG terminal site. Measures to minimize impacts from fencing would include establishment and maintenance of passage for mammals and other terrestrial wildlife around the perimeter of the fenced LNG terminal. This would be accomplished by maintaining a natural grade and native vegetative community along the shoreline between the berm and the MLLW elevation as described in section 4.4.2.2. In addition, the majority of the fenced area (71.7 percent) would be graveled and developed for industrial use, and thus would not provide suitable habitat for foraging, breeding, dispersal, or other wildlife movements. Therefore, wildlife in the area would be expected to use other, more suitable areas of habitat for dispersal or other movements. As such, significant impacts on wildlife as a result of the installation of terminal fencing are not anticipated.

Power Line

Construction of the power line would temporarily impact about 17.7 acres of forested habitats. Following construction, 12.7 acres of forest habitats would be replanted with native trees and shrubs and allowed to revegetate. In general, temporary impacts on terrestrial wildlife due to construction of the power line would be similar to those described above for construction of the LNG terminal; however, impacts would be considered longer-term because of the time required to restore forest habitat to its preconstruction condition. The remaining 0.1 acre of habitat temporarily impacted by the power line would be upland scrub-shrub. Restoration of woody vegetation associated with upland scrub-shrub habitat would be complete within 3 to 5 years.

Impacts on wildlife from operation of the power line would be limited to disturbance during maintenance activities and potential electrocution of nesting birds. Maintenance activities would include mechanical and chemical control of about 5.0 acres of forested habitats within the power line right-of-way and maintenance of access roads, towers, and the transmission lines. These activities would be conducted by PacifiCorp and would be of limited duration, but would happen infrequently over the life of the power line. Activities would be conducted only as needed to prevent vegetation from interfering with operation and maintenance of the power line. For the most part, the affected vegetative communities would be early seral forest, which is often dominated by shrubby vegetation within the right-of-way (see section 4.4.2.2). However, some clearing and topping/limbing of coniferous forest could be required to accommodate the supporting towers.

Specific vegetation maintenance procedures that PacifiCorp would apply to maintenance of the power line include:

- mowing would be limited to 15 feet on either side of distribution primary wires and within power line rights-of-way;
- frequency of vegetative control using mechanical and chemical means would be determined based on need and annual inspections and would not occur on a predetermined basis;
- wetlands would be worked by hand in accordance with all applicable federal, state, and local laws and regulations;
- tree removal conditions are site- and tree-specific. However, tree clearing would generally be limited to within 15 feet of distribution conductors and within the 100-foot power line right-of-way. Removal of trees that are dead, dying, diseased, deformed, or unstable and that have a high probability of falling would be emphasized;
- trees would not be felled into streams in a way that could obstruct or impair the flow of water, unless instructed otherwise by the responsible governing agency. Machine work would not be performed within 50 feet of a live stream. Water pollution would be prevented and soil or debris would not be placed in streams. Equipment would use existing or designated stream crossings. State fish and wildlife agencies would be contacted if tree removal in and around streams could cause erosion or if resulting exposure could increase water temperature. Federal and state laws and regulations would be followed concerning stream protection; and
- pre-maintenance surveys would be conducted to protect migratory birds by marking active nests if the line must be worked during nesting season.

Comments were raised during the scoping process regarding the potential for the power line to electrocute migratory birds and nesting raptors during operation of the proposed project. To minimize impacts on birds, PacifiCorp has included specific elements in the power line and tower design for use in raptor areas. Additional discussion of potential impacts on migratory birds is included in section 4.6.2.2.

Unique or Sensitive Wildlife Habitats

Julia Butler Hansen National Wildlife Refuge

The proposed LNG terminal site is near the JBHNR, which is located on the far shore of the Columbia River in Washington and across Clifton Channel on Tenasillahe Island. The proposed ship berth and unloading facilities would be less than 2,000 feet from the closest point of the refuge – the southeast corner of Tenasillahe Island. The area historically has been used for the placement of dredged materials. As described above, the JBHNR contains over 5,600 acres of pasture, forested tidal swamp, woodlots, marshes, and sloughs along the Columbia River in both Washington and Oregon and supports a population of Columbian white-tailed deer federally listed as endangered under the ESA. The presence of potentially suitable Columbian white-tailed deer habitat within the LNG terminal site, as well as the site's proximity to the refuge suggests that this species may utilize the area. Potential impacts on the Columbian white-tailed deer and its habitat are discussed in section 4.6.2.2. Impacts on wildlife at the JBHNR as a result of construction and operation of the proposed LNG terminal would be limited to increased noise and terminal lighting. Impacts on wildlife as a result of terminal lighting are discussed above.

Increased noise would occur as a result of both construction and operation of the LNG terminal. As discussed in section 4.10.2.2, NorthernStar selected five (N1 - N5) noise measurement and analysis sites in the vicinity of the proposed LNG terminal (see figure 4.10.2-1). Although none of these sites were within the JBHNR, N2 and N3 (both located on Puget Island) are a similar distance from the proposed terminal site as the southeastern corner of Tenasillahe Island within the JBHNR across the Clifton Channel. Generally, the background noise levels at these locations are relatively low (46 to 48 A-weighted scale (dBA) L_{dn}). During dredging activities, noise levels are expected to average between 68 and 73 dBA L_{dn} at N2 and N3; during non-dredging construction activities at N2 and N3, noise levels would average between 50 and 53 dBA L_{dn} . During operation of the LNG terminal, the analysis showed an average increase of 4 dBA L_{dn} at N2 and N3. Noise levels attributed to construction and operation of the LNG facility drop off quickly to ambient levels at distances farther than N3 (farther than 1 mile from the LNG site). These data suggest that during construction and operation of the Bradwood Landing Project, noise levels at the southeastern corner of Tenasillahe Island would be higher than existing conditions. In fact, conditions may be noisy enough to disturb and/or displace some wildlife species found on the southeastern corner of Tenasillahe Island, particularly during dredging operations. However, this portion of the JBHNR is dominated by sands deposited during dredging of the Columbia River navigation channel, and is an area that provides limited value as wildlife habitat. As such, we anticipate only relatively minor impacts on wildlife inhabiting the JBHNR.

During the draft EIS comment period, comments were received regarding potential impacts on sensitive wildlife sites and sensitive species from blasting activities. NorthernStar would develop a Blasting Management Plan that would contain measures for noise mitigation. Due to the presence of both sensitive wildlife sites and high quality habitat for the Columbian white-tailed deer and other sensitive species in the vicinity of the LNG terminal, we recommend that:

- **NorthernStar should consult with the NMFS, FWS, ODFW, and other appropriate agencies in developing its Blasting Management Plan relative to the proposed noise mitigation measures. NorthernStar should file its Blasting Management Plan along with agency comments on the plan with the Secretary for review and written approval by the Director of OEP, prior to blasting activities.**

Oregon Major Big Game Habitat

The proposed LNG terminal site would be located within major big game habitat as mapped by Clatsop County. Elk and deer tracks were observed near the proposed terminal site during a site visit, and black bear have been observed at the site by previous property owners. The *Clatsop County Comprehensive Plan* (Clatsop County, 1996) includes development standards for ODFW-identified big game areas. To minimize disturbance to wildlife, NorthernStar would establish signage along roads and instruct project personnel to reduce vehicle speeds along roads where big game and Columbian white-tailed deer occur to avoid vehicle-animal collisions. Project personnel would also be instructed not to approach big game (either adults or young) at any time. Section 4.6.2.2 includes additional discussion of the Columbian white-tailed deer.

Active Osprey Nest

The proposed LNG terminal site currently supports an active osprey nest on an existing piling along the Columbia River shoreline near the southeast end of the LNG terminal site. Ospreys are common birds of prey that are frequently present near rivers and other waterbodies that provide sufficient quantities of aquatic prey. This species is common along the Columbia River and often builds nests on artificial nest platforms provided by the utility companies. These nest sites are frequently located in close proximity to roadways and other disturbed sites.

The osprey nest would be affected by increased noise and visual disturbance coming from the construction area, which could lead to nest abandonment and failed reproduction. Therefore, NorthernStar has consulted with biologists from the FWS and ODFW to identify appropriate measures to avoid or minimize disturbance to nesting osprey and avoid a “taking” under the Migratory Bird Treaty Act. Per ODFW recommendations, osprey nest relocation would be conducted outside of the critical nesting period (early September through late February). This relocation would occur when no osprey courtship behavior is observed at the site and when the nest is not being actively used (i.e., outside of the breeding season).

Osprey typically exhibit a high degree of nest fidelity and are likely to attempt to rebuild at the existing location unless a superior site is provided nearby. As such, the relocated structure would be of comparable or better quality and meet the following conditions:

- the new nest platform would be in an exposed location that is as high or higher than the original nest site and surrounding structures (including power lines);
- the new location would be located as close as possible to the existing nest, but no closer than 0.25 mile from activities associated with construction and operation of the LNG terminal;
- the new location would be no closer than 600 feet to an existing osprey, bald eagle, or peregrine falcon nest;
- if using a transmission pole, a predator guard (sheet metal) would be installed at the base of the pole;
- an elevated perch (minimum of 3 feet above the nest platform) would be included in the platform design to attract the osprey pair to the new nest site;

- the platform and structure would be mounted securely and capable of supporting a nest that may weigh 100 to 200 pounds; and
- the old nest would be kept intact (if possible) and relocated onto the new platform; however, if the nest cannot be kept intact, portions of the old nest would be used to construct the new nest.

If the piling for the original nest were to be left intact, it would be modified to discourage ospreys from rebuilding a nest at the same site. This would likely be accomplished by installing a triangular perch guard to prevent osprey from landing and rebuilding the replaced nest.

Mitigation Measures

Project design, construction, and operation plans have been modified to avoid or minimize impacts on terrestrial wildlife. These efforts would be ongoing during construction in order to capitalize on avoidance and minimization opportunities that cannot be predicted. However, both direct and indirect impacts on wildlife would result from construction and operation of the proposed LNG terminal. Mitigation measures discussed in this section are specifically for impacts on upland habitats. Mitigation measures proposed by NorthernStar for wetland and aquatic habitats would also benefit terrestrial wildlife, and are discussed in sections 4.4.1.2 and 4.5.2.1, respectively, and in NorthernStar's Compensatory Mitigation Plan.

The FERC received numerous comments stating that the mitigation proposed by NorthernStar does not adequately compensate for impacts associated with the project. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. To ensure that the mitigation proposed for the Bradwood Landing Project adequately compensates for project-related impacts, we have recommended that NorthernStar continue to consult with the appropriate natural resource agencies to finalize its Compensatory Mitigation Plan. The final Compensatory Mitigation Plan should be filed along with agency comments and applicable approvals with the Secretary prior to construction of the project.

The primary proposed mitigation site for impacts on wildlife habitat is at Peterson Point, which is located 6 miles west of Clatskanie, Oregon. The Peterson Point Mitigation Site currently provides habitat for a variety of wildlife species including Columbian white-tailed deer, beaver, bald eagle, northern harrier, red-tailed hawk, numerous species of waterfowl and songbirds, and a variety of reptiles and amphibians, including tree frogs. About 40 to 100 Columbian white-tailed deer from the Oregon lowlands subpopulation occasionally use the site. Additionally, there are two bald eagle nests within a 2-mile radius of the site; one is located about 1.0 mile north of the mitigation site on a slough bordering Whites Island and the other is located about 1.8 miles from the site on Whites Island. No other federally endangered or threatened species have been documented at the Peterson Point Mitigation Site.

NorthernStar proposes to restore about 114 acres of native forest and about 31 acres of riparian habitat. As described in section 4.5.3.3, the current owner has been working with Ducks Unlimited to enhance wildlife habitat values through a combination of activities including blocking drainage ditches, installing flow control structures, and clearing hybrid poplars. The result is a mosaic of hybrid poplar stands, emergent wetlands and pasture/grassland habitats. The proposed mitigation parcels are in strategic locations throughout the site and include 114 acres of hybrid poplars on relatively higher ground that is drier than many of the other areas at the site due, in part, to flow control structures and pump stations, which regulate the water levels in the sloughs and ditches. In addition, the mitigation site contains 31 acres along the Columbia River and Westport Slough that are currently providing high-quality riparian habitat. Mitigation at this site would include a combination of preservation and enhancement by planting understory and riparian vegetation (for Columbian white-tailed deer), controlling noxious weeds,

installing artificial nest structures (for purple martins, osprey, wood ducks, and bats), and installing brush piles to provide refugia for small mammals, herptofauna, and ground-nesting birds. The parcels restored on the Peterson Point Mitigation Site would be protected in perpetuity from development by accomplishing deed restrictions, memorandums of understanding, and control by a third party.

The primary goal of the Peterson Point Mitigation Site would be to enhance and protect potentially suitable habitat for the Columbian white-tailed deer (see section 4.6.2.2). However, by restoring 145 acres of forested habitat, a net benefit would be provided to a wide variety of terrestrial wildlife species by increasing the availability of potential habitat for breeding, foraging, and dispersal. NorthernStar proposes to conduct annual monitoring of the Peterson Point Mitigation Site for 5 years. Monitoring reports, which would be submitted to the ODFW and FWS, would include a detailed summary of conditions of each of the parcels. In addition to submitting monitoring results, recommendations would be made for maintenance of non-native weedy species and/or corrective actions necessary to meet the performance standards.

NorthernStar has also developed an SEI, which would be implemented throughout the life of the project. Although the primary goal of the SEI would be to ensure the recovery of salmon and the lower Columbia River ecosystem, the projects would also benefit terrestrial species. The SEI is described in detail in section 4.6.2.2.

4.5.2.4 Oregon Department of Fish and Wildlife - Habitat Mitigation Policy

The ODFW developed a HMP (OAR 635-415-0010) to further fish and wildlife management policies “through application of consistent goals and standards to mitigate impacts on fish and wildlife habitat caused by land and water development actions” (ODFW, 2006a). The policy includes a description of six qualitative habitat categories, which are based on relative importance to fish and wildlife. The rule establishes mitigation goals and corresponding implementation standards for each habitat category. These categories with their mitigation goals and implementation standards are summarized below.

- Habitat Category 1 is irreplaceable, essential habitat for a fish or wildlife species, population, or a unique assemblage of species and is limited on either a physiographic province or site-specific basis, depending on the individual species, population, or unique assemblage. The mitigation goal for Category 1 habitat is no loss of either habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or no authorization of the proposed development action if impacts cannot be avoided.
- Habitat Category 2 is essential habitat for a fish or wildlife species, population, or unique assemblage of species and is limited either on a physiographic province or site-specific basis depending on the individual species, population, or unique assemblage. The mitigation goal, if impacts are unavoidable, is no net loss of either habitat quantity or quality and to provide a net benefit of habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through reliable in-kind, in-proximity habitat mitigation to achieve no net loss of either pre-development habitat quantity or quality. In addition, a net benefit of habitat quantity or quality must be provided. If this cannot be achieved, the ODFW shall recommend against or shall not authorize the proposed development action.

- Habitat Category 3 is essential habitat for fish and wildlife, or important habitat for fish and wildlife that is limited either on a physiographic province or site-specific basis, depending on the individual species or population. The mitigation goal is no net loss of either habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through reliable in-kind, in-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality. If this cannot be achieved, ODFW shall recommend against or shall not authorize the proposed development action.
- Habitat Category 4 is important habitat for fish and wildlife species. The mitigation goal is no net loss in either existing habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through reliable in-kind or out-of-kind, in-proximity or off-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality. If this cannot be achieved, ODFW shall recommend against or shall not authorize the proposed development action.
- Habitat Category 5 is habitat for fish and wildlife having high potential to become either essential or important habitat. The mitigation goal, if impacts are unavoidable, is to provide a net benefit in habitat quantity or quality. The implementation standard recommends or requires avoidance of impacts through alternatives to the proposed development action; or mitigation of impacts, if unavoidable, through actions that contribute to essential or important habitat. If this cannot be achieved, ODFW shall recommend against or shall not authorize the proposed development action.
- Habitat Category 6 is habitat that has low potential to become essential or important habitat for fish and wildlife. The mitigation goal is to minimize impacts. The implementation standard recommends or requires actions that minimize direct habitat loss and avoid impacts on off-site habitat.

NorthernStar's Compensatory Mitigation Plan identified a number of sites in the general project area that would be set aside and/or developed as compensatory mitigation. Specifically, these sites would compensate for temporary or permanent impacts on wetlands, wildlife habitats, and salmonid habitats that could not otherwise be mitigated. The compensatory mitigation sites were identified only after all other forms of impact mitigation (i.e., avoidance, minimization, rectification, and reduction) were considered and, when appropriate, implemented. In developing these sites, it is NorthernStar's intent to provide an overall net benefit to the environment of the lower Columbia River ecosystem. However, because NorthernStar's Compensatory Mitigation Plan has not been finalized, we recommended in section 4.4.1.1, that NorthernStar continue to consult with the COE, ODSL, WDE, other applicable agencies, and appropriate Native American tribes to finalize its Compensatory Mitigation Plan. Based on NorthernStar's proposed compensatory mitigation and our recommendation to continue to consult with appropriate agencies regarding compensatory mitigation, we anticipate that the goals and standards of ODFW's HMP would be met.

4.5.3 Pipeline Facilities

4.5.3.1 Aquatic Resources

Existing Aquatic Resources

Anadromous and freshwater fish occurring in the lower Columbia River and its tributaries are described in section 4.5.1.1.

Commercial and Recreational Fisheries

Commercial and recreational fisheries of the lower Columbia River and its tributaries are described in section 4.5.1.1.

Impacts on Aquatic Resources

General project activities potentially impacting aquatic resources include in-water construction activities, terrestrial/riparian habitat modification, water appropriations, accidental spills or leaks of hazardous materials, and periodic maintenance of the pipeline. Much of the impact discussion included below applies to the fish protected under the ESA, which are described in detail in sections 4.6.1.1 and 4.6.2.3, and to EFH designated under the MSA, which is discussed further in section 4.5.2.3.

In-Water Construction Activities

Fish and other aquatic resources could be impacted by in-water construction activities associated with pipeline construction. The degree of impacts on fish associated with construction activities would depend on the timing of in-water construction. Construction during periods of sensitive fish activity (i.e., spawning, juvenile rearing, and migration) can have a greater impact on fish than construction during other periods. To minimize impacts on fish, pipeline construction within waterbodies would occur during in-water work windows designated by the ODFW and WDFW.

The proposed pipeline would impact 94 waterbodies, of which 52 are intermittent and 42 are perennial. Of these, up to 23 would be crossed using the HDD or conventional bore methods, which would avoid in-water construction activities. The remaining waterbodies would be crossed using a dry open-cut method (see table 4.3.2-4). Waterbody crossing methods are described in detail in sections 2.4.2.2 and 4.3.2.4).

In-stream construction across waterbodies would directly affect aquatic resources. In addition, construction across waterbodies would remove vegetation and habitat, thereby potentially increasing the sedimentation and turbidity of the water, streambank erosion, and water temperature. Construction-related impacts on aquatic resources could also result from an inadvertent release of drilling mud during HDDs. A discussion of potential impacts on aquatic resources is provided below. The degree of impact would depend on the proposed crossing method, the existing conditions at each crossing location, the mitigation measures employed, and the timing of construction.

Dry waterbody crossing methods (i.e., diverted dry open-cut, flume, dam and pump) could interfere with essential life processes. In-stream construction could also delay or prevent migrating fish from reaching upstream spawning areas or could delay downstream movement of juveniles. Equipment moving through a stream and the trenching of a waterbody could physically damage fish, fish eggs, and other aquatic organisms, including fish prey and forage species. In-stream structures for support of equipment bridges over streams may similarly impact fish and other aquatic organisms. The HDD and

conventional bore methods avoid in-stream construction and generally minimize impacts on aquatic resources.

The majority of the waterbodies affected by the Bradwood Landing Project would be crossed using the dam and pump or flume method if water is flowing in the waterbody at the time of construction. In-stream activities associated with placing the flume pipe and constructing the sandbag dams would be expected to displace most fish either upstream or downstream from the dams. Flumes and dams would be completely installed and functioning before any in-stream disturbance. All flume and dam and pump crossings would be completed as a single effort to minimize the duration of in-stream disturbance.

Inadvertent Release of Drilling Mud

NorthernStar proposes to install the pipeline across all 12 waterbodies containing federally listed salmonids or their designated critical habitat (see table 4.3.2-6) using the HDD or conventional bore method. The HDD and bore methods eliminate the need to excavate a trench through the stream or river channel, and would minimize or eliminate sedimentation and turbidity associated with the more common open-cut methods of pipeline construction. NorthernStar has agreed to follow our Procedures, which require submittal of a plan prior to construction that contains site-specific diagrams showing the location of mud pits, pipe staging areas, and all areas to be disturbed or cleared for construction.

Although the HDD method would minimize or avoid in-stream impacts on aquatic resources because it eliminates the need for in-stream excavation, it does not completely eliminate the possibility of impacts due to the possibility of an inadvertent release of drilling mud or fluid (also referred to as a frac-out) into the waterbody. Drilling mud primarily consists of water mixed with bentonite, which is a naturally occurring clay material. The only other possible additives would be non-toxic solid materials (e.g., sawdust, nut shells, bentonite pellets, or other commercially available non-toxic products) that could be needed to plug an inadvertent release. Bentonite, by itself, is essentially non-toxic (Breteler et al., 1985; Hartman and Martin, 1984; Sprague and Logan, 1979). However, bentonite, as with any fine particulate material, can interfere with oxygen exchange by the gills of aquatic organisms (EPA, 1986). The degree of interference generally increases with water temperature (Horkel and Pearson, 1976). Impacts would be localized and would normally be limited to individual fish in the immediate vicinity of the frac-out. The majority of highly mobile aquatic organisms, such as fish, would be able to avoid or move away from the affected area. Other less mobile or immobile organisms, such as fish eggs, mussels, and other macroinvertebrates, would incur direct mortality.

Comments were received on the draft EIS relating to potential impacts on spawning habitat due to a frac-out during pipeline construction. As stated above, if fish eggs are present in the vicinity of a frac-out, direct mortality could occur. However, at the time of a frac-out, NorthernStar would stop drilling immediately and notify appropriate agencies. A vacuum truck or pump(s), with a sufficient hose, would then be used to remove the bentonite, working from downstream to upstream, to allow maximum visibility. Hand tools may be used to scarify the sediments and ensure removal to the maximum extent practicable, thus minimizing impacts on spawning habitat.

As discussed in section 4.3.2.4, the highest potential for a frac-out typically occurs at the beginning or the end of the HDD borehole where the separation between the borehole and ground surface is the least. NorthernStar has designed the proposed HDD crossings so that areas at greatest risk of a potential inadvertent release are in upland areas away from the water's edge. HDD entry and exit pits would be located a minimum of 75 feet from sensitive waterbodies (Appendix B), which would minimize the potential for an inadvertent release into a waterbody, thereby minimizing the likelihood of impacts on aquatic resources. NorthernStar's *HDD Contingency Plan* describes how the drilling operations would be conducted and monitored to minimize the potential for inadvertent drilling mud releases. The plan also

includes procedures and measures to be taken during an inadvertent release of drilling mud. NorthernStar would station the necessary equipment and supplies to respond to an inadvertent release of drilling mud upon discovery of loss of drilling fluid. At the time of a release of drilling mud, NorthernStar would stop drilling immediately, contain drilling fluids, and notify appropriate agencies. Appropriate resource experts, such as fisheries biologists and wetland scientists would be brought onsite to monitor resources and effects of the release.

Suspended Sediments and Turbidity

Increased suspended sediment and turbidity levels, due to in-water trenching and backfilling, would pose the greatest potential for impacts on aquatic species due to construction of the proposed pipeline. The extent of the impact would be dependent on sediment loads, water velocity, and sediment particle size at the time of construction. Potential impacts of clearing the pipeline right-of-way would be analogous to, but on a much smaller scale than, timber harvest and associated road construction, which have been found to increase the frequency and magnitude of soil destabilization, erosion, and eventually stream sedimentation (Everest et al., 1987; Swanson et al., 1987). As discussed above, sedimentation can adversely affect fish eggs and fish survival, benthic community diversity and health, and spawning habitat. Suspended particles and sediment can result in turbidity in sufficient quantities to affect oxygen exchange over the gills in aquatic species, resulting in weakened individuals or mortality. Additionally, sediment stirred into the water column can be redeposited on downstream substrates, which could bury aquatic macroinvertebrates (an important food source for salmonids). However, studies indicate that impacts on streams and rivers from typical pipeline construction would be temporary, and that no long-term effects on water temperature, pH, dissolved oxygen, benthic invertebrate populations, or fish populations would occur (Vinkour and Shubert, 1987; Blais and Simpson, 1997). To reduce sedimentation and erosion, NorthernStar would perform turbidity monitoring in accordance with state permits, implement its pipeline ESC Plan for Oregon, and its SWPPP for Washington. NorthernStar would compensate for impacts on surface waters and aquatic resources that could not be avoided by setting aside or developing a number of mitigation sites, which are described in its Compensatory Mitigation Plan.

Vegetation and Habitat Removal

Aquatic resources could be affected through the removal of vegetation and habitat at the waterbody crossing sites. Potential impacts include increased water temperature, decreased LWD and the associated reduction in habitat, and increased mass failures adjacent to waterbodies. These impacts are discussed below.

Clearing the right-of-way would remove shading vegetation from uplands and riparian areas, exposing the land and water to increased sunlight, resulting in both direct increases in water temperatures and indirect increases as water flows over the warmer land surface and eventually reaches the waterbody (Beschta and Taylor, 1988). The effects of water temperature on the life stages of salmonids have been extensively reviewed and are described in section 4.5.2.1. To mitigate these potential impacts, NorthernStar would allow a corridor at least 25 feet wide, as measured from the OHWM, to permanently revegetate with native plant species across the entire construction right-of-way following construction. However, to facilitate access for periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be maintained in an herbaceous state. NorthernStar's use of the HDD construction method to cross waterbodies would also limit impacts on riparian habitats. The only potential disturbance in riparian areas crossed using the HDD method would be minor trimming of vegetation using hand tools directly over the pipeline. This minor clearing is required to facilitate the temporary deployment of HDD guidance (telemetry) cables along the ground during construction and to perform a leakage survey after installation and commissioning.

In addition to potential temperature impacts, one of the most significant potential effects of forest clearing on fisheries is the reduction of LWD in streams and on land (Harmon et al., 1986; Sedell et al., 1988). Large logs provide in-stream channel structures (i.e., pools and riffles), which are critical to salmon spawning and rearing. As the size of individual logs or accumulations of logs increases, the size and stability of pools that are created also increase (Beschta, 1983). Riparian forests that undergo harvesting of large trees take on secondary-growth characteristics and contribute lower quantities of woody debris than unmanaged, old-growth forests (Bisson et al., 1987). However, sufficiently wide, carefully managed riparian buffers that retain a full complement of ages, sizes, and species of native trees and vegetation can ensure adequate recruitment of LWD to streams (Bisson et al., 1987; Murphy and Koski, 1989; Morman, 1993).

NorthernStar is consulting with the FWS, NMFS, and state agencies regarding potential mitigation for replacement of in-stream habitat. These preliminary discussions indicate that mitigation could include the placement of LWD within the waterbodies following construction to mitigate for loss of habitat from in-stream construction. The use of LWD as a mitigation measure for impacts associated with in-stream construction has been documented as an effective means of creating in-stream habitat heterogeneity, reducing streambank erosion, reducing sediment mobilization, and enhancing local fish abundance (Scarborough and Robertson, 2002; Bethel and Neal, 2003). Because short-term loss of riparian vegetation within construction work areas may affect water temperatures by removing shade sources, placement of LWD on the streambanks and in the streams can provide shade and increase bank stability while vegetation is maturing following construction. Additionally, placement of LWD in streams or on streambanks can supply habitat for forage species and enhance the salmonid rearing potential of an area. Due to the importance of numerous fish species in waterbodies along the proposed route, we have recommended in section 4.3.2.4 that NorthernStar continue to consult with the COE, NMFS, FWS, and appropriate federal and state agencies to finalize its *Waterbody and Wetland Construction and Mitigation Procedures Plan*, including a description of the specific methods of in-water habitat mitigation to be conducted.

Forest clearing and construction have also been found to increase the frequency and amount of sediment production through mass failures which are a major contributor of sediment to streams, particularly in steep landscapes (Swanson et al., 1987). Mass failures adjacent to streams and resulting debris flows carve stream banks, thereby resulting in significant patches of bare ground. These areas favor revegetation by fast-growing species such as red alder rather than a diverse plant community which is normally characteristic of riparian habitats (Knutson and Naef, 1997). Debris flows also move LWD to floodplain areas or to concentrated locations, reducing the distribution of this habitat throughout the stream (Swanson et al., 1987). Although the potential for mass failures cannot be completely eliminated, since this is also a natural phenomenon, NorthernStar would ensure equipment stability and worker safety by avoiding the placement of HDD or bore entry and exit pits in areas where steep slopes are present because they require significant extra workspace as compared to open-cut methods. Clearing this extra workspace on already unstable sideslopes would increase the likelihood of mass failures and landslides. NorthernStar would also implement its pipeline ESC Plan for Oregon and its SWPPP for Washington to reduce the potential for mass failures. In addition, we have also recommended that NorthernStar conduct additional field mapping and subsurface investigations as needed to develop a Final Pipeline Design Geotechnical Report.

Streambank Erosion

The clearing and grading of vegetation during construction could increase erosion along streambanks and turbidity levels in the waterbodies. Alteration of the natural drainage ways or compaction of soils by heavy equipment near streambanks during construction may accelerate erosion of the banks, runoff, and the transportation of sediments into waterbodies. The degree of impact on aquatic

organisms would depend on sediment loads, stream velocity, turbulence, streambank composition, and sediment particle size. To minimize these impacts, NorthernStar would use temporary equipment bridges, mats, and pads to support equipment that must cross the waterbody or work in saturated soils adjacent to the waterbody. In accordance with our Procedures and where topography allows, NorthernStar would attempt to preserve a minimum of 10 feet of vegetation along the waterbody banks during clearing and grading and locate temporary extra workspaces back from the edge of perennial and intermittent waterbodies where feasible to minimize the disturbance of riparian vegetation. As discussed in section 4.4.2.3, NorthernStar would allow a corridor at least 25 feet wide, as measured from the OHWM, to permanently revegetate with native plant species across the entire construction right-of-way following construction. At waterbodies that would be crossed via the HDD method, the only anticipated streambank disturbance would be minor trimming of vegetation using hand tools directly over the pipeline. NorthernStar would also install sediment barriers, such as silt fence and straw/hay bales, adjacent to waterbodies until the right-of-way revegetation is complete.

Introduction of Exotic Species

Comments were received on the draft EIS stating that invasive mussels may occur within waterbodies crossed by the proposed project. Although NorthernStar has developed a *Noxious Weeds and Soil-borne Plant Disease Control Plan* for upland vegetation, a similar plan has not been developed to prevent the introduction of invasive species into waterbodies impacted by pipeline construction. Therefore, we have recommended in section 4.3.2.4 that NorthernStar continue to consult with the COE, NMFS, FWS, and appropriate federal and state agencies to finalize its *Waterbody and Wetland Construction and Mitigation Procedures Plan*, including measures to prevent the spread of invasive species due to construction activities within waterbodies.

Terrestrial/Riparian Habitat Modification

Fish and other aquatic resources could be impacted indirectly by activities that alter terrestrial and riparian habitat including upland pipeline construction. The clearing and grading of vegetation during construction could increase erosion along streambanks and turbidity levels in the waterbodies. Alteration of the natural drainage ways or compaction of soils by heavy equipment near streambanks during construction may accelerate erosion of the banks, runoff, and the transportation of sediments into waterbodies. The degree of impact on aquatic organisms due to erosion would depend on sediment loads, stream velocity, turbulence, streambank composition, and sediment particle size. Potential impacts due to vegetation clearing are discussed above (see *Vegetation and Habitat Removal*). NorthernStar would minimize potential impacts on wildlife during construction by implementing the procedures in its pipeline ESC Plan for Oregon and SWPPP for Washington. To avoid impacts on aquatic habitat during operation of the project, NorthernStar would allow a riparian strip at least 25 feet wide, as measured from the waterbody's MHW mark, to permanently revegetate with native plant species across the entire construction right-of-way. Within the riparian strip, trees greater than 15 feet tall, or deep-rooted shrubs that could damage the pipeline's protective coating, obscure periodic surveillance, or interfere with potential repairs, would not be allowed to grow within 15 feet (30 feet total) of the pipeline (see section 4.4.2.3).

Water Appropriation

As discussed in section 4.3.2.4, NorthernStar would appropriate water from the Columbia River for hydrostatic testing of the proposed pipeline. As described in section 4.5.2.1, NorthernStar would obtain the necessary permits from state agencies before withdrawing water and use modern fish screening technology on surface water intakes. The volume of water withdrawn for hydrostatic testing of the pipeline would not measurably reduce downstream flows. Water appropriated for hydrostatic testing of

the pipeline would be discharged to an upland area near the pipeline crossing of the Columbia River using appropriate filtering techniques. The water would be discharged at an approximate rate of 1,000 gpm and would not be chemically treated. All discharges would be in compliance with NorthernStar's ODEQ water discharge permit and would not be expected to impact fish.

Accidental Spills or Leaks of Hazardous Materials

For any large construction project, there is the potential for spills or leaks of fuels or hazardous materials from storage containers, equipment working in or near streams, and fuel transfers. Any spill of fuel or hazardous liquid that reaches a waterbody would be detrimental to water quality. The chemicals released during spills could have acute, direct effects on fish, or could have indirect effects such as altered behavior, changes in physiological processes, or changes in food sources. Fish could also be killed if a large volume of fuel or hazardous liquid is spilled into a waterbody. Ingestion of large numbers of contaminated fish could affect primary and secondary fish predators in the food chain.

To minimize the potential for spills, NorthernStar prepared a pipeline ESC Plan and a SWPPP that include spill prevention and response procedures. NorthernStar's implementation of these plans would minimize the potential for and the impact of any spill near surface waters. Specific measures in these plans include prohibiting liquid transfer, vehicle and equipment washing, and refueling within 100 feet of waterbodies and specific steps to be followed to control, contain, and clean up any spill that occurs. NorthernStar's implementation of these plans would minimize the potential for and the impact of any spill near surface water during construction of the pipeline.

Crossing of Unstable Slopes

Most of the unstable slopes near sensitive waterbodies would be crossed by the HDD construction method. There are no other locations where the pipeline would cross an unstable slope within 200 feet upslope of a waterbody. Further information regarding unstable slopes and mitigation measures is provided in section 4.1.4.3.

Mitigation Measures

Project design, construction, and operation plans have been modified to avoid or minimize impacts on aquatic resources. These efforts would be ongoing during construction in order to capitalize on avoidance and minimization opportunities that cannot be predicted. However, both direct and indirect impacts on aquatic resources would result from construction and operation of the proposed pipeline. NorthernStar has committed to provide an overall net benefit to the environment of the lower Columbia River ecosystem.

Following construction of the pipeline, habitat and ecosystem function would be restored in place. Permanent impacts on aquatic resources would be mitigated by restoring habitat with similar ecological function. Mitigation would occur in areas substantially larger than that lost to permanent impacts, and would be restored to a higher level of ecosystem function. However, although compensatory mitigation actions would restore habitat and have long-term benefits to wetlands, estuarine ecosystems, and habitat for salmonids in general, there would be short-term adverse effects and longer term adverse effects on some non-target species. In terms of overall ecosystem health, these trade-offs are considered appropriate and valuable enough to more than balance the cost of the adverse effects.

As described in sections 4.5.2.2 and 4.5.2.3, NorthernStar identified a number of sites in the general project area that would be set aside and/or developed as compensatory mitigation in Oregon. In addition to these sites in Oregon, the Delameter Creek Mitigation Site would include restoration of

riparian habitats in Washington, thereby providing additional benefits to aquatic resources. This mitigation site is discussed in section 4.4.1.3.

The FERC received numerous comments stating that the mitigation proposed by NorthernStar does not adequately compensate for impacts associated with the project. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. To ensure that the mitigation proposed for the Bradwood Landing Project adequately compensates for project-related impacts, we have recommended that NorthernStar continue to consult with the appropriate natural resource agencies to finalize its Compensatory Mitigation Plan. The final Compensatory Mitigation Plan should be filed along with agency comments and applicable approvals with the Secretary prior to construction of the project.

4.5.3.2 Essential Fish Habitat

EFH is described in detail in section 4.5.1.2. Table 4.5.3-1 provides a list of the waterbodies impacted by the proposed route that provide EFH for salmonid species. For the purposes of this analysis, all fish-bearing streams that would be crossed by the proposed pipeline route are assumed to provide EFH for Chinook or coho salmon. Within the nine waterbodies designated as EFH for Chinook and/or coho salmon that would be crossed using the open-cut method, in-water work would affect a total of 0.4 acre of EFH would be temporary affected. As described in section 4.3.2.4, all waterbody crossings that involve open trenching would be constructed during established in-water work windows. To reduce impacts on EFH, NorthernStar would implement its *Waterbody and Wetland Construction and Mitigation Procedures Plan*, pipeline ESC in Oregon, and SWPPP in Washington as well as our Procedures.

In freshwater, EFH for Chinook and coho salmon include habitats for spawning, rearing, and migration corridors (PFMC, 2003). Components of the proposed pipeline with the potential to adversely affect designated EFH include removal of terrestrial and riparian vegetation, in-water pipeline construction, accidental spills and leaks of hazardous materials, and water appropriation for hydrostatic testing. Construction adjacent to EFH could also result in increased stormwater runoff and/or an inadvertent spill of hazardous materials, either of which could result in substantial adverse effects on EFH. Potential impacts on aquatic resources (which include EFH) from pipeline construction as well as measures that would be implemented to avoid or minimize impacts on aquatic resources is presented in section 4.5.3.1.

The determinations of effect on EFH resulting from the proposed Bradwood Landing pipeline are described in table 4.5.3-2. The FERC will respond to any EFH Conservation Recommendations issued by the NMFS through the EFH/ESA consultation process. Official written correspondence between FERC and the NMFS for the Bradwood Landing Project is part of the public record for this proceeding and is available through the FERC's internet web page (at www.ferc.gov) by clicking on the elibrary link.

4.5.3.3 Terrestrial Wildlife

As described in section 4.4.2.3, the Bradwood Landing pipeline would cross nine distinct upland vegetation cover types. Each of these vegetative communities provides nesting, cover, and/or foraging habitat for a variety of wildlife. Open water and wetlands habitats also provide these functions for wildlife species. Potential impacts on these habitat types are described and quantified in sections 4.3.2.4 and 4.4.1.3, respectively. Wildlife habitats crossed by the pipeline are shown in table 4.5.3-3.

TABLE 4.5.3-1			
Fishbearing Waterbodies Impacted by the Bradwood Landing Pipeline			
Waterbody	MP	Type/Flow Conditions	Proposed Crossing Method
Oregon^a			
Tributary 1 to Driscoll Slough	4.1	Perennial	HDD
Driscoll Slough	4.2	Perennial	HDD
Tributary to Westport Slough	5.0	Intermittent	HDD
Westport Slough	5.2	Perennial	HDD
Westport Slough/ Midland Canal	10.0	Perennial	HDD
Clatskanie River	13.2	Perennial	HDD
Larson Slough	15.0	Perennial	Dam and Pump
McLean Slough 1	16.8	Intermittent	Dam and Pump
McLean Slough 2	17.7	Intermittent	N/A ^b
Columbia River	19.0	Perennial	HDD
Washington^c			
Columbia River	19.6	Perennial	HDD
Cameron Creek	20.6	Perennial	HDD
Abernathy Creek	21.1	Perennial	HDD
Germany Creek	22.4	Perennial	HDD
Fall Creek	23.2	Perennial	Dam and Pump or Flume
Harmony Creek	24.7	Perennial	Bore
Brock Creek	26.0	Perennial	Dam and Pump or Flume
Tributary 5 to Coal Creek	27.5	Perennial	Bore
Tributary 1 to Coal Creek	27.7	Intermittent	N/A ^b
Coal Creek	28.0	Perennial	HDD
Tributary 1 to Clark Creek	30.3	Intermittent	Dam and Pump
Clark Creek	30.4	Perennial	Dam and Pump or Flume
Tributary 2 to Clark Creek	30.7	Intermittent	Dam and Pump
Cowlitz River	34.3	Perennial	HDD
Ostrander Creek	36.2	Perennial	Bore
^a NMFS, Northwest Fisheries Science Center, 2005			
^b Not crossed by proposed centerline. No crossing method proposed.			
^c Washington Department of Natural Resources, 2007.			

TABLE 4.5.3-2			
Potential Impacts on EFH Due to the Bradwood Landing Pipeline			
EFH	Description of EFH	Project Action with Potential Impacts on EFH	Determination of Effect
Pacific Coast Salmon	All streams, lakes, ponds, wetlands, and other waterbodies currently and historically accessible to salmon.	Accidental spill or leak of hazardous materials. Pipeline construction at waterbody crossings. Water withdrawals. Accidental spills or leaks of hazardous materials.	Substantial adverse effect on Pacific Coast salmon EFH (see section 4.5.3.1 for a discussion of mitigation measures).
Source: Pacific Fishery Management Council, 2006.			

TABLE 4.5.3-3		
Acreages of Wildlife Habitats Impacted by the Bradwood Landing Pipeline Facilities		
Habitat	Pipeline ^a	
	Construction	Operation
Coniferous forest	76.2	22.9
Deciduous forest	32.1	9.6
Mixed forest	52.5	15.7
Early seral forest	16.3	4.9
Riparian forest	2.9	0.9
Scrub-shrub	6.9	3.0
Palustrine emergent wetland	49.2	0.0
Palustrine scrub-shrub wetland	0.4	0.0
Palustrine forested wetland	5.0	1.8
Multiple wetland types	43.3	12.9
Open water	10.9	3.8
Agricultural	98.6	41.6
Dredged materials/bare ground	0.6	0.4
Developed and roads	42.7	8.5
Total	437.6	126.0
^a Pipeline facilities includes the construction or permanent right-of-way, extra work spaces, and associated aboveground facilities.		

Table 4.5.3-4 identifies some of the wildlife species that are common to these habitats. The most prevalent habitats are forest (i.e., evergreen, deciduous, mixed, early seral, and riparian forests) and wetlands (i.e., palustrine emergent, scrub-shrub, forested, and multiple wetland types). Forest habitats provide the greatest vertical structure and support diverse faunal assemblages. Wetland habitats support diverse floral species and provide foraging and dispersal habitat for a wide variety of wildlife species. These habitats account for about 41.1 and 22.4 percent, respectively, of the wildlife habitat that would be affected by construction of the proposed project. A portion of the forest and wetland habitats would also be considered riparian habitat. Similar to the other forest habitats, riparian forest provides significant vertical structure, and generally supports the most diverse faunal assemblages of the affected habitats. Agricultural and developed lands account for approximately 22.5 and 9.8 percent, respectively, of the wildlife habitat affected. Although agricultural habitats support several cover types, they often have low diversity within each cover type. The least prominent habitats that would be affected are, in descending order of prevalence, open water habitats (2.5 percent), upland scrub-shrub (1.6 percent) and dredged materials and bare ground (<1.0 percent).

General Impacts on Terrestrial Wildlife

Construction of the proposed pipeline would affect 437.6 acres of wildlife habitat and would convert approximately 159.1 acres of land to permanent right-of-way, which would be maintained in an herbaceous state. The impacts of construction and operation of the proposed pipeline on terrestrial wildlife and wildlife habitats would vary depending upon the timing of construction and types of construction techniques used, as well as on the requirements of each species and the habitat present where various project components would be constructed. Direct impacts of construction on wildlife would include the displacement of wildlife within the project area and direct mortality of some individuals. In general, impacts on terrestrial wildlife due to construction of the pipeline and proposed mitigation measures would be similar to those described above for construction of the LNG terminal.

TABLE 4.5.3-4

Wildlife Species Occurring within the Vegetative Communities in the Bradwood Landing Pipeline Area

Vegetative Communities	Typical Wildlife Found within the Vegetative Communities
Forest ^a	<p>Amphibians: northwestern salamander, western red-backed salamander, roughskinned newt, western toad, Pacific treefrog, red-legged frog, bullfrog ^d.</p> <p>Reptiles: rubber boa, common garter snake, northwestern garter snake.</p> <p>Mammals: beaver, big brown bat, black bear, black-tailed deer, bobcat, bushy-tailed woodrat, California myotis, Columbian white-tailed deer, cougar, coyote, deer mouse, Douglas squirrel, elk, forest deer mouse, hoary bat, little brown myotis, long-eared myotis, long-legged myotis, mink, mountain beaver, porcupine, raccoon, red fox, silver-haired bat, striped skunk, Townsend's chipmunk, vagrant shrew, western gray squirrel, Yuma myotis.</p> <p>Birds: American robin, bald eagle, barred owl, belted kingfisher, blue grouse, black-capped chickadee, dark-eyed junco, downy woodpecker, great blue heron, great-horned owl, hairy woodpecker, northern flicker, olive-sided flycatcher, osprey, peregrine falcon, red-breasted nuthatch, red-tailed hawk, ruby-crowned kinglet, ruffed grouse, rufous hummingbird, song sparrow, spotted towhee, Steller's jay, Swainson's thrush, willow flycatcher, winter wren, and yellow-rumped warbler.</p>
Scrub-Shrub ^b	<p>Amphibians: Pacific treefrog, red-legged frog, bullfrog ^d.</p> <p>Reptiles: rubber boa, northwestern garter snake, common garter snake.</p> <p>Mammals: beaver, big brown bat, black-tailed deer, California myotis, Columbian white-tailed deer, coyote, deer mouse, hoary bat, little brown myotis, long-eared myotis, long-legged myotis, mink, nutria ^d, raccoon, red fox, Townsend's vole, Yuma myotis.</p> <p>Birds: American kestrel, American robin, Bewick's wren, dark-eyed junco, great blue heron, marsh wren, song sparrow, red-winged blackbird, red-tailed hawk, rufous hummingbird, white-crowned sparrow, wood duck.</p>
Wetlands ^c	<p>Amphibians: northwestern salamander, western toad, Pacific tree frog, red-legged frog, bullfrog ^d, Oregon spotted frog.</p> <p>Reptiles: western painted turtle, northwestern pond turtle, common garter snake.</p> <p>Mammals: beaver, big brown bat, black bear, California myotis, coyote, hoary bat, little brown myotis, long-eared myotis, long-legged myotis, mink, muskrat, northern river otter, nutria ^d, raccoon, striped skunk, silver-haired bat, Townsend's big-eared bat, vagrant shrew, Yuma myotis.</p> <p>Birds: American coot, belted kingfisher, Bewick's wren, black-bellied plover, black-capped chickadee, Canada goose, cinnamon teal, cliff swallow, common snipe, dunlin, great blue heron, greater yellowlegs, mallard, marsh wren, northern harrier, northern pintail, northern shoveler, peregrine falcon, pied-billed grebe, purple finch, red-winged blackbird, short-billed dowitchers song sparrow, sora, tree swallow, violet-green swallow, Virginia rail, western sandpiper.</p>
Streams and Ponds	<p>Amphibians: long-toed salamander, northwestern salamander, Pacific giant salamander, western toad, Pacific tree frog, red-legged frog, bullfrog ^d, Oregon spotted frog, tailed frog.</p> <p>Reptiles: western painted turtle, northwestern pond turtle, common garter snake, rubber boa.</p> <p>Mammals: beaver, big brown bat, black bear, California myotis, coyote, hoary bat, little brown myotis, long-eared myotis, mink, muskrat, nutria ^d, raccoon, silver-haired bat, Townsend's big-eared bat, Yuma myotis.</p> <p>Birds: American dipper, band-tailed pigeon, barn swallow, belted kingfisher, Bewick's wren, black swift, black-capped chickadee, black-throated gray warbler, Bullock's oriole, common merganser, common yellowthroat, great blue heron, green heron, hooded merganser, mallard, mourning dove, olive-sided flycatcher, peregrine falcon, red-eyed vireo, ruffed grouse, rufous hummingbird, song sparrow, spotted sandpiper, spotted towhee, warbling vireo, willow/alder flycatcher, Wilson's warbler, wood duck, yellow-breasted chat, yellow warbler.</p>
Nearshore	<p>Mammals: beaver, big brown bat, black bear, California myotis, Pacific harbor seal, hoary bat, little brown myotis, long-eared myotis, long-legged myotis, mink, muskrat, northern river otter, nutria ^d, raccoon, silver-haired bat, Steller sea lion, Townsend's big-eared bat, Yuma myotis.</p> <p>Birds: American dipper, bald eagle, bufflehead, California gull, Canada goose, Caspian tern, common goldeneye, cormorants, great blue heron, greater scaup, lesser scaup, mallard, northern rough-winged swallow, osprey, peregrine falcon, purple martin, red-winged blackbird, ring-billed gull, rock dove ^d, western grebe.</p>
Agricultural	<p>Mammals: beaver, big brown bat, black-tailed deer, black rat, California myotis, coast mole, coyote, creeping vole, deer mouse, fox squirrel, hoary bat, house mouse, little brown myotis, long-eared myotis, long-legged myotis, long-tailed vole, muskrat, shrew-mole, silver-haired bat, snowshoe hare, striped skunk, Townsend's big-eared bat, Townsend's mole, Townsend's vole, Trowbridge's shrew, vagrant shrew, Yuma myotis.</p> <p>Birds: American bittern, American crow, Canada goose, common yellowthroat, barn swallow, Brewer's blackbird, common snipe, house finch, house sparrow ^d, killdeer, mourning dove, northern harrier, red-tailed hawk, ring-necked pheasant, rock dove ^d, Savannah sparrow, song sparrow, spotted towhee, western meadowlark.</p>
Dredged Materials and Bare Ground	<p>Reptiles: common garter snake, northwestern garter snake.</p> <p>Mammals: black-tailed deer, deer mouse, raccoon.</p> <p>Birds: American Crow, killdeer, mourning dove, rock dove ^d, song sparrow, spotted towhee.</p>

^a Forested communities include coniferous, deciduous, mixed, early seral, and riparian forests.

^b Scrub-shrub communities include both upland scrub-shrub and riparian scrub-shrub.

^c Wetland communities include palustrine emergent, palustrine scrub-shrub, palustrine forested, and multiple wetland types.

^d Non-native species or invasive species occurring in the vicinity of the pipeline.

As described in detail in NorthernStar's pipeline ESC Plan, the entire construction right-of-way would be allowed to revegetate; however, large brush and trees would be periodically removed near the pipeline. Trees greater than 15 feet tall, or deep-rooted shrubs that could damage the pipeline's protective coating, obscure periodic surveillance, or interfere with potential repairs, would not be allowed to grow within 15 feet (30 feet total) of the pipeline. A 10-foot-wide area centered over the pipeline may be cleared annually, which would result in the conversion of forested communities to a grassland/herbaceous cover type.

Because much of the area affected by pipeline construction would be allowed to revert to the preconstruction habitat type, impacts on wildlife species would generally be short term. However, long-term impacts on terrestrial wildlife would occur in forested areas due to the time required to restore the forested habitat to its preconstruction condition. As discussed in section 4.4.2.2, about 176.8 acres of upland forested habitat would be affected by construction of pipeline facilities. Forested habitats affected by pipeline construction would include 76.2 acres of coniferous forest, 52.2 acres of mixed forest, 32.1 acres of deciduous forest, and 16.3 acres of early seral forest. Upland forested communities would be replanted in-kind with trees, with the exception of the portion of the right-of-way within 15 feet of the pipeline (30 feet total), resulting in permanent impacts on about 54 acres of upland forested communities.

Clearing of forested habitats associated with pipeline construction and maintenance would increase the amount of edge habitat in the area. Forest fragmentation can have negative effects on forest dwelling species, causing individuals to crowd into remaining patches of habitat. This can lead to increased competition for nesting habitat, breeding habitat, and food resources (Piatt et al, 2006). It also allows fringe forest species to move into the area, which can lead to competition for resources and can increase levels of predation and nest parasitism (Cornell Lab of Ornithology, 2003). Consequently, some studies have shown a positive correlation between nest success rates and greater distances from the forest edge (Piatt et al, 2006). However, due to the similar and ample habitat in the vicinity of the project, the conversion of 54 acres of forested habitats to herbaceous/grassland habitats would not be expected to have an adverse impact on wildlife populations.

Temporary impacts on scrub-shrub habitat due to construction (6.9 acres) of the pipeline would be more short term than the impacts on forest lands, but regeneration of these areas could still take up to 3 years. Although the structural component of scrub-shrub habitats would recover slowly, successful restoration of non-woody vegetation may improve the value of forage for some wildlife within a relatively short time.

A total of about 2.9 and 97.9 acres of riparian forest and wetland habitats, respectively, would be affected by construction of the pipeline facilities. These areas are important habitats for a number of resident wildlife species. Disturbance to these habitats would be minimized through implementation of NorthernStar's pipeline ESC Plan in Oregon and SWPPP in Washington and would be mitigated in accordance with recommendations from the FWS, NMFS, ODFW, and WDFW as described in NorthernStar's Compensatory Mitigation Plan. We have also recommended that NorthernStar consult with the appropriate federal and state resource agencies to develop a project specific Wetland Restoration Plan that would include measures to re-establish herbaceous and/or woody species, control exotic species, and monitor the success of wetland revegetation and weed control efforts. Additional discussion of wetland impacts and mitigation can be found in section 4.4.1.3.

Following construction and restoration, NorthernStar would monitor the revegetation of the right-of-way in non-cultivated areas during the first and second year after construction, and until revegetation is considered successful. Non-cultivated areas where seedling establishment has failed would be reseeded during the next appropriate seeding period. The revegetation of the construction area would be considered successful when, based on visual observation, the density or cover of well established,

herbaceous, non-nuisance vegetation in the construction area is similar to the density or cover of herbaceous vegetation in adjacent areas not disturbed by construction. If the herbaceous vegetative cover or density in the construction area is not similar to the herbaceous vegetative cover or density in adjacent areas not disturbed by construction, or if there are excessive noxious weeds after the first or second growing season, an agronomist would determine the need for additional restoration measures. NorthernStar would implement additional restoration or mitigation measures, as necessary. Additionally, NorthernStar has developed a *Noxious Weeds and Soil-borne Plant Disease Control Plan* to prevent the introduction and proliferation of noxious weeds during and after construction.

Unique or Sensitive Wildlife Habitats

Oregon Major Big Game Habitat

MPs 0.0 through 1.0 of the proposed pipeline route would be located within major big game habitat as mapped by Clatsop County. In addition, the proposed pipeline route between MPs 1.0 and 6.2 is mapped as peripheral big game range. Elk and deer tracks were observed near the proposed terminal site during a site visit, and black bear have been observed at the site by previous property owners. The *Clatsop County Comprehensive Plan* (Clatsop County, 1996) includes development standards for ODFW-identified big game areas. To minimize disturbance to wildlife, NorthernStar would establish signage along roads and instruct project personnel to reduce vehicle speeds along roads where big game, including Columbian white-tailed deer, occur to prevent vehicle-animal collisions. Project personnel would also be instructed not to approach big game (either adults or young) at any time. Sections 4.6.1.1 and 4.6.2 include additional discussion of the Columbian white-tailed deer.

Ducks Unlimited Waterfowl Management Area

From approximate MPs 6.0 to 8.1, the proposed pipeline would cross the Karamanos property, portions of which are managed by Ducks Unlimited as a waterfowl management area. NorthernStar has initiated consultation with the landowner and the Ducks Unlimited land manager regarding the proposed project (Karamanos, 2005; Lobdel, 2005). According to the landowner, Ducks Unlimited is funding the establishment of more wetland habitat with ponds over a 35-year period in the western and eastern portions of the property. To minimize impacts on waterfowl, NorthernStar would schedule construction activities between March and September, the period when waterfowl would be least likely to inhabit the property. In addition, because the Karamanos property is proposed for use as a mitigation site (the Peterson Point Mitigation Site), it is unlikely that the project would result in adverse impacts on the portion of the property managed by Ducks Unlimited (see section 4.5.2.3).

Westside Riparian-Wetlands

Approximately 1.8 acres of riparian forest habitat would be affected by the portion of the proposed pipeline in Washington. By definition, this vegetation community is a WDFW Priority Habitat. Approximately 85 percent of Washington's terrestrial vertebrate species use riparian habitat for essential life activities and the density of wildlife in riparian areas is comparatively high (Knutson and Naef, 1997). Forested riparian habitat has an abundance of snags that are critical to cavity-nesting birds and mammals and to many insectivorous birds. Downed logs are common within this habitat and provide cover and resting habitat for amphibians, reptiles, and small mammals. In addition, the relatively mild microclimate of riparian areas offers relief from hot, dry summers and cold, snowy winters which is especially important to species such as Columbian white-tailed deer and elk (Knutson and Naef, 1997). Riparian habitats form natural corridors that are important travel routes between foraging areas, breeding areas, and seasonal ranges, and provide protected dispersal routes for young (Knutson and Naef, 1997).

Based on the WDFW Priority Habitat classification, riparian habitats within the project area are also considered critical areas by Cowlitz County (as defined in Chapter 19.15 of the CCC) and warrant protection. Proposed mitigation for impacts on riparian forest is included in NorthernStar's Compensatory Mitigation Plan.

Mitigation Measures

As described in detail in section 4.5.2.3, the Peterson Point Mitigation Site would be the primary mitigation site for impacts on terrestrial wildlife in Oregon. The restoration of forested habitat at the Delameter Creek Mitigation Site would provide a net benefit to wildlife in the vicinity of the proposed project in Washington. However, as described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. To ensure that the mitigation proposed for the Bradwood Landing Project adequately compensates for project-related impacts, we have recommended that NorthernStar continue to consult with the appropriate natural resource agencies to finalize its Compensatory Mitigation Plan. The final Compensatory Mitigation Plan would be filed along with agency comments and applicable approvals with the Secretary prior to construction of the project.

4.6 THREATENED, ENDANGERED, AND OTHER SPECIAL STATUS SPECIES

Federal agencies are required by section 7 of the ESA (19 USC § 1536(c)), as amended, to ensure that any actions authorized, funded, or carried out by the agency do not jeopardize the continued existence of a federally listed endangered or threatened species, or result in the destruction or adverse modification of the designated critical habitat of a federally listed species. The action agencies (i.e., the FERC, COE, and Coast Guard) are required to consult with the FWS and/or NMFS to determine whether federally listed endangered or threatened species or designated critical habitat are found in the vicinity of the proposed project, and to determine the proposed action's potential effects on those species or critical habitats. For actions involving major construction activities with the potential to affect listed species or designated critical habitat, the federal agency must prepare a BA for those species that may be affected. The action agency must submit its BA to the FWS and/or NMFS and, if it is determined that the action would likely adversely affect a listed species, the federal agency must submit a request for formal consultation to comply with section 7 of the ESA. In response, the FWS and/or NMFS would issue a BO as to whether or not the federal action would likely jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat.

As the lead federal agency in conducting the NEPA analysis, FERC is also analyzing project-related activities authorized by the Coast Guard and the COE that could potentially affect federally listed endangered and threatened species. In compliance with section 7 of the ESA and the MSA, the FERC staff prepared a BA and EFH Assessment for the Bradwood Landing Project and submitted it to the FWS and NMFS in March 2007. Based on comments from the FWS and NMFS, the FERC staff is currently revising the BA and EFH Assessment and will resubmit the BA and EFH Assessment to the services with a request to initiate consultation. The BA and EFH Assessment details the environmental baseline for federally listed species, designated critical habitat, and EFH; direct, indirect, interdependent and interrelated, and cumulative effects; proposed conservation measures; and determinations of effect. A general summary of the information included in the BA and EFH Assessment is included in this EIS.

In addition to the federal ESA, the State of Oregon has endangered species provisions that protect native vertebrates and plants on state lands (ORS sections 496.172 to .192; 498.026; 564.100 to .135) and requires consideration of the impacts of forest practices on threatened and endangered species (ORS section 527.610). The State of Washington also has an endangered species law that covers animals (Wa. Rev. Code Ann. sections 77.08.010, 77.12.020, 77.16.040, 77.16.120, 77.21.010). Most species that are listed by these states as either threatened or endangered are also listed as federally threatened or endangered. Other special status species include those protected by the Migratory Bird Treaty Act and the MMPA.

For purposes of this environmental analysis, special status species of plants and animals include:

- species that are listed by the federal government as endangered or threatened, or are candidates for listing;
- species listed by Oregon and Washington as endangered, threatened, or candidates for listing;
- species listed under the MMPA;
- species listed under the Migratory Bird Treaty Act; and
- species identified by federal or state agencies as rare or sensitive with the potential to occur in the vicinity of the proposed project.

To assess potential impacts on special status species and designated critical habitat, the FERC staff (assisted by NorthernStar, as our non-federal representative) informally consulted with the FWS, NMFS, ODFW, WDFW, Oregon Natural Heritage Information Center (ORNHIC), and WDNR Natural Heritage Program (WNHP).

Table 4.6.1-1 identifies the special status species potentially occurring in the project area and describes the portion of the project area where the species may occur. The current status of species is discussed in section 4.6.1. Potential impacts on special status species and their designated critical habitat is discussed in section 4.6.2.

4.6.1 Current Status of Species

4.6.1.1 Federally Listed Threatened and Endangered Species

Fish

Informal consultation with the FWS and NMFS identified 13 federally listed threatened or endangered anadromous salmonid ESUs or DPSs, as well as the North American green sturgeon, as potentially occurring in the project area (see table 4.6.1-1). ESUs and DPSs are distinct populations of a species of fish or wildlife that interbreed when mature (Waples, 1991). Designated critical habitat for 12 of these ESU/DPSs is also present in the project area. Critical habitat has not been designated for the Lower Columbia River Coho salmon ESU or the Southern DPS of the North American green sturgeon.

Primary Constituent Elements (PCE), included in the critical habitat designation (70 Federal Register 52630 – 52858), essential to support one or more life stages of the ESU or DPS (sites for spawning, rearing, migration, and foraging) include:

- freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development;
- freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;
- freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;
- estuarine areas free of obstruction and water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation; and
- nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

TABLE 4.6.1-1

Federally Listed Species Potentially Occurring in the Vicinity of the Bradwood Landing Project

Species	Federal Status	State Status		Portion of the Project Area Where Species May Occur
		Oregon	Washington	
Fish				
Chinook Salmon <i>Oncorhynchus tshawytscha</i>				
• Lower Columbia River ESU	Threatened ^a	NL	Candidate	LNG carrier route LNG terminal Pipeline facilities
• Upper Columbia River Spring-run ESU	Endangered ^a	NL	Candidate	LNG carrier route LNG terminal Pipeline facilities
• Upper Willamette River ESU	Threatened ^a	NL	NL	LNG carrier route LNG terminal Pipeline facilities
• Snake River Spring/Summer-run ESU	Threatened ^a	Threatened	Candidate	LNG carrier route LNG terminal Pipeline facilities
• Snake River Fall-run ESU	Threatened ^a	Threatened	Candidate	LNG carrier route LNG terminal Pipeline facilities
Chum Salmon <i>O. keta</i>				
• Columbia River ESU	Threatened ^a	NL	Candidate	LNG carrier route LNG terminal Pipeline facilities
Coho Salmon <i>O. kisutch</i>				
• Lower Columbia River ESU	Threatened	Endangered	NL	LNG carrier route LNG terminal Pipeline facilities
Sockeye Salmon <i>O. nerka</i>				
• Snake River ESU	Endangered ^a	NL	Candidate	LNG carrier route LNG terminal Pipeline facilities
Steelhead <i>O. mykiss</i>				
• Lower Columbia River DPS	Threatened ^a	NL	Candidate	LNG carrier route LNG terminal Pipeline facilities
• Middle Columbia River DPS	Threatened ^a	NL	Candidate	LNG carrier route LNG terminal Pipeline facilities
• Upper Columbia River DPS	Threatened ^a	NL	Candidate	LNG carrier route LNG terminal Pipeline facilities
• Upper Willamette River DPS	Threatened ^a	NL	NL	LNG carrier route LNG terminal Pipeline facilities
• Snake River Basin DPS	Threatened ^a	NL	Candidate	LNG carrier route LNG terminal Pipeline facilities
Bull Trout <i>Salvelinus confluentus</i>				
• Columbia River DPS	Threatened ^b	NL	Candidate	NA

TABLE 4.6.1-1 (cont'd)

Federally Listed Species Potentially Occurring in the Vicinity of the Bradwood Landing Project

Species	Federal Status	State Status		Portion of the Project Area Where Species May Occur
		Oregon	Washington	
North American Green Sturgeon <i>Acipenser medirostris</i>				
• Southern DPS	Threatened	NL	NL	LNG carrier route LNG terminal
Reptiles and Amphibians				
Green Sea Turtle <i>Chelonia mydas</i>	Endangered	Endangered	Threatened	LNG carrier route
Leatherback Sea Turtle <i>Dermochelys coriacea</i>	Endangered	Endangered	Endangered	LNG carrier route
Loggerhead Sea Turtle <i>Caretta caretta</i>	Threatened	Threatened	Threatened	LNG carrier route
Olive Ridley Sea Turtle <i>Lepidochelys olivacea</i>	Endangered	Endangered	NL	LNG carrier route
Mammals				
Blue Whale <i>Balaenoptera musculus</i>	Endangered	Endangered	Endangered	LNG carrier route
Fin Whale <i>Balaenoptera physalus</i>	Endangered	Endangered	Endangered	LNG carrier route
Humpback Whale <i>Megaptera novaeangliae</i>	Endangered	Endangered	Endangered	LNG carrier route
North Pacific Right Whale <i>Eubalaena japonica</i>	Endangered ^c	Endangered	NL	LNG carrier route
Sei Whale <i>Balaenoptera borealis</i>	Endangered	Endangered	Endangered	LNG carrier route
Killer Whale <i>Orcinus orca</i>				
• Southern Resident DPS	Endangered	NL	Endangered	LNG carrier route
Sperm Whale <i>Physeter macrocephalus</i>	Endangered	Endangered	Endangered	LNG carrier route
Steller Sea Lion <i>Eumetopias jubatus</i>				
• Eastern DPS	Threatened	NL	Threatened	LNG carrier route LNG terminal
Columbian White-tailed Deer <i>Odocoileus virginianus leucurus</i>				
• Lower Columbia River DPS	Endangered	NL	Endangered	LNG carrier route LNG terminal Pipeline facilities
Birds				
Brown Pelican <i>Pelecanus occidenatlis</i>	Endangered ^d	Endangered	Endangered	LNG carrier route
Marbled Murrelet <i>Brachyramphus marmoratus</i>	Threatened	Threatened	Threatened	LNG carrier route LNG terminal Pipeline facilities
Northern Spotted Owl <i>Strix occidentalis caurina</i>	Threatened	Threatened	Endangered	LNG carrier route LNG terminal Pipeline facilities
Short-tailed Albatross <i>Phoebastria albatrus</i>	Endangered	Endangered	Candidate	LNG carrier route
Streaked Horned Lark <i>Eremophila alpestris strigata</i>	Candidate	NL	Candidate	LNG carrier route LNG terminal

TABLE 4.6.1-1 (cont'd)

Federally Listed Species Potentially Occurring in the Vicinity of the Bradwood Landing Project

Species	Federal Status	State Status		Portion of the Project Area Where Species May Occur
		Oregon	Washington	
Western Snowy Plover <i>Charadrius alexandrinus nivosus</i>				
• Pacific Coast DPS	Threatened ^e	Threatened	Endangered	LNG carrier route LNG terminal
Invertebrates				
Oregon Silverspot Butterfly <i>Speyeria zerene hippolyta</i>	Threatened	NL	Endangered	LNG carrier route
Plants				
Kincaid's Lupine <i>Lupinus sulphureus kincaidii</i>	Threatened	Threatened	Endangered	LNG carrier route LNG terminal Pipeline facilities
Nelson's Checker-mallow <i>Sidalcea nelsoniana</i>	Threatened	Threatened	Endangered	LNG carrier route LNG terminal
Water Howellia <i>Howellia aquatilis</i>	Threatened	NL	Threatened	LNG terminal Pipeline facilities

^a Denotes critical habitat for this species has been designated within the proposed project area.

^b Although the bull trout is federally listed as threatened, the NMFS has stated that it does not occur in the proposed project area (NMFS, 2006c); therefore, it is not included in the discussion of special status species.

^c Endangered status for the North Pacific right whale was proposed December 27, 2006 (71 FR 77694-77704).

^d The FWS proposed to remove the brown pelican from the list of endangered and threatened species due to recovery on February 20, 2008 (73 FR 9408-9433).

^e Critical habitat for the Pacific Coast DPS of the western snowy plover was proposed on March 22, 2004 (69 FR 75608-75656).

NA Not applicable

NL Not listed

Sources: NMFS, 2006c; FWS, 2006a, 2006b, 2006c; ODFW, 2007; ORNHIC, 2006; WDFW, 2006a; WNHP, 2007.

Detailed descriptions of designated critical habitat for the salmonid ESU/DPSs potentially affected by the project are provided in the BA and EFH Assessment for the Bradwood Landing Project. Sections 4.6.2.1, 4.6.2.2, and 4.6.2.3 provide summaries of designated critical habitat along the waterway for LNG traffic, at the LNG terminal, and along the pipeline route, respectively.

Each of the ESU/DPSs can be divided into ocean-type salmonids and stream-type salmonids. Ocean-type salmonid ESUs in the project area include one chum ESU and three Chinook ESUs (Lower Columbia River, Snake River Fall, and Upper Willamette River). Ocean-type subyearlings, known as fry, commonly spend weeks to months in rearing habitats before undergoing a physiological transition called smolting. Smolting develops the additional strength, energy, and reserve capacity required to adapt to and survive the physical and biological challenges of the ocean environment. Ocean-type smolts migrate downstream to and through the estuary as subyearlings, generally leaving the spawning and rearing area when they have reached a size of 3 to 4 inches. Because they undergo migration at a smaller size, ocean-type salmonids tend to form schools, presumably to reduce predation (Pitcher, 1986).

Stream-type salmonid ESU/DPSs in the project area include five steelhead DPSs (Upper Willamette River, Upper Columbia River, Middle Columbia River, Lower Columbia River, and Snake River Basin), two Chinook ESUs (Upper Columbia River Spring and Lower Snake River Spring/Summer), one sockeye ESU, and one coho ESU. Stream-type salmonids usually remain in the area from which they hatched for 1 year or more and migrate to the ocean as relatively large smolts (generally 4 to 12 inches). Duration and location of rearing varies by salmonid species; for example, steelhead may remain in freshwater for several years before migrating to the ocean, and sockeye rear in lakes rather than streams. As is the case with ocean-type salmonids, stream-type salmonid smolts undergo a physiological alteration in the spring that prepares them for migration and saltwater adaptation. Although the timing of migration varies by species, smolts tend to be spring migrants that pass quickly through the project area from early April to September, remaining in the area between a few days and weeks.

The larger size of the stream-type smolts allows them to occupy a wider range of habitats. Stream-type smolts are commonly found farther from shore with a deeper distribution than ocean-type migrants. Johnsen and Sims (1973) compared beach seine and purse seine catches of Chinook from fresh and brackish water sites in the lower Columbia River. The majority of Chinook collected from the shorelines by beach seine were in the range of 2.0 to 3.0 inches, while the majority of Chinook collected from deeper water by purse seine were in the range of 3.5 to 6.0 inches. These larger fish collected from offshore locations are the smolt-size juveniles characteristic of stream-type salmon.

The following sections discuss the life histories and existing conditions for salmonids identified by the FWS and NMFS as potentially occurring in the vicinity of the proposed project.

Chinook Salmon

Populations of Chinook, called “runs,” are grouped by the time they return to the rivers to begin their final spawning journey; spring, summer, fall, and winter. Although Chinook salmon can be found entering spawning rivers throughout the year, the majority return from April to December. Spawning and rearing times are dependent on the timing of the individual runs. Because of their large mature body size (approximately 30 pounds and 36 inches in length) (NOAA, 2007), Chinook salmon tend to use deeper water and larger gravel size to spawn than other salmonids. The female digs the nest, or redd, about 1 foot deep in areas with moderate to high velocity water. Most spawning and rearing activity takes place in the main stream channels immediately above the saltwater limit or hundreds of miles upstream. Depending on size, a female Chinook will produce 2,000 to 14,000 eggs, with an average of 5,000 eggs per female. Adults die soon after spawning.

Young Chinook salmon emerge from their redds in 3 to 5 months. Research shows that low dissolved oxygen levels and/or low water temperatures increase the length of time the eggs take to develop. The juvenile salmon grow and feed as they migrate downstream toward the ocean, stopping to rear in coastal estuaries for periods lasting up to 5 months before completing their migration to the open ocean. Most Chinook salmon smolts from the Pacific Northwest enter the ocean during their first year of life. Chinook salmon return to spawn in as little as 1 year, or may remain in the ocean for up to 9 years before returning to spawn. Chinook salmon are opportunistic and carnivorous feeders throughout their life, primarily feeding on insects, crustaceans, invertebrates, and other fish.

From April through November, sub-yearling ocean-type juvenile Chinook salmon inhabit the estuaries and intertidal areas of the Pacific Coast. These estuarine areas with fresh and saltwater wetlands and aquatic/riparian vegetation provide habitats that are crucial to juvenile Chinook salmon survival (Myers et al., 1998). Water quality within these areas is also crucial to their survival. Increases in siltation, changes in water temperature, and loss of riparian vegetation all have negative impacts on water quality (StreamNet, 2006). Finally, LWD provides deep, slow flowing pools and off-channel alcoves, creating cover from predators, protection from the sun, and feeding areas for juvenile Chinook.

Lower Columbia River Chinook

Both spring- and fall-run Chinook salmon comprise the ESU, but the majority are fall-run. Evidence from coded wire tag recoveries indicate that since 1960 the majority of the returning fall Chinook salmon on the Oregon side of the lower Columbia River are strays from Big Creek hatchery as well as Rogue River fall-run Chinook salmon released into Big Creek and the Youngs Bay area (Biological Review Team, 1997; Kostow, 1995). A significant portion of the naturally spawning Chinook salmon in Skamokawa Creek and Elochoman River are hatchery strays (WDFW, 2003). Long-term population trends for the Clatskanie River are positive, with an annual increase of 1 to 5 percent (Biological Review Team, 1997). However, trends for most of the other tributaries in the lower Columbia River are negative. The draft 2005 ODFW Oregon Native Fish Status Report indicates that naturally produced Lower Columbia River fall- and spring-run Chinook salmon in Oregon are currently at risk for extinction (ODFW, 2005).

Kostow (1995) designated three streams of the Lower Columbia-Clatskanie subbasin as containing habitat for spawning of fall Chinook: Hunt Creek, Plympton Creek, and the Clatskanie River. Hunt Creek is located adjacent to the LNG terminal site and is a tributary to the Columbia River. Plympton Creek is a tributary to the Westport Slough, which is crossed by the proposed pipeline. Clatskanie River is a tributary to the Columbia River, which is crossed by the proposed pipeline and is hydrologically connected to Westport Slough.

Eight to 10 historic populations in this ESU have become extirpated, most of them spring-run populations. Some natural production still occurs within the lower Columbia River in about 20 populations; however, only one population exceeds 1,000 spawners. High hatchery production continues to pose genetic and ecological risks to natural populations and masks their performance. Although the Clatskanie River population is an exception, most populations in this ESU have not substantially increased in recent years (Biological Review Team, 2003).

Upper Columbia River Spring-run Chinook

Upper Columbia River spring-run Chinook salmon populations exhibit an ocean-type life history (Taylor, 1990; Chapman et al., 1991; Chapman et al., 1994; Matthews and Waples, 1991; Waknitz et al., 1995). Spawning takes place in large, low-elevation streams (Schreck et al., 1986). Ocean-type fry west of the Cascade Crest emerge in April and May, and the majority rear from 1 to 4 months in freshwater

prior to emigrating to the ocean (Mullan, 1987; Olsen et al., 1992; Hymer et al., 1992; WDFW and Western Washington Treaty Indian Tribes, 1993; Chapman et al., 1994; Marshall et al., 1995). However, a small proportion of summer- and fall-run fish remain in freshwater until their second spring and emigrate as yearlings (Chapman et al., 1994; Waknitz et al., 1995). The proportion of yearling out-migrants varies from year to year, perhaps because of environmental fluctuations.

Upper Willamette River Chinook

Willamette Falls limits access of this ESU to the upper reaches of the Willamette River. High flows in the spring provide a window when returning salmon can ascend the falls, while low flows in autumn prevent fish from ascending the falls (Howell et al., 1985). Three major populations exist in the river above Willamette Falls, including the McKenzie River and the North and South Forks of the Santiam River (Kostow, 1995). Adult spring Chinook salmon enter the Columbia River in March and April, but they do not ascend Willamette Falls until May or June. Spawning generally begins in late August and continues into early October, peaking in September (Mattson, 1948; Nicholas, 1995; Willis et al., 1995). Approximately one-third of the habitat available to this run has been made inaccessible by the construction of dams, and the natural production areas for this ESU are limited.

Snake River Spring/Summer-run Chinook

The Snake River contains five principal subbasins that produce spring- and/or summer-run Chinook salmon (Columbia Basin Fish and Wildlife Authority, 1990). Three of the five principal subbasins (Clearwater, Grand Ronde, and Salmon Rivers) are large, complex systems composed of several smaller tributaries, which are further composed of many small streams. In contrast, the other two principal subbasins (Tucannon and Imnaha Rivers) are small systems in which the majority of salmon production occurs within the main rivers themselves. In addition to the five principal subbasins, three small streams provide small spawning and rearing areas (Columbia Basin Fish and Wildlife Authority, 1990). Snake River spring- and/or summer-run Chinook salmon have historically spawned in virtually all accessible and suitable habitat in the Snake River upstream from its confluence with the Columbia River (Evermann, 1896; Fulton, 1968).

Adult spring-run Chinook salmon enter the Columbia River and migrate upstream past Bonneville Dam (CRM 146) from March through May; summer-run Chinook salmon migrate during June and July. Snake River spring- and summer-run Chinook salmon tend to use small, higher elevation streams (headwaters). Snake River spring- and summer-run Chinook salmon exhibit a stream-type life history, and migrate swiftly to the ocean as yearling smolts (Schreck et al., 1986).

This ESU saw a large increase in returning salmon in many populations in 2001. However, recent abundance in this ESU is still short of the levels proposed in the recovery plan for Snake River salmon (NMFS, 1995b). The high level of both production/mitigation and supplementation hatcheries in this ESU leads to ongoing risks to natural populations and makes it difficult to assess trends in natural productivity and growth rate (Biological Review Team, 2003).

Snake River Fall-run Chinook

Adult Snake River fall-run Chinook salmon enter the Columbia River in July and August and reach the mouth of the Snake River between the middle of August and October. Spawning occurs in the mainstem and in the lower reaches of large tributaries in October and November. Based on what is known of Upper Columbia River fall-run Chinook salmon, juveniles in the Snake River presumably emerge from the gravel in March and April, and downstream migration usually begins within several weeks of emergence (Chapman et al., 1991). An overall average of 41 percent of the wild fish and 51

percent of the hatchery fish rear in mainstem Snake and Columbia River reservoirs, migrating out as yearling reservoir-type smolts the following year, with the remainder out-migrating as ocean-type sub-yearlings (Connor et al., 2005).

Fall-run Chinook salmon were widely distributed throughout the Snake River and many of its tributaries, from its confluence with the Columbia River upstream to Shoshone Falls, Idaho (Columbia Basin Interagency Committee, 1957; Haas, 1965; Fulton, 1968; Van Hynning, 1968; Lavier, 1976). The construction of 12 dams on the mainstem Snake River substantially reduced the distribution and abundance of the Snake River Fall-run Chinook salmon ESU (Irving and Bjornn, 1981). Fish passage facilities proved unsuccessful at several projects, and spawning habitats, particularly areas most frequently used by fall-run Chinook salmon, were eliminated with the formation of reservoirs.

Chum Salmon

Chum salmon spend more of their life history in marine waters than other Pacific salmonids. Chum salmon usually spawn in coastal areas, and juveniles out-migrate to the estuary almost immediately after emerging from the gravel that covers their redds (Salo, 1991). As discussed previously, this ocean-type migratory behavior contrasts with the stream-type behavior of some other species of salmonids. This means survival and growth in juvenile chum salmon depends less on freshwater conditions than on favorable estuarine conditions.

Mature chum salmon are fall-run fish and return to the lower reaches of coastal streams to spawn. Chum salmon usually migrate only a short distance upstream, to a point just upstream from the tidewater limit. Unlike other salmon, chum are not strong jumpers, so they are often found distributed downstream from significant barriers in spawning streams. The female lays about 2,000 to 4,000 eggs in a redd and will guard her nest until her death a short time later, about 11 to 15 days after entering freshwater. Chum salmon eggs hatch between December and February and the juvenile chum salmon emerge from the gravel in 1 to 2 months, depending on stream temperature. They quickly migrate downstream to the estuary, feeding on insect larvae in the stream during their journey. Chum salmon juveniles are common in estuaries from January through July (StreamNet, 2006).

Very little research has been done on the Columbia River runs of chum salmon and there is not much known about the status of this species. Historically, chum salmon spawned in the lower reaches of several streams within the lower Columbia-Clatskanie subbasin.

Observations of chum salmon fry are often more difficult to make than are observations of juveniles of other salmonids because chum salmon out-migrants: 1) are smaller than out-migrants of other salmonids; 2) migrate at night; 3) usually have less distance to migrate before reaching saltwater than do other species; and 4) do not school as tightly as some other salmonids. Downstream migration may take only a few hours or days in rivers where spawning sites are close to the mouth of the river or it may take several months.

Kostow (1995) cited a dramatic decline in run sizes within the Columbia River, noting that the 1992 commercial harvest landed about 700 fish, whereas harvest prior to the 1940s ranged from 100,000 to 600,000 fish annually. Most of the production of chum salmon within the lower Columbia River is from streams on the Washington side of the river and the mainstem Columbia River below Bonneville Dam (CRM 146) (Ehlke and Keller, 2003). Chum salmon have been reported in October in the Washougal, Lewis, Kalama, and Cowlitz Rivers in Washington and the Sandy River in Oregon (Salo, 1991). However, the NMFS does not recognize any naturally spawning populations of chum salmon in Oregon (Johnson et al., 1997). Since 1995, there have been no recreational or directed commercial harvests of chum salmon within the Columbia River (Johnson et al., 1997).

Coho Salmon

Coho generally spawn in the tributaries and headwater streams of large rivers, preferably in areas with low water velocity and small-sized gravel. The female digs from one to four redds and generally spawns with different males in each redd, producing 1,000 to 5,000 eggs. Coho die soon after spawning. The eggs hatch in about 1 month and juveniles emerge from the gravel in about 2 to 5 weeks. Juvenile coho usually remain in freshwater for 1 year, moving in and out of side-channels, sloughs, beaver ponds, and tributary streams, seeking food and shelter from the high winter currents (Weitkamp et al., 1995). Although they may begin their migration downstream from April through August, most migrate downstream approximately 1 year after emerging from the gravel (Weitkamp et al., 1995). Coho salmon generally spend 2 days to 1 month in the estuary, feeding and adapting to saltwater before entering the open ocean. Coho generally spend 2 years in the ocean, returning to natal streams to spawn in their third year of life. A small percentage of the coho, usually less than 5 percent of the population, will return early after only 1 year in the ocean and are known as “jack salmon” (Weitkamp et al., 1995).

The coho salmon is a carnivorous and opportunistic feeder throughout its life, feeding primarily on insects, invertebrates, and crustaceans when young, and on other fish and squid when in the open ocean. Like other salmonids, including Chinook, juvenile coho require LWD to provide deep, slow flowing pools that create cover from predators, protection from the sun, and feeding areas.

Spawning of adult coho is largely dependent on streamflows, with most of the population in the lower Columbia River spawning when there is an increase in or maximal streamflow. Generally, adult Lower Columbia River coho salmon can be found migrating to their natal streams between June and February and spawning from September through March (Weitkamp et al., 1995; Good et al., 2005; WDFW, 2003; Wade, 2000, 2002).

Coho salmon from the Lower Columbia River ESU are mostly hatchery produced individuals. Only within the Clackamas and Sandy Rivers of the Columbia River ESU are natural populations known to be found (Good et al., 2005). The 2001 Biological Review Team review of the coho ESU in the lower Columbia River indicated that the vast majority, over 90 percent, of the historical populations appear to be either extirpated or nearly so.

Sockeye Salmon

The sockeye salmon is an anadromous fish with a stream-type life history that spawns and rears in freshwater lakes and streams. The life history of sockeye is variable throughout the Pacific Northwest, depending largely on the region of origin and local stream conditions. Migration into freshwater to spawn commonly occurs between June and August, with spawning taking place August through December. Most sockeye migrate great distances up freshwater streams, through lakes, and into tributary streams, although some sockeye do spawn in the shores of freshwater lakes (Gustafson et al., 1997).

Sockeye salmon are native to the Snake River and historically were abundant in several lake systems in Idaho and Oregon (Gustafson et al., 1997). In this century, a variety of factors have led to the demise of all Snake River sockeye salmon except those returning to Redfish Lake in the Stanley Basin of Idaho. Adults migrate upstream to Redfish Lake between July and September. Juveniles migrate downstream from Redfish Lake during April and May (Dolat, 1997).

Snake River sockeye salmon are unique in that they are the longest migrating sockeye salmon population in the world, traveling up to 900 miles to the high elevation lakes where they spawn. Since becoming listed as an endangered species in 1991, hatchery programs have begun to assist recovery efforts for the population (Good et al., 2005).

Steelhead

Steelhead are listed on a DPS basis, which is analogous to the salmonid ESU designations. Steelhead is the name commonly applied to the anadromous form of the biological species *Oncorhynchus mykiss*. The anadromous form of steelhead is under the jurisdiction of NMFS, while the resident freshwater forms, usually called rainbow or redband trout, are under the jurisdiction of the FWS. Steelhead exhibit one of the most complex suites of life history traits of any species of Pacific salmonid. Unlike other salmonids, steelhead can spawn more than once (iteroparous), whereas all other salmonids discussed spawn once then die (semelparous). The anadromous steelhead may spend up to 7 years in freshwater before smoltification and up to 3 years in saltwater before returning to spawn. Spawning migrations occur throughout the year, with seasonal peaks of activity. In a given river basin, there may be one or more peaks in migration activity. Large rivers, such as the Columbia River, may have migrating adult steelhead at all times of the year.

Steelhead can be divided into two basic reproductive ecotypes based on the state of sexual maturity at the time of river entry and duration of spawning migration (Burgner et al., 1992). The stream-maturing type enters freshwater in a sexually immature condition between May and October and requires several months to mature and spawn. The ocean-maturing type enters freshwater as a mature adult between November and April and spawns shortly thereafter. Steelhead found in the Columbia River are almost exclusively stream-maturing and generally spawn farther upstream than ocean-maturing steelhead.

Lower Columbia River Steelhead

This DPS occupies streams and tributaries to the Columbia River between the Cowlitz and Wind Rivers, Washington (inclusive), and the Willamette and Hood Rivers, Oregon (inclusive). Excluded are steelhead populations in the upper Willamette River Basin above Willamette Falls, Oregon and the Little and Big White Salmon Rivers, Washington. This DPS comprises both winter- and summer-run steelhead. Genetic data show distinction between steelhead of this DPS and adjacent regions, with a particularly strong difference between coastal and inland steelhead in the vicinity of the Cascade Crest (Busby et al., 1996). The majority of stocks within this DPS, for which data is available, have been declining in the recent past, but some have been increasing strongly (Busby et al., 1996; Good et al., 2005).

Middle Columbia River Steelhead

Almost all steelhead populations within this DPS are summer-run fish, with two winter-run exceptions in the Klickitat River and Fifteenmile Creek watersheds. A balance between 1- and 2-year-old smolt out-migrants characterizes most of the populations within this DPS. Adults spend between 1 and 2 years in the ocean before returning to spawn.

Production within the Middle Columbia River steelhead DPS has declined due, in part, to losing spawning habitat because of low flows. Loss of riparian habitat and in-stream structure are also threats to the Middle Columbia River steelhead. Blockages have prevented access to sizable steelhead production areas in the Deschutes and White Salmon Rivers. While there are hatchery facilities located within the drainages of the DPS, there are also stocks within the DPS that have had little or no supplementation from hatcheries.

Upper Columbia River Steelhead

All of the steelhead in this DPS are summer-run fish. Upper Columbia River steelhead return to the Columbia River in the later summer and early fall; most migrate relatively quickly up the mainstem of the river to their natal tributaries. A portion of the returning run over-winters in the mainstem reservoirs,

passing over the upper dams in April and May of the following year. Spawning occurs in the late spring of the calendar year following entry into the river. Upper Columbia River steelhead smolt out-migrants are predominantly 2- and 3-year-old juveniles. Most adult steelhead return after 1 or 2 years at sea, starting the cycle again (Busby et al., 1996).

Current abundance of the Upper Columbia River steelhead, both natural and hatchery produced, have increased in recent years. The average return through Priest Rapids Dam from 1997 through 2001 was 12,900 fish, while the average for the previous 5 years (1992 through 1996) was 7,800 fish. Most returns to the upper Columbia River are hatchery origin fish. Wild fish estimated during this period averaged 2,200 fish, more than double the average from the previous 5-year average of 1,040 fish.

Upper Willamette River Steelhead

This DPS occupies the Willamette River and its tributaries upstream from Willamette Falls. The native steelhead of this basin are late-migrating winter steelhead, entering fresh water primarily in March and April (Busby et al., 1996). This unusual run timing appears to be an adaptation for ascending Willamette Falls, which functions as an isolating mechanism for upper Willamette River steelhead. Early migrating winter steelhead and summer steelhead have been introduced to the upper Willamette River basin and, since naturally spawned steelhead are defined as part of the DPS, some populations (particularly early spawning fish in Coast Range subbasins) may represent introduced stocks. On average, native winter steelhead within this DPS have been declining since 1971 and have exhibited large fluctuations in abundance (ODFW, 2005).

Snake River Basin Steelhead

The Snake River Basin steelhead DPS is comprised of a diversity of steelhead populations with more similar genetic make-up to each other than to those steelhead that spawn outside of the Snake River basin. The Snake River Basin steelhead DPS spawn at high elevations (up to 6,500 feet) and migrate up to 900 miles to their spawning locations. Within this DPS, all steelhead are summer-run fish, but they are divided into two ecotypes, commonly referred to as either A-run or B-run. A-run fish are defined as passing Bonneville Dam before August 25 and B-run fish pass Bonneville Dam after August 25 (Busby et al., 1996). Adult A-run steelhead enter freshwater from June through August and are smaller than B-run fish, which enter freshwater from late August through October. Most of the steelhead populations in the Columbia River basin east of the Cascade Range are A-run fish. B-run steelhead are thought to be produced only in the Clearwater, Middle Fork Salmon, and South Fork Salmon Rivers (Busby et al., 1996). Much of the Snake River Basin steelhead DPS is currently composed of hatchery fish.

North American Green Sturgeon

The Southern DPS of North American green sturgeon is federally listed as threatened. Based on spawning locations, two DPS have been designated for this species: the Southern DPS and the Northern DPS. The Northern DPS spawn in the Rogue, Klamath, Trinity, and Eel Rivers in Oregon and California, and the Southern DPS only spawn in the Sacramento River, California.

Green sturgeon are anadromous and occur along the west coast of the United States and Canada (Erickson and Hightower, 2007). They are the most marine of all sturgeon species (Adams et al., 2006). Migration behaviors and distinctions between non-spawning locations for each DPS are unclear. Both the Northern and Southern DPS have been identified by genetic analysis in the Columbia River and associated estuaries in Oregon/Washington. In the Columbia River system, sturgeon concentrate in the estuaries during summer months. They have been known to travel upriver as far as the Bonneville Dam, but do not spawn in the river (Israel et al., 2004). Green sturgeon abundance is relatively high in the

Columbia River estuary system compared to other estuaries on the west coast of the United States (NOAA, 2006G).

Juveniles spend 1 to 3 years in freshwater before migrating to near coastal habitats between late summer and early winter (Israel et al., 2004; Erickson and Hightower, 2007; Adams et al., 2006). Mature adults (13 to 20 years old) return to natal rivers during the summer every 3 to 5 years, where they broadcast spawn their eggs over the surface of river cobbles (Israel et al., 2004; Adams et al., 2006). Green sturgeon feed on benthic invertebrates and tend to be nocturnal (Israel et al., 2004). When at sea, sturgeon are found over shallow continental shelf areas (less than 300 feet deep) and are often concentrated in specific areas off the coasts of Oregon and Washington (Erickson and Hightower, 2007).

Sea Turtles

Four species of sea turtles have been documented off the coasts of Oregon and Washington and are federally listed as threatened or endangered under the ESA. These include the green, olive ridley, leatherback, and loggerhead sea turtles. Sea turtles nesting on beaches in the United States are under the jurisdiction of the FWS; sea turtles occurring in U.S. waters are under the jurisdiction of the NMFS. None of the listed sea turtles are known to nest along the Pacific Coast of the United States (NMFS and FWS, 1998a; 1998b; 1998c; 1998d).

All four species of sea turtles potentially affected by the project are highly migratory. Eastern Pacific populations of sea turtles generally spend the winter months in breeding grounds off of southern Mexico and Central America, and although sea turtles have been reported during the summer months as far north as Alaska, occurrences are more common in southern California and northern Mexico (NMFS and FWS, 1998a, 1998b, 1998c, and 1998d).

Although sea turtles are generally considered a warm temperate marine reptile; green, olive ridley, leatherback, and loggerhead sea turtles have been recorded off the coasts of Oregon and Washington in the last 10 years (Green et al., 1992). Green et al. (1992) conducted a study to assess the presence and abundance of federally listed species off the Pacific Coast of the United States. This study collected both aerial and shipboard marine fauna data along the Washington and Oregon coasts between 1989 and 1990. During this time, 16 sea turtles were observed; all sightings were leatherback sea turtles and all occurred between June and September, when water temperatures are warmest. Most (62.5 percent) of these sightings occurred over the continental slope waters, with the remainder found over the continental shelf.

The diets of sea turtles vary greatly. Green sea turtles are known to be generally herbivorous; the foraging habits of olive ridley sea turtles are largely unknown, although crustaceans are believed to be a major part of their diet; loggerhead sea turtles primarily forage on benthic invertebrates; and leatherback sea turtles forage on cnidarians and tunicates (NMFS and FWS, 1998a, 1998b, 1998c, and 1998d).

Whales

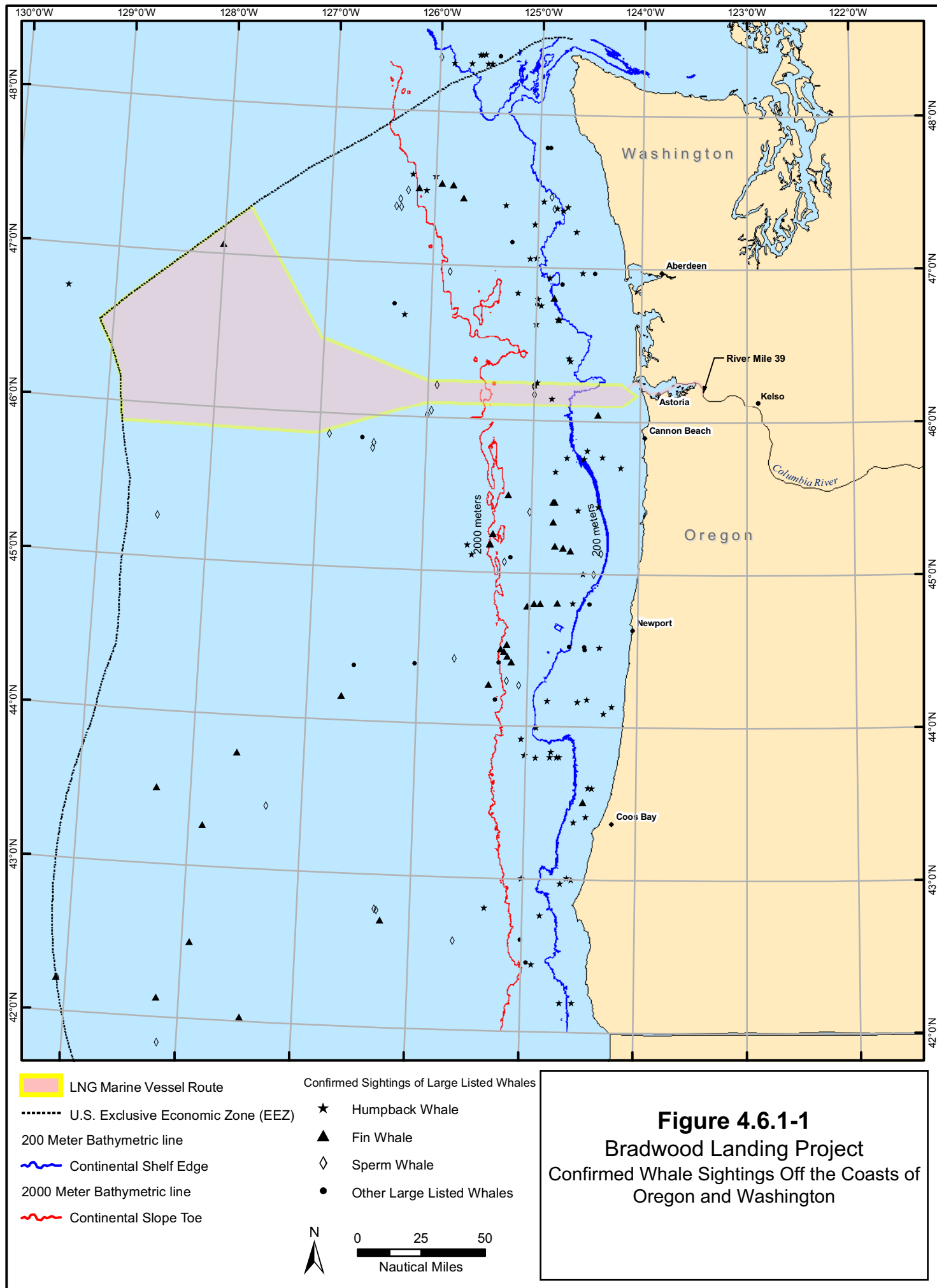
Seven species of whales potentially occur off the coasts of Oregon and Washington that are federally listed as endangered under the ESA (these species are also protected under the MMPA). These include the blue, fin, humpback, North Pacific right, sei, Southern Resident killer, and sperm whales. Whales tend to feed during the summer in the northern latitudes and migrate to the tropical southern latitudes in the winter for breeding. Some whales do not migrate as far north as the rest of the population; therefore, whales can be encountered throughout the year off the coasts of Oregon and Washington.

As depicted in figure 4.6.1-1, marine mammal aerial and shipboard surveys have been conducted in the waters off of Oregon and Washington to determine marine species distribution, abundance, and habitat use patterns. In addition, opportunistic sighting data compiled by the NMFS National Marine Mammal Laboratory's Platform of Opportunity Program (POP) was also used to assess whale distribution. The POP database has been collecting opportunistic data since 1958. Based on the distribution data from both the POP database and the Green et al. 1992 study, beyond the base of the continental slope, marine mammal sightings become increasingly rare compared to sightings along either the slope or shelf. The sperm and sei whales, which are known to have a more oceanic (deeper depth) distribution than other whale species, are exceptions to this pattern.

The blue whale, a baleen whale, is the largest animal ever known to have lived on Earth. Blue whales are found in all oceans worldwide. Blue whales in the Pacific Coast region are part of the Eastern North Pacific Stock, which contains an estimated 1,186 whales (Caretta et al., 2007). Blue whales spend about one-half their time outside the EEZ (Caretta et al., 2007). Blue whales forage in portions of the LNG carrier transit route off of California, British Columbia, and/or the Gulf of Alaska. In addition, blue whales occur throughout the EEZ between June and November prior to migrating south. Unpublished satellite data shows blue whales migrating north/south offshore of the Columbia River mouth, although the distance from the mouth was not known at the writing of this EIS (Calambokidis, 2006).

The fin whale is a baleen whale with populations centered in the temperate zones of both the northern and southern hemispheres. Fin whales found off the Pacific Coast are part of the California/Washington/Oregon Stock. Ship surveys conducted off the Pacific Coast estimated the population to be 3,454 whales (Caretta et al., 2007). Acoustic signals from fin whales are detected year-round off the coasts of northern California, Oregon, and Washington, with peak numbers occurring in the summer and fall (NMFS, 1998). Recent observations show aggregations of fin whales off the coast of Oregon during the summer months (Caretta et al., 2007). Although it has been determined that fin whales are migratory, the pattern of migration is apparently complex, and not well-understood. For example, fin whales occur year-round in some areas (such as the Pacific Coast), but the density of individuals in an area changes seasonally (NMFS, 1998). Although their distribution and migratory patterns are not well understood, 78 percent of the 27 fin whale sightings recorded by Green et al. (1992) and all 9 sightings recorded in the POP database occurred over the slope.

The humpback, one of the large baleen whales, occurs in all oceans of the world, although it is less common in Arctic regions. The Eastern North Pacific Stock resides along the Pacific Coast in the summer and fall months and spends the winter and spring in coastal Central America and Mexico (Caretta et al., 2007). Caretta et al. (2007) provided a best estimate of abundance for the population of humpbacks in California, Oregon, and Washington coastal waters of approximately 1,396 whales. The humpback whales of the Pacific Coast have generally increased in abundance since the taking of humpback whales was prohibited in 1966. Humpback whales occur throughout the EEZ between May and November, with the higher concentrations occurring near abrupt changes in bathymetric relief. Humpback whales congregate near the shelf edge, especially near Heceta Bank in Oregon and submarine canyons in Washington (Green et al., 1992). Of the 68 humpback whale sightings recorded during the Green et al. (1992) study, 41 percent occurred over the shelf, 57 percent occurred over the slope, and 2 percent occurred offshore. The POP database recorded 22 sightings; of these, 29 percent occurred over the shelf, 52 percent occurred over the slope, and 19 percent occurred offshore.



The North Pacific right whale historically ranged across the entire North Pacific Ocean. The current status of this species is unknown but is thought to number only in the tens of animals. Between 1900 and 1994, only 29 verifiable sightings occurred along the Pacific Coast and Hawaii (Caretta, et al., 1995). Recent sightings of the North Pacific right whale have occurred in the Bering Sea and Northern Gulf of Alaska near Kodiak Island. North Pacific right whales are known to occur in the southeast Bering Sea and the northern Gulf of Alaska. The right whales that have been found here have been predominantly males, but at least one female has been identified by genetic analysis of a biopsy sample (LeDuc, 2004). Little else is known about the North Pacific right whale's current state, including whether the whales known to occur in the Bering Sea are all that remain of the entire population, or if they are just one portion of the eastern population, with the rest of the population occurring elsewhere during summer months. Additionally, little, if anything, is known about the route that North Pacific right whales take on their migration south.

The sei whale is a baleen whale with a similar life history, appearance, and distribution as the fin whale. Sei whales occurring off the Pacific Coast are part of the Eastern North Pacific Stock. Generally occurring in offshore waters, sei whales do not appear to be associated with coastal features, which partially accounts for the low frequency of observations in the shelf waters of Oregon and Washington (NMFS, 1998; Caretta et al., 2005). The sei whale abundance estimate for California, Oregon, and Washington waters out to 300 nautical miles is approximately 43 whales (Caretta et al., 2007). Migration of the Eastern North Pacific Stock is between coastal waters of the Pacific Coast and Vancouver Island (Rice, 1977). Sei whales have been recorded within the EEZ during the summer months. The POP database includes four sightings of sei whales since 1958. Of these, one sighting occurred in shelf waters, one occurred along the slope, and two occurred offshore. However, shipboard surveys between 1991 and 2001 did not record any sightings of the sei whale within the EEZ (Caretta et al., 2005; Green et al., 1992).

The Southern Resident killer whale, a toothed whale, occurs in all oceans and seas of the world, although it prefers the colder waters of both hemispheres. The greatest abundances of killer whales occur within 500 miles of the continents (Mitchell, 1975). Killer whales inhabiting the inland and coastal waters of Oregon and Washington are part of the Eastern North Pacific Southern Resident Stock. This stock is comprised of three pods, one occurs in inland waters, and the other two spend more time offshore (Ford et al., 2000). However, most sightings of these resident whales occur during the summer months in inland waters of Washington and southern British Columbia. This stock has been intensely studied and contained an estimated 88 whales as of November 2007 (Center for Whale Research, 2008). The Southern Resident killer whale DPS occurs mainly within the inland waters of Washington. However, during the winter of 2005 and 2006, Southern Resident killer whales were documented daily at the mouth of the Columbia River (Calambokidis, 2006).

The sperm whale, a toothed whale, is found throughout the northern Pacific Ocean, and has been seen in every season except winter off the coasts of Oregon and Washington (Green et al., 1992). Sperm whales found off the coasts of Oregon and Washington are part of the California-Oregon-Washington Stock, which contains about 2,265 individuals (Caretta et al., 2007). Sperm whale abundance appears to have been rather variable off the coast of California between 1979/1980 and 1996, but does not show any obvious trends. Large populations of sperm whales are known to occur both west and south of the California-Oregon-Washington stock; however, there is no evidence of sperm whale movements into this region from either the west or south (NMFS 2006f). Sperm whales are known to occur in both the open offshore portions of the EEZ and along the slope. Of the 36 recorded during the Green et al. (1992) study, 11 percent occurred over the slope and 89 percent occurred offshore. The POP database had 10 sightings and, of those, 7 occurred over the slope and 3 occurred offshore.

Steller Sea Lion

The Steller sea lion is federally listed as endangered under the ESA, is listed as threatened by the State of Washington, and is protected under the MMPA. The largest of the eared seals, which includes sea lions and fur seals, the Steller sea lion occurs along the rim of the northern Pacific Ocean (NMFS, 1992). Steller sea lions occurring near the project area are part of the Eastern DPS, which extends from southeastern Alaska to northern California. In 2002, the total population of the Eastern DPS was estimated to be 47,885 (Pitcher, ADFG, NMFS unpublished data). The numbers of Steller sea lions in Oregon and Washington have increased in recent years, with Oregon counts increasing at an average rate of 3.7 percent per year since 1977, and Washington counts increasing an average of 9.2 percent per year since the early 1990s (LCFRB, 2004).

Steller sea lions occur throughout the year in Oregon and Washington. Although not known to migrate, Steller sea lions disperse widely outside of the breeding season. Recent tagging efforts have shown that Steller sea lions move between the mouth of the Columbia River and the Bonneville Dam at CRM 146, foraging for food (Stansell et al., 2007). Rookeries occur in a wide variety of areas, but most locations have specific favorable characteristics, including slightly sloped topography, protection from the wind, and isolation from humans and other mammalian predators. Rookeries are occupied from late May through early July, with females arriving about 3 days before the pup is born (NMFS, 1992). Females generally exhibit site fidelity, and rookery locations change little from year to year (NMFS, 1992). No breeding territories (or rookeries) are located in Washington, but five Steller sea lion rookeries occur in Oregon, including Rogue Reef, Sea Lion Caves, Three Arch Rocks, and both Long Brown Rock and Seal Rock at Orford Reef. The nearest rookery to the proposed project is at Three Arch Rocks, which is about 60 miles south of the mouth of the Columbia River.

Haulout sites are locations used by breeding, non-breeding, and subadult sea lions during the non-breeding season, and are generally associated with jetties, offshore rocks and islands, logbooms, marina docks, and navigation buoys (NMFS, 1992; LCFRB, 2004). Similar to rookeries, sea lions show a high degree of site fidelity to haulouts. The nearest haulout site to the proposed project is the South Jetty near the mouth of the Columbia River, which is used by hundreds of sea lions every year (LCFRB, 2004). Use of the South Jetty is lowest in the spring and summer, when adults return to rookeries for pupping and breeding, and increases in fall and winter when animals move to haulouts and forage on salmonids and eulachon. The only other haulout site used by Steller sea lions in the vicinity of the lower Columbia River is the Large Navigation Buoy, which is located about 6 miles into the Pacific Ocean (Jeffries et al., 2000). Recent surveys by the WDFW documented 1,000 Steller sea lions near the mouth of the Columbia River (WDFW, 2007).

Columbian White-tailed Deer

The Columbian white-tailed deer, listed as endangered both federally and in Washington, is the westernmost subspecies of the white-tailed deer. Currently, there are two Columbian white-tailed deer DPSs, one is located in Douglas County, Oregon, and the other is located along the lower Columbia River in Oregon and Washington (Brown, 2003; Smith et al., 2003). Current population estimates for subpopulations of the Columbian white-tailed deer along the lower Columbia River are provided in table 4.6.1-2. Population density is estimated at about 25 to 75 deer per square mile (Clark, 2006).

TABLE 4.6.1-2	
Population Estimates for the Columbian White-tailed Deer along the Lower Columbia River	
Location	2005 Population
Julia Butler Hansen National Wildlife Refuge	
Washington Mainland	100
Tenasillahe Island	100
Wallace Island	25
Crims Island	25
Puget Island	125
Westport Bottomlands	120
Clatskanie Lowlands	25
Fisher Island and Willow Grove	25
Lord Island and Diblee Flats	20
Source: Clark, 2006.	

The majority of deer within the Columbia River population are included in one of four subpopulations (Washington mainland, Tenasillahe Island, Puget Island, and the Oregon lowlands). Each subpopulation is geographically separated by major channels of the Columbia River (WDFW, 2004). Both the Washington mainland and Tenasillahe Island subpopulations occur within the JBHNR, which was established in 1972 (and was then called the Columbian White-tailed Deer National Wildlife Refuge) to protect over 5,600 acres of shoreline and island habitat for the preservation of the Columbian white-tailed deer (WDFW, 2004). These subpopulations are both currently considered secure and viable. The Oregon lowlands subpopulation is located near the community of Westport and reportedly further upstream in the Clatskanie lowlands (FWS, 1983; Clark, 2006). There are also plans to establish another subpopulation on Crims Island, and another subpopulation is being planned on a group of islands including Fisher, Hump, Lord, and Walker islands (FWS, 2005a). This group of islands is located approximately 1 mile upstream of the Crims Island subpopulation and the two subpopulations are expected to merge in the future (FWS, 2005a).

Columbian white-tailed deer typically inhabit forested areas located along waterways and generally select areas that offer both food and cover (Davison, 1979; Verts and Carraway, 1998). Sitka spruce with a grass understory is used most frequently; however, in summer, Columbian white-tailed deer preferentially inhabit mixed forests of western red cedar, red alder, and Sitka spruce with a grassy understory (Suring and Vohs, 1979). Pastures are generally avoided, presumably due to limited cover (Verts and Carraway, 1998). In a study conducted by Smith (1987), density of deer was greatest in areas where woodland cover was greater than 50 percent. Foraging habitat used by Columbian white-tailed deer is generally located within 820 feet of forest cover, and varies greatly with season. Typical forage includes evergreen blackberry, Pacific ninebark, red-osier dogwood, salal, juniper, western red cedar, foxtail, orchard grass, tall fescue, mannagrass, yarrow, red clover, and buttercup (Dublin, 1980). However, Dublin (1980) found that between 25 percent and 50 percent of the diet was comprised of woody browse species between September and February.

Fawning begins at the beginning of June and ends in mid- to late-July (ODOT, 2006; Watson and Schirato, 1990). Peak fawning occurs in mid- to late-June (FWS, 2003). Habitats used for fawning include fields of tall grasses and other habitats that provide thermal and hiding cover and are located away from other deer (Clark, 2006). After birth, the doe goes about her usual activities, returning several times a day to nurse the newborn fawns (Clark, 2006). The young fawns will generally rest or hide during the day in the same location where they were born or may be moved one or more times by the mother (Clark,

2006). Fawns typically are weaned after 10 weeks, although some may continue nursing into autumn (Verts and Carraway, 1998).

Brown Pelican

On February 20, 2008, the FWS proposed to remove the brown pelican from the list of endangered and threatened species due to recovery (73 Federal Register 9408–9433). The brown pelican is currently listed federally and by the states of Oregon and Washington as endangered. The brown pelican occurs along the Pacific Coast between California and Chile (FWS, 2006f). Habitat of the brown pelican is mainly coastal; they are rarely seen inland or far out at sea (FWS, 2006g). Pelicans nest in colonies that are usually located on coastal islands, on the ground, or in small bushes and trees (Palmer, 1962). Nests are composed primarily of grasses, reeds, sticks, and straw and are situated to avoid mammalian predators. This species is not known to breed in Oregon; however, the mouth of the Columbia River supports one of the largest non-breeding communal roosts in the United States. In 2002, as many as 11,000 brown pelicans roosted on East Sand Island at the mouth of the Columbia River between late spring and early fall (FWS, 2008). Brown pelicans roosting in this area feed mostly in shallow portions of the estuary but may sometimes occur up to 40 miles from shore. Their diet consists of various fishes, especially sardines (*Sardinops* spp.), mullet (*Mugil* spp.), and anchovies (*Engraulis* spp.) (FWS, 2005b).

Marbled Murrelet

The marbled murrelet is listed federally and by the states of Oregon and Washington as threatened. Marbled murrelets breed along the Pacific Coast of the United States between Alaska and central California. In the Pacific Northwest, marbled murrelets nest solitarily on mossy platforms on large branches in mature conifer forests within 20 to 50 miles of the coast (Lank et al., 2003; FWS, 1997). Nest stands utilized by marbled murrelets typically have multiple canopy layers, moderate to high canopy closure, and are composed of Douglas-fir, Sitka spruce, and western hemlock. Marbled murrelets nest high in large trees (minimum of 30 inches diameter at breast height) with large, moss-covered branches that serve as nest platforms (Burger, 2002; Nelson and Wilson, 2002). Forests with trees older than 150 years are thought to provide the best structures for suitable nesting habitat, but they also will also use younger stands of trees for nesting (Nelson and Wilson, 2002; Hamer and Nelson, 1995; FWS, 1997; FWS, 2004). Marbled murrelets forage in nearshore marine habitats, generally in waters less than 260 feet deep, on a variety of small fish and invertebrates (FWS, 1996a).

Northern Spotted Owl

The northern spotted owl is listed as threatened federally and in Oregon, and as endangered in Washington. The northern spotted owl is a forest bird that inhabits old-growth coniferous and mixed conifer-hardwood forests from British Columbia through northern California. Suitable habitats for spotted owls provide elements necessary for nesting, roosting, foraging, and dispersal. Characteristics of nesting and roosting habitat in western Oregon and Washington generally include forests dominated by Douglas-fir and western hemlock with large (more than 30 inches diameter at breast height) overstory trees. Canopies exhibit a moderate to high canopy closure (60 to 80 percent), and are multi-layered with multiple tree species (FWS, 1992a). In addition, trees with various structural deformities (cavities, broken tops, mistletoe infections) and large snags are also characteristics of northern spotted owl habitat, as well as accumulated fallen trees and debris on the forest floor (FWS, 1992a). Most nest and roost sites are within forest stands with trees that are often older than 200 years, but spotted owls also utilize mature forests 100 to 200 years old. Foraging and dispersal habitats may be in younger, more open and fragmented forests than those associated with nesting and roosting (FWS, 1992a).

Short-tailed Albatross

The short-tailed albatross is listed as endangered both federally and by the State of Oregon. Short-tailed albatross are oceanic birds that occur throughout most of the North Pacific Ocean and are often found close to the Pacific Coast of the United States (FWS, 2006h). The short-tailed albatross generally breeds in the South Pacific, where it nests on the ground on small oceanic islands, favoring volcanic ash slopes with sparse vegetation and formerly level open areas adjacent to tall clumps of the grass *Miscanthus sinensis* (NatureServe, 2006). Most of the world's breeding short-tailed albatross nest on Torishima Island in the Tsubamezaki colony from late October through early November. There are no breeding populations of short-tailed albatross in the United States, but attempted nesting has been regularly observed on Midway Atoll in the northwestern Hawaiian Islands (FWS, 2006h). Short-tailed albatross forage at sea, but specific geographic and seasonal distribution patterns within the marine range are not well understood. The short-tailed albatross forages at the water surface on squid, fish, eggs of flying fish, shrimp, and other crustaceans (FWS, 2006h). Short-tailed albatross are also known to follow ships and forage on scraps and other refuse (NatureServe, 2006).

Streaked Horned Lark

The streaked horned lark is a candidate for listing federally and in the State of Washington. The streaked horned lark is a rare subspecies of the horned lark that breeds and winters in Oregon and Washington. Historically, many streaked horned larks bred and over-wintered in Oregon (Gabrielson and Jewett, 1940); however, the Washington population was largely migratory (Bowles, 1900; Rogers, 1999; 2000). Currently, flocks tend to arrive in the later half of February, and most leave by mid- to late-August (Bowles, 1900; Rogers, 1999; 2000). Surveys conducted in the winter of 2003 – 2004 and 2004 – 2005 indicate that, as suggested by Rogers (2000), most streaked horned larks winter along the lower Columbia River and in western Oregon (Pearson and Hopey, 2005; Pearson et al., 2005). In 2005, Pearson and Hopey found that there are two peaks in clutch initiation: the first taking place in April through early May or late May through early June, and the second taking place in late June through early July as a result of nesting failure in the first clutch.

This species is associated with bare ground or sparsely vegetated habitats. Along the lower Columbia River, streaked horned larks nest between late March and June in sparsely vegetated, expanses of sand adjacent to the river, or in areas dominated by grasses and forbs with few or no trees or shrubs (Pearson and Hopey, 2005). Streaked horned lark nests are built in shallow depressions in the open or near grassy clumps (FWS, 2006i). Foraging for weed seeds and insects occurs in sparsely vegetated dunes, beaches, and dredge spoils, as well as intertidal areas (FWS, 2006i; Pearson and Hopey, personal observation).

Western Snowy Plover

The western snowy plover is federally listed as threatened within 50 miles of the Pacific Coast. In addition, the western snowy plover is listed in the State of Oregon as threatened and by the State of Washington as endangered. The Pacific Coast population of western snowy plovers occurs from southern Washington to southern Baja California, Mexico (FWS, 2006j). This species nests beside or near tidal waters on barren to sparsely vegetated sand beaches, dry salt flats in lagoons, dredge spoils deposited on beach or dune habitat, levees and flats at salt-evaporation ponds, and river bars (FWS, 2006j). Plovers lay their eggs in shallow depressions in sandy or salty areas with sparse vegetation between early March and late September (FWS, 2006k). Western snowy plovers forage primarily on invertebrates in the wet sand and among surf-cast kelp within the intertidal zone; in dry, sandy areas above the high tide; on salt pans; on spoil sites; and along the edges of salt marshes, salt ponds, and lagoons (FWS, 2006k).

Eight main nesting areas currently occur along Oregon's coast (FWS, 2006l). The northernmost of these sites is near the central coastal community of Florence, which is about 155 miles south of the mouth of the Columbia River. This species historically occurred within the coastal areas of the lower Columbia River, but plovers have not been documented in this area since 1985 (69 Federal Register 75617). In addition, there is no evidence that indicates the western snowy plover occurs or has occurred upstream of the mouth of the Columbia River (Pacific Coast Joint Venture, 1994).

Oregon Silverspot Butterfly

The Oregon silverspot butterfly is listed as threatened federally and as endangered by the State of Washington. The range of the Oregon silverspot butterfly is restricted to coastal areas of California, Oregon, and Washington, where it occurs in three types of grassland habitat, including coastal salt spray meadows, stabilized dunes, and mountain meadows (Washington State Department of Transportation (WDOT), 2006; FWS, 2005c). The Oregon silverspot butterfly requires the early blue violet (*Violet adunca*) as a host plant to complete its development. Females oviposit their eggs near the violet in late August and early September (FWS, 2006m). As an adult, the Oregon silverspot generally moves out of the meadows and into the fringes of conifers or brush where there is shelter for more efficient heat conservation and nectaring flights. Where such sheltered conditions exist, the adults will use various nectar sources, including California aster (*Aster chilensis*), yarrow (*Achillea millefolium*), Indian thistle (*Cirsium edule*), false dandelion (*Hypochaeris radicata*), and tansy ragwort (*Senecio jacobaea*) (FWS, 2006m).

Kincaid's Lupine

Kincaid's lupine is listed as threatened federally and by the states of Oregon and Washington. Kincaid's lupine is the primary host plant for the federally endangered Fender's blue butterfly; the plant is used by Fender's blue butterfly for egg-laying and as a larval food source (FWS, 2005b).

Kincaid's lupine is a low-growing plant that is unable to survive prolonged periods of shade. Loss of prairie habitat has made the ecosystem supporting Kincaid's lupine one of the most endangered in the United States (Noss et al., 1995). The few remnant patches of prairie habitat in Oregon and Washington are threatened to varying degrees by the spread of invasive grasses and shrubs as well as by the succession of prairie to forest (FWS, 2005a). This species is found mainly in the Willamette Valley and south into Douglas County, Oregon, where it occupies both wet and upland prairie habitats and open oak savannas (WDNR and BLM, 1997; FWS, 2005b).

Nelson's Checker-mallow

Nelson's checker-mallow is listed as threatened federally and by the State of Oregon, and is listed as endangered in Washington. There are two Nelson's checker-mallow DPSs (northern Coast Range and Willamette Valley). The Willamette Valley DPS also includes two outlying populations occurring in Cowlitz and Lewis Counties, Washington (FWS, 1998).

The Willamette Valley DPS of Nelson's checker-mallow usually occupies open habitat such as ditches, margins of streams, roadsides, fence rows, drainage swales, native prairie remnants, and fallow fields (FWS, 1998). Most known sites have been densely colonized by invasive weeds, especially introduced forage grasses. Throughout its range, Nelson's checker-mallow habitat is threatened by reduction in native prairie and grassland habitat caused by fire suppression; the associated invasion of woody species; and because of residential, agricultural, and commercial development in otherwise suitable habitat (WDNR and BLM, 1997; FWS, 1998). The Willamette Valley population is considered extremely imperiled and at high risk of extirpation due to agricultural and urban development,

competition with invasive species, seed predation by weevils, small population sizes, and genetic isolation and lack of variation (FWS, 1998).

Water Howellia

Water howellia is listed as threatened both federally and by the state of Washington. Water howellia is an aquatic plant restricted to seasonally flooded, freshwater wetlands. These wetlands are generally small (less than 2.5 acres) and shallow (less than 3 feet deep) (FWS, 1996b). Water howellia require late summer/fall drying of the wetland for seed germination, and spring submergence for growth and subsequent blooming (FWS, 1996b). In western Washington, water howellia inhabit wetlands bordered by Oregon ash and trembling aspen and are generally located adjacent to forests dominated by Douglas-fir and Oregon white oak. Shrubs and emergent vegetation often occurring near water howellia include red-osier dogwood, snowberry, hardhack, water parsnip, bur-reed, inflated sedge, lesser spearwort, and water buttercup (FWS, 1996b; WDNR and BLM, 1997).

4.6.1.2 State Listed Threatened and Endangered Species

NorthernStar consulted with the ODFW, ORNHIC, WDFW, and WNHP to identify state-listed endangered and threatened species with the potential to occur within the proposed project area. Many state listed endangered or threatened species are also federally listed; these species were discussed previously in section 4.6.1.1. Life history information for the remaining state listed threatened or endangered species are discussed below.

Bald Eagle

The bald eagle is listed as threatened by the states of Oregon and Washington. Although the bald eagle was previously listed as threatened under the ESA, the FWS announced on June 28, 2007 that the bald eagle has recovered and would be removed from the list of threatened and endangered species effective August 8, 2007. However, the bald eagle is still federally protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Under both laws, the disturbance of eagles, their nests, and eggs is prohibited. On June 5, 2007, the FWS issued the Bald Eagle Management Guidelines, which clarified its regulations regarding implementation of the Bald and Golden Eagle Protection Act.

In the Pacific Northwest, bald eagles typically nest in multi-layered, uneven-aged, coniferous stands that are located within 1 mile of large bodies of water (Anthony et al., 1982). Trees are preferably large and stoutly limbed, with snags, broken tops, or rocks that provide easy access to foraging areas. Bald eagles often construct several nests within a territory and alternate between them from year to year; however, overall fidelity to a territory near a reliable food source is high (Stinson et al., 2001).

In Oregon and Washington, bald eagles may begin nest repairs in December, but courtship and pair bonding generally occur during January and February (Stinson et al., 2001). Adults begin incubating eggs by mid to late March, and young hatch near the end of April. Juveniles typically fledge during July but may remain in the nest vicinity through the end of summer (Garrett et al., 1993). Bald eagles inhabiting the Columbia River estuary forage primarily on tidal flats. Although bald eagles on the Columbia River feed primarily on fish; waterfowl, mammals, and marine invertebrates also can make up about 10 percent of this species' diet (Watson et al., 1991; Garrett et al., 1993).

Adult bald eagles in Oregon and Washington remain in their territories until early fall, when they migrate to British Columbia or southeastern Alaska for about 6 weeks to forage on early salmon runs. Fledglings and juvenile eagles also migrate north during this time, but will remain in British Columbia or

Alaska for several months before returning. During this time, southern migrants will occupy rivers in Oregon and Washington for several weeks before continuing north on their migration.

Bald eagles may roost communally in the winter, with three or more eagles perching for consecutive nights in the same trees (Watson and Rodrick, 2001). Communal roosts tend to be located near a rich food resource (i.e., runs of anadromous fish, high concentrations of waterfowl) and in forest stands that are uneven-aged and have at least a remnant of the old-growth forest component (FWS, 1986). Roosts tend to have more favorable microclimates and protection from inclement weather than surrounding areas and thereby facilitate energy conservation. Areas free of disturbance also are an important feature of bald eagle wintering habitat (FWS, 1986).

The greatest threats to nesting and wintering eagle populations are activities that permanently alter bald eagle habitat (e.g., removal of nest, roost, and perch trees, removal of buffers) and human activities that temporarily disturb eagles to the point of reproductive failure or reduced vigor (Watson and Rodrick, 2001). Human activities near nest sites during the breeding season can disturb eagles, leading to abandonment and reduced reproductive success. Disturbances to feeding eagles, particularly during the winter months, can cause the birds to expend more energy, which increases their susceptibility to disease and poor health (Stalmaster, 1987).

Western Pond Turtle

The western pond turtle is listed as endangered in the State of Washington and is classified as sensitive-critical in the State of Oregon. The current range of the western pond turtle extends from Puget Sound in Washington, south to Baja California (Hays et al., 1999). This species of turtle is highly aquatic and occurs in streams, ponds, lakes, and permanent and seasonal wetlands during most of the year. Although western pond turtles spend most of their lives in water, they require terrestrial habitats for nesting. In addition, pond turtles often over-winter on land and may spend portions of the warmest months in aestivation (an inactive state to avoid drought conditions) (Hays et al., 1999). Pond turtles are generally wary, initiating escape behavior when a perceived threat is 330 feet or more distant; however, they may be seen basking on emergent or floating vegetation, logs, rocks, and occasionally mud or sand banks (Hays et al., 1999). Western pond turtles generally nest within 330 feet of water, but may occasionally nest up to 1,300 feet from the nearest waterbody. The western pond turtle is an omnivore and a scavenger, foraging primarily on insects, including the larvae of caddisflies, dragonflies, and nymphs (PacificBio, 2006).

Gray Whale

The eastern North Pacific stock of gray whale was the target of intense whaling between the 1850s and early 1900s, but has increased to about 26,600 individuals as of 1999, largely due to protection from commercial whaling. The eastern North Pacific gray whale represents one of the ESA's success stories. The gray whale was listed as endangered throughout its range on June 2, 1970, and was officially considered recovered and delisted on June 16, 1994. The gray whale is still listed as endangered in the State of Oregon.

Gray whales make the longest migration of any whale, traveling 4,600 to 6,200 miles semi-annually between their summer feeding grounds and winter breeding grounds. Gray whales generally travel within 2 miles of the shoreline over most of their migration route, unless crossing mouths of rivers and straits (Dohl et al., 1983; Braham, 1984). Most of the Eastern North Pacific stock spends the summer feeding in the northern Bering and Chukchi Seas. However, gray whales have been reported feeding in the summer in waters off of Southeast Alaska, British Columbia, Washington, Oregon, and California. Each fall, the whales generally begin their migration between November and December south along the

coast of North America from Alaska to Baja California, Mexico. The eastern North Pacific stock winters mainly along the west coast of Baja California, using certain shallow, nearly landlocked lagoons and bays. The northbound migration generally begins in mid-February and continues through May, with cows and newborn calves migrating northward primarily between March and June along the west coast of the United States.

Subsistence hunters in Alaska and Russia have traditionally harvested whales from the eastern North Pacific stock; between 1996 and 2000, an average of 97 whales per year were taken. The nearshore migration route used by gray whales makes ship strikes another potential source of mortality; between 1996 and 2000, six serious injuries or mortalities of gray whales caused by ship strikes were documented. Gray whales entangled in fishing gear have reportedly been found swimming, floating, or stranded along the Pacific Coast of the United States and British Columbia, and during the 5-year period from 1996 to 2000, an estimated five to six gray whales died per year as a result of interactions with commercial fishing gear. Gray whales are also subjected to the effects of coastal development, pollution, military activities, exploration and development of oil and gas resources, and the whale watching industry.

In 1999 and 2000, a large number of gray whale strandings (273 in 1999 and 355 in 2000) occurred along the west coast of North America between Baja California, Mexico and the Bering Sea. This was compared to an average of 38 gray whale strandings per year for the previous 4 years and only 21 strandings in 2001. While the direct cause is unknown, a variety of anthropomorphic events (e.g., chemical contamination, fishery interactions and ship strikes) are hypothesized to have played a role. Other projected theories include starvation, natural toxins, and disease.

Western Wahoo

Western wahoo is listed as threatened in the State of Washington and grows in shaded, moist draws and ravines west of the Cascades (WNHP, 2007). Western wahoo generally prefers forested areas, but is sometimes found in grassy areas with some trees. Commonly associated species include Oregon white oak (*Quercus garryana*), Douglas-fir, snowberry (*Symphoricarpos albus*), Pacific blackberry (*Rubus ursinus*), western hemlock (*Tsuga heterophylla*), swordfern, and Sitka spruce. This species is generally found on fine sandy loam, silty loam, and silty clay loam soils, and it flowers from May to June (WNHP, 2003).

4.6.1.3 Other Special Status Species

Sensitive Species

In addition to the species listed under the ESA or by the States of Oregon and Washington, seven species that are candidates for listing as endangered or threatened or species of special concern have been identified by state agencies as having the potential to occur in the vicinity of the proposed project. In addition, the NMFS and ODFW expressed concerns regarding several sensitive species, including the coastal cutthroat trout, red -legged frog, tailed frog, western painted turtle, American peregrine falcon, and olive-sided flycatcher. The life histories of these sensitive species are discussed below.

Coastal Cutthroat Trout

The coastal cutthroat trout is currently listed in Oregon as a critically sensitive species. Habitat requirements vary depending on the life history traits of individual populations. Unlike other anadromous salmonids, sea-run forms of coastal cutthroat trout do not over-winter in the ocean and rarely make extended migrations across large bodies of water (64 Federal Register 16397). Migrations are normally within 6 miles of land, but have been detected up to 30 miles offshore (Giger, 1972; Sumner, 1972; Jones,

1976; Percy, 1997; Johnston, 1982). Coastal cutthroat trout may migrate to sea in late spring/early summer at 2 to 3 years of age, and return to freshwater in late autumn/early winter; however, some migrate entirely within a freshwater environment (British Columbia Ministry of Environment, Environmental Stewardship Division, 2007; FWS, 2007a). In the Pacific Northwest, coastal cutthroat trout spawn in tributaries of small watersheds and in small tributaries of larger watersheds between summer and winter. Young cutthroat trout emerge from the gravel between March and June, depending on location and timing of spawning, with a peak in April (Trotter, 1997).

In particular, anadromous coastal cutthroat trout of Oregon typically spawn in the lower Columbia River tributaries that are free of barriers to upstream movement, and later migrate to estuarine or marine water to feed (Johnson et al., 1999). Studies done on anadromous cutthroat trout in the lower Columbia River streams have shown over a 90 percent decline in both wild and hatchery fish in the last decade (ODFW, 1997). Potential factors believed to be contributing to this decline include: genetics, fisheries, reduction in nearshore productivity, and reduction of stream and estuary habitat (ODFW, 1997).

Eulachon

Eulachon (Columbia River smelt) are a candidate for listing in the State of Washington. From December to April, eulachon migrate from the ocean to upriver spawning areas in the mainstem Columbia and Cowlitz Rivers and occasionally into the Lewis, Kalama, and Sandy Rivers. Like salmonids, both male and female adults die after spawning. Eulachon are broadcast spawners and females release from 20,000 to 60,000 eggs. The eggs are sticky and settle to the bottom where they incubate for 30 to 40 days before hatching. Larval eulachon are about 0.15 inch in size and drift with the bottom currents as they develop, ultimately entering the ocean.

Eulachon are primarily fished commercially for use as bait for both the commercial and recreational sturgeon fisheries, but they are also fished as food. Mainstem fishing is done primarily by gill net and, to a lesser extent, by otter trawl. Fishing in the tributaries is done with dip nets as regulated by the States of Oregon and Washington. Total eulachon landings for the mainstem Columbia River for 2006 were estimated at 13,221 pounds, significantly higher than 2005, which had the lowest annual landings on record (208 pounds) (WDFW, 2006b). The highly variable or possibly cyclical run size makes trends in abundance hard to interpret; however, recent ocean conditions are probably the most important factor controlling eulachon abundance, and even riverine conditions (e.g., water temperature) play a major role in determining the species' spawning distribution and abundance (NMFS, 1999).

Lampreys

The lampreys (family Petromyzonidae, stone suckers) belong to a group of fish known as Agnatha, the most primitive of all living vertebrates. Two species of lamprey are designated as sensitive species and are native to the Columbia River basin: the Pacific lamprey (*Lampetra tridentata*), and river lamprey (*L. ayresi*). The river lamprey is currently a candidate for listing as endangered or threatened in the State of Washington and the Pacific lamprey is listed vulnerable within Oregon (ODFW, 2007; WDFW, 2007). The Pacific and river lamprey are both anadromous species. On January 23, 2003, a petition was filed by 11 conservation groups to list these two species as endangered or threatened under the ESA.

Life history information is sparse for these species. Larval lampreys are referred to as ammocoetes. They spend up to 6 years burrowed in the sediment, feeding on diatoms and detritus where they transform into a juvenile stage called macrophthmia. At this stage the lampreys are silver in color, develop teeth and a sucker-like disc, and form true eyes. Physiological transformations occur that initiate migratory behaviors and enable them to tolerate sea water (Fish Passage Center, 2007). After a 2-month

transformation into adults, Pacific and river lamprey migrate into the ocean where they spend 2 to 3 years parasitizing fishes and mammals (PSMFC, 1997). Pacific lampreys enter saltwater between late winter and early spring, while river lampreys enter saltwater between May and July. Lampreys return to freshwater rivers to spawn in the spring, where they lay up to 100,000 eggs in a nest built in gravel or sandy sediments. The adults die after spawning (PSMFC, 1997; ODFW, 2002).

The freshwater habitat requirements of lamprey are similar to anadromous salmonids and include mid-gradient tributaries for spawning. Juveniles burrow into soft mud substrates and remain there for up to 6 years. Adults then move to marine environments for 2 to 3 years before returning to tributaries to spawn (Bayer and Seelye, 1999).

Columbia Torrent (seep) Salamander

The Columbia torrent (seep) salamander is a candidate for listing in the State of Washington and is listed as critical on Oregon's State Sensitive Species List. The Columbia torrent salamander lives in coastal coniferous forests at the edges of clear, cold, fast-flowing streams with rock or gravel bottoms in southwestern Washington and northern Oregon (Burke Museum of Natural History and Culture, 2006; NatureServe, 2006). They can be abundant under gravel at stream edges and in the spray zones of waterfalls. During rainy seasons, they are occasionally found on land away from streams (Burke Museum of Natural History and Culture, 2006). Breeding occurs in spring and early summer, with eggs being laid under gravel in shaded streams (NatureServe, 2006). The Columbia torrent salamander forages on aquatic and semi-aquatic invertebrates, including beetles, stoneflies, snails, flies, and amphipods. (Nussbaum et al., 1983).

Northern Red-legged Frog

The northern red-legged frog is listed as sensitive-undetermined within the Coast Range Ecosystem by the State of Oregon and occurs from southwest British Columbia to Mendocino County in northern California. This species is most common in humid forests, woodlands, grasslands, and streambanks with plant cover (California Herps, 2006). Adult frogs require riparian vegetation near deep, still, or slow-moving ponds or intermittent streams. Riparian habitats provide shelter, escape from predators, and shade to maintain cool water temperatures (Animal Diversity Web, 2007).

Reproduction in northern red-legged frogs occurs from late November to early April, ensuring water temperatures between about 43 °F and 45 °F. Breeding habitat is in permanent water sources such as lakes, ponds, reservoirs, slow streams, marshes, bogs, and swamps; however, non-breeding frogs can be highly terrestrial and are sometimes found in damp areas far from water (California Herps, 2006). The female lays egg masses ranging from 500 to 1,100 eggs in perennial waterbodies that contain extensive vegetation consisting of cattails and tules or bulrushes (Hickman and Roberts, 1995; Davidson, 1996; Jennings and Hayes, 1985). Eggs attach at a minimum depth of 18 inches and at least 2 to 3 feet from the water's edge and hatch within 6 to 14 days (Jennings et al., 1993; Davidson, 1996). As they grow, the froglets move from shallow water to knee-deep water to hide from larger predators (Jennings and Hayes, 1985; Hickman and Roberts, 1995). Males can probably reproduce after 3 years of age while females reproduce after 4 years (Jennings and Hayes, 1985). Life spans of the Northern red-legged frogs range from 12 to 15 years (Cowan, 1941).

Tailed Frog

Tailed frogs are listed as vulnerable on Oregon's State Sensitive Species List and occur in shallow, cold, clear, shaded streams typically found in permanent forests. These streams possess a bed containing rocks that adults can hide under and flat, protruding, moss-free stones that tadpoles can cling

onto with their adhesive organ (Hallock and McAllister, 2005; Getubig, 2006). Adults tend to be highly aquatic, though they have been seen to venture onto land during the night when the humidity and moisture content of the forest is high (Getubig, 2006).

Western Painted Turtle

The western painted turtle is listed as critical on Oregon's State Sensitive Species List and occurs in slow-moving shallow streams, rivers, and lakes. This species prefers soft substrates with abundant vegetation and half-submerged logs for basking (Conant and Collins, 1998). Western painted turtles forage on aquatic vegetation, insects, crayfish, and small mollusks (Conant and Collins, 1998).

Townsend's Big-eared Bat

The Townsend's big-eared bat is currently a candidate for listing as threatened or endangered in the State of Washington and is listed as critical on Oregon's State Sensitive Species List. Townsend's big-eared bat has been documented in nearly every county in Washington and is common throughout most of Oregon (WDFW, 2005). Most habitats occurring in the counties affected by the project are suitable for feeding by Townsend's big-eared bats; however, the distribution of suitable roosts influences the actual locations where they are able to feed. A variety of different roost types are required by Townsend's big-eared bats, including day, nursery, night, and winter roosts. Day roosts are used for resting and hiding during the active season and may include old buildings, silos, concrete bunkers, barns, caves, and mines (WDFW, 2005). Nursery roosts occur in similar structures as well as actively used buildings and large "rooms" in concrete dams (WDFW, 2005). Unlike day and nursery roosts, Townsend's big-eared bats use night roosts for very short periods as stopover hiding and resting places between feeding bouts, but little is known about the use of night roosts. During winter, roosts may be used for weeks to months at a time and may include caves, lava tubes, mines, and other structures. Unlike many species of bats, bridges are not considered valuable roosts for Townsend's big-eared bats (WDFW, 2005). Mating takes place between November and February, with females giving birth to a single young in late May or early June (Schmidly, 1991; Nagorsen and Brigham, 1993). Townsend's big-eared bats forage nocturnally, emerging from roosts later than many bat species to forage primarily on moths; however, they will feed on a variety of other arthropods when available (WDFW, 2005; Nagorsen and Brigham, 1993).

American Peregrine Falcon

Although the American peregrine falcon was previously listed as endangered by the State of Oregon, on April 13, 2007, the ODFW delisted the American peregrine falcon from the Oregon Threatened and Endangered Species List. American peregrine falcons occur from non-Arctic portions of Alaska and Canada south to Baja California, Central Arizona, and Mexico. This species winters chiefly in its breeding range, except that the more northern birds move south (FWS, 2006n). The American peregrine falcon nests in cliffs that tend to dominate the surrounding landscape; however, they also utilize cut riverbanks, trees, and manmade structures, including tall towers and the ledges of tall buildings (FWS, 2006n). Nests typically are situated on ledges of vertical rocky cliffs, commonly with a sheltering overhang (Palmer, 1988; Campbell et al., 1990). The diet of American peregrine falcons includes small- to medium-sized avian species, such as blue jays, flickers, meadowlarks, pigeons, starlings, shorebirds, and waterfowl (FWS, 2006n).

Lewis' Woodpecker

Lewis' woodpecker is currently a candidate for listing in the State of Washington. Although this species historically occurred throughout southwestern Washington, its distribution is currently limited to

areas east of the Cascades and is not known to occur within the project area. Lewis' woodpecker is closely associated with old-growth ponderosa pine and mature riparian cottonwood forests throughout the west (NatureServe, 2006). Suitable habitat for Lewis' woodpecker typically includes forests with an open canopy and shrubby understory, snags available for nest sites, hawking perches, and insect fauna (Bock, 1970). Breeding populations of this species are locally distributed, often occurring in colonies and in burned forests (Jewett et al., 1953; Raphael and White, 1984; Block and Brennan, 1987; and Tobalske, 1997). Lewis' woodpecker is an opportunistic feeder whose diet varies seasonally. During the spring and summer, Lewis' woodpecker primarily forages on insects including ants, bees and wasps, beetles, grasshoppers, and true bugs (Tobalske, 1997). Fruits and berries are the most frequently eaten foods in late summer and fall, and winter food sources include acorns, commercial nuts, and corn (WDFW, 2002).

Northern Goshawk

The northern goshawk is currently a candidate for listing in the State of Washington and is listed as critical on Oregon's State Sensitive Species List. The northern goshawk is widely distributed across North America and generally inhabits coniferous and mixed forests, preferring mature forests with a combination of old, tall trees with intermediate canopy coverage and small open areas within the forest for foraging during their nesting season (Pajerski, 2005; Johnsgard, 1990; Squires and Reynolds, 1997). In the western United States, this species generally nests in mature forests dominated by ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), Douglas-fir, cedar, spruce, willow, and aspen (*Populus tremuloides*) (NatureServe, 2006). Typically, the nest is located near the trunk of a medium to large tree and near openings in the forest such as roads, swamps, and meadows (Pajerski, 2005). Northern goshawks breed between early April and mid-June. Mating northern goshawks begin to prepare their nests as much as 2 months before egg-laying. Northern goshawks forage on a wide variety of vertebrates and, occasionally, insects (NatureServe, 2006).

Olive-sided Flycatcher

The olive-sided flycatcher is listed as vulnerable on Oregon's State Sensitive Species List. The olive-sided flycatcher has a widespread distribution and occurs in coniferous forests, usually at mid- to high-elevations (Cornell Lab of Ornithology, 2006). Olive-sided flycatchers are most often associated with forest openings, forest edges near natural openings (e.g., meadows, bogs, canyons, rivers), human-made openings (e.g., harvest units), or open to semi-open forest stands. The olive-sided flycatcher has been recorded on both of the Breeding Bird Surveys conducted near the project area (Sauer et al., 2005).

Purple Martin

The purple martin is currently a candidate for listing in the State of Washington and is listed as critical on Oregon's State Sensitive Species List. Purple martins occur within much of the eastern United States during the summer months. In the western states, this species occurs in scattered locations along the Pacific Coast, and in the deserts and mountains of the southwest into Mexico (Cornell Lab of Ornithology, 2006). Purple martins arrive along the Pacific Coast between April and June and return to South America between August and mid-October (NatureServe, 2006). A study conducted in 1998 to determine the distribution, abundance, and nest site characteristics of purple martins in Oregon found that they were locally common along the Columbia River, in some coastal estuaries, and at the Fern Ridge Reservoir (Hovarth, 1999). Habitat chosen for nesting sites varied substantially and included open water, grassy fields, recent clearcuts, and burns with brush and young trees. However, characteristics common to nesting sites included a distance of more than 18 feet to large live trees and the presence of an unoccupied cavity (Hovarth, 1999). Purple martins forage on a variety of invertebrates, including ants, wasps, beetles, grasshoppers, and dragonflies (NatureServe, 2006).

Marine Mammals

The MMPA established, with limited exceptions, a moratorium on the “taking” of marine mammals in waters or on lands under U.S. jurisdiction. The act further regulates, with certain exceptions, the “take” of marine mammals on the high seas by persons, vessels, or other conveyances subject to the jurisdiction of the United States. Thirty-one species of marine mammals have been recorded off the coasts of Oregon and Washington, including 6 species of baleen whales; 19 species of toothed whales, beaked whales, dolphins, and porpoises; 5 species of pinnipeds (seals and sea lions); and the sea otter (Caretta et al., 2007; Angliss and Outlaw, 2008). Of these, five species of baleen whales, two species of toothed whales, and one pinniped are either state- or federally listed and are discussed in sections 4.6.1.1 and 4.6.1.2.

Off the coasts of Oregon and Washington, 11 whales (minke, short-finned pilot, Baird’s beaked, Cuvier’s beaked, pygmy sperm, dwarf sperm whales, and 6 species of mesoplodont beaked whales), 4 dolphins (Pacific white-sided, Risso’s, short-beaked common, and northern right whale dolphins), and 2 porpoises (harbor and Dall’s porpoises) are all known to occur (Caretta et al., 2007; Angliss and Outlaw, 2008). However, the occurrence of these species would generally be limited to marine portions of the waterway.

In addition, California sea lions, Pacific harbor seals, Northern elephant seals, Northern fur seals, and sea otters occur off the coasts of Washington and/or Oregon. Although Northern fur seals and Northern elephant seals are occasionally present in this area, they do not occur in great numbers or for very long (NMFS, 2007b). The extent of Northern fur seals, and Northern elephant seals, presence in nearshore marine areas adjacent to the Columbia River is unknown (NMFS, 2008b). Similarly, the occurrence of the sea otter is limited to waters off the coast of Washington from Destruction Island (near the Hoh River) north to Neah Bay (FWS, 1995). Alternatively, large numbers of California sea lions and Pacific harbor seals can be found utilizing haulout (or resting) sites along the lower Columbia River (locations shown on maps in Appendix C). These species are described below.

California Sea Lions

California sea lions are found from southern Mexico to southeast Alaska. The United States stock is defined geographically for management purposes and is described as being comprised of animals that breed in the waters of the U.S. The current population estimate for the United States stock of California sea lions is 238,000 (Caretta et al., 2007) and has now reached carrying capacity.

California sea lions generally occur in the lower Columbia River during much of the year, except between mid-June and August when most animals return to breeding rookeries in southern California. However, peak numbers occur during the migration periods in May and September (Scordino, 2006). Recent surveys conducted by the WDFW documented 1,500 California sea lions near the mouth of the Columbia River in 2006 (WDFW, 2007; Jeffries, 2008). Females are rarely observed north of the California-Oregon border; therefore, California sea lions in the Pacific Northwest are sub-adult or adult males (NMFS, 2008b).

The breeding range of California sea lions in the United States is centered on the California Channel Islands but pupping has been reported farther north on the Farallon Islands and at Año Nuevo, California (Keith et al., 1984). Mature males (over 8 years) defend breeding territories on rookeries between May and August. Females return to the rookeries to give birth and most pups are born in June. Males breed with females that come into estrus in their territory. Most males are unsuccessful at establishing breeding territory on the rookeries due to heavy competition between dominant animals and retreat to the sea or to nearby “bachelor” beaches to await breeding opportunities (Heath, 2002)

California sea lions feed on a variety of fish and cephalopods (squid, octopus) based upon season, location, and prey availability. In Oregon coastal rivers, California sea lions are known to eat salmonids and lamprey along with other non-salmonid fish (Roffe and Mate, 1984). Based on analysis of intestinal samples, the California sea lion diet in the Columbia River estuary includes smelt, salmonids, rockfish, lamprey, and herring (Brown et al., 1995).

Pacific Harbor Seals

Pacific harbor seals inhabit coastal and estuarine waters and shoreline areas from Baja California to western Alaska. The Oregon/Washington Coastal stock of harbor seal is one of three management stocks for this species along the Pacific coast of the continental United States. The range of the Oregon/Washington stock, defined geographically for management purposes, extends from the California/Oregon border north to the Strait of Juan de Fuca at Cape Flattery, Washington.

Pacific harbor seals are present throughout the year at the mouth of the Columbia River. Several stocks of Pacific harbor seals occur in waters along the Pacific Coast. The Oregon/Washington coastal stock is estimated to contain about 25,000 animals (NMFS, 2007b).

Numerous harbor seal haulout sites are found on the intertidal mudflats and sandbars in the lower Columbia River estuary including nursery areas in Cathlamet Bay near Astoria (Jeffries et al. 2000; NMFS, 2008b). Harbor seals generally are non-migratory but local movements are associated with factors such as tides, weather, season, prey availability, and reproduction (Scheffer and Slipp, 1944; Bigg, 1969, 1981). Along the coasts of Oregon and Washington females give birth to pups at haulout sites between April and mid-July (Huber et al., 2001). Females breed within weeks of giving birth and breeding activity takes place in the water (NMFS, 2008c).

Although harbor seals are present year-round in the Columbia River estuary, they do exhibit seasonal movements and their numbers within the Columbia River upstream of the South Jetty increase from January to April and then decrease from May through August as the harbor seals move to adjacent bays (e.g., Netarts Bay, Tillamook Bay, Willapa Bay, and Grays Harbor) during the pupping season (Jeffries, 2008). During a typical day in May, approximately 3,000 Pacific harbor seals can be observed resting on haulout sites in the Columbia River estuary (NMFS, 2008b), but very few, if any, may be upstream of the South Jetty area.

The diet of harbor seals in the lower Columbia River is seasonally variable and diverse. In the winter, smelt are predominant; at other times of year, the diet includes anchovy, Pacific herring, salmonids, staghorn sculpin, starry flounder, and lamprey (Riemer and Brown, 1997). Harbor seals forage at varying distances from their haulouts depending on the frequency and quantity of prey encountered. The foraging home-range for harbor seals is unstudied in the Columbia River estuary. However, several studies have taken place in other areas of the Pacific (e.g., Alaska and California). For example, despite occasional long-distance movements in excess of 124 miles, harbor seals in both the Pacific and Atlantic Oceans rarely forage more than 31 miles from haul-out sites (Lowry et al., 2001). However, harbor seals in San Francisco Bay were found to have a foraging home range of only 3 miles from their primary haulout (Grigg et al., 2001).

Migratory Bird Treaty Act

The Columbia River estuary is one of the most important sites on the Pacific Flyway for migratory birds, with more than 300 species occurring in the area throughout the year (Lower Columbia River Estuary Partnership, 2007a). Peak counts in the estuary during migration have been almost 150,000 birds (Lower Columbia River Estuary Partnership, 1999). The Migratory Bird Treaty Act implements

various treaties and conventions for the protection of migratory birds. Under this act, taking, killing, or possessing migratory birds (including any part, nest, or egg) is unlawful.

4.6.2 Impacts and Mitigation

4.6.2.1 Waterway for LNG Marine Traffic

Federally Listed Species

Fish

Lower Columbia River Chinook Salmon ESU

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult, smolt, and juvenile life stages of the Lower Columbia River Chinook salmon ESU. The marine portion of the waterway provides habitat for adult salmon throughout the year. Within the lower Columbia River, migrating spring- and fall-run adults occur between March and June and August and October, respectively. Spring-run out-migrating smolts occur during their second spring/summer, and fall-run out-migrating smolts occur primarily as sub-yearlings from April through June (NMFS, 2005c). In addition, juvenile Chinook salmon rear throughout the year in nearshore habitat of the Columbia River mainstem, lower Columbia River islands, and the accessible low gradient reaches of Columbia River floodplain sloughs.

Critical Habitat – The Lower Columbia River Chinook salmon ESU has designated critical habitat (rearing and migratory corridor PCEs) within the lower Columbia River mainstem. Chinook salmon migrate through the Columbia River estuary en route to their spawning grounds upstream. In addition, critical habitat for rearing has been designated within nearshore habitats of the Columbia River mainstem, Columbia River islands, and the accessible low gradient reaches of Columbia River floodplain sloughs (70 Federal Register 52630 – 52858). The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation.

Upper Columbia River Spring-run Chinook Salmon ESU

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult and smolt life stages of the Upper Columbia River Spring-run Chinook salmon ESU. The marine portion of the waterway provides habitat for adult salmon throughout the year. Within the lower Columbia River, spawning adults migrate upstream to their spawning grounds between March and June and smolts out-migrate between May and June (NMFS, 2005c). In addition, juveniles spend approximately 1 year rearing in freshwater before passing through the lower Columbia River between May and June (NMFS, 2005c). The Upper Columbia River Spring-run Chinook salmon ESU does not have spawning or rearing habitat along the waterway.

Critical Habitat – The Columbia River is designated as critical habitat (rearing and migratory corridor PCEs) for the Upper Columbia River Spring-run Chinook salmon ESU. However, as described above, no rearing occurs along the portion of the lower Columbia River affected by LNG carrier transit (70 Federal Register 52630 – 52858). The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation.

Upper Willamette River Chinook Salmon ESU

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult, smolt, and juvenile life stages of the Upper Willamette River Chinook salmon ESU. The marine portion of the waterway provides habitat for adult salmon throughout the year. Within the lower Columbia River, spawning adults migrate upstream to their spawning grounds primarily between April and May, with a peak in mid-May, but have also been known to occur as early as February (NMFS, 2005c). According to the NMFS (2005c), out-migration has been found to occur in recently emerged juveniles in the winter through early spring, in sub-yearlings in the fall through early winter, and as yearlings in the late winter through spring. In addition, juvenile Upper Willamette River Chinook salmon rear throughout the year in nearshore habitat of the Columbia River mainstem, lower Columbia River islands, and the accessible low gradient reaches of Columbia River floodplain sloughs.

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Upper Willamette River Chinook salmon ESU (70 Federal Register 52630 – 52858). The lateral extent of critical habitat for each designated stream reach is defined as the width of the stream channel as defined by its bankfull elevation.

Snake River Spring/Summer-run Chinook Salmon ESU

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult and smolt life stages of the Snake River Spring/Summer-run Chinook salmon ESU. The marine portion of the waterway provides habitat for adult salmon throughout the year. Within the lower Columbia River, spawning adults migrate upstream to their spawning grounds between January and May (COE, 1973). Out-migrating smolts pass through the lower Columbia River during their second spring/summer (Bell Fisheries Handbook, 1973). The Snake River Spring/Summer-run Chinook salmon ESU does not have spawning or rearing habitat along the waterway.

Critical Habitat – The Columbia River is designated critical habitat (migratory corridor PCE) for the Snake River Spring/Summer-run Chinook salmon ESU (58 Federal Register 68543 – 68554). Adjacent riparian zones are included in the designation, defined as those areas within 300 feet of the normal line of highwater of a stream channel.

Snake River Fall-run Chinook Salmon ESU

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult, smolt, and juvenile life stages of the Snake River Fall-run Chinook salmon ESU. The marine portion of the waterway provides habitat for adult salmon throughout the year. Within the lower Columbia River, spawning adults migrate upstream to their spawning grounds between August and December and out-migrating sub-yearling smolts pass through the lower Columbia River between April and June (Bell Fisheries Handbook, 1973). In addition, juveniles spend up to 1 year rearing in nearshore habitat of the Columbia River mainstem, lower Columbia River islands, and the accessible low gradient reaches of Columbia River floodplain sloughs (Bell Fisheries Handbook, 1973).

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Snake River Fall-run Chinook salmon ESU (58 Federal Register 68543 – 68554). Adjacent riparian zones are included in the designation, defined as those areas within 300 feet of the normal line of highwater of a stream channel.

Columbia River Chum Salmon ESU

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for all life stages of the Columbia River chum salmon ESU. The marine portion of the waterway provides habitat for adult salmon throughout the year. Within the lower Columbia River, migrating adults and spawning occur between mid-October and December (Ehlke and Keller, 2003; NMFS, 2005c). Out-migrating smolts are present between March and May, with a peak in mid-March/early April (NMFS, 2005c). Juvenile chum salmon generally migrate directly to estuaries upon hatching; however, occasionally juveniles rear in the waters of the lower Columbia River and its tributaries between December and May (NMFS, 2005c).

Critical Habitat – The Columbia River is designated as critical habitat (rearing, migratory corridor, and spawning PCEs) for the Columbia River chum salmon ESU (70 Federal Register 52630 – 52858). As described above, adult chum salmon migrate through and spawn in the lower Columbia River. In addition, critical habitat for juvenile rearing has been designated within nearshore habitats of the Columbia River mainstem. The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation.

Lower Columbia River Coho Salmon ESU

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult, smolt, and juvenile life stages of the Lower Columbia River Coho Salmon ESU. The marine portion of the waterway provides habitat for adult salmon throughout the year. Within the lower Columbia River, adults migrate upstream to their spawning grounds between late August and early February, peaking in October; sub-yearling smolts out-migrate through the lower Columbia River between March and July; and juveniles rear throughout the year in nearshore habitat of the Columbia River mainstem, lower Columbia River islands, and the accessible low gradient reaches of Columbia River floodplain sloughs.

Critical Habitat – Critical habitat has not been designated for the Lower Columbia River coho salmon ESU.

Snake River Sockeye Salmon ESU

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult and smolt life stages of the Snake River sockeye salmon ESU. The marine portion of the waterway provides habitat for adult salmon throughout the year. Within the lower Columbia River, spawning adults are known to migrate upstream in two different runs to their spawning grounds. The first occurs as an early run between late July and early August, and the second occurs as a late run from September to October (Bell Fisheries Handbook, 1973). Out-migrating yearling smolts pass through the lower Columbia River between April and June (Bell Fisheries Handbook, 1973). The Snake River sockeye salmon ESU does not have spawning or rearing habitat along the waterway.

Critical Habitat – The Columbia River is designated critical habitat (migratory corridor PCE) for the Snake River sockeye salmon ESU (58 Federal Register 68543 – 68554). Critical habitat includes the adjacent riparian zone defined as those areas within 300 feet of the normal line of high water of a stream channel.

Lower Columbia River Steelhead DPS

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult, smolt, and juvenile life stages of the Lower Columbia River steelhead DPS. The marine portion of the waterway provides habitat for adult steelhead throughout the year. The lower Columbia River provides habitat for migrating adults throughout the year, with seasonal peaks in activity. Out-migrating smolts pass through the lower Columbia River between March and June with peaks in April or May (NMFS, 2005c). In addition, juveniles rear throughout the year in nearshore habitat of the Columbia River mainstem, lower Columbia River islands, and the accessible low gradient reaches of Columbia River floodplain sloughs.

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Lower Columbia River steelhead DPS (70 Federal Register 52630 – 52858). The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation.

Middle Columbia River Steelhead DPS

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult and smolt life stages of the Middle Columbia River steelhead DPS. The marine portion of the waterway provides habitat for adult steelhead throughout the year. The lower Columbia River provides habitat for migrating adults throughout the year, with seasonal peaks in activity. Out-migrating smolts pass through the lower Columbia River between March and June (NMFS, 2005c). The Middle Columbia River steelhead DPS does not have spawning or rearing habitat along the waterway.

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Middle Columbia River steelhead DPS (70 Federal Register 52630 – 52858). The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation.

Upper Columbia River Steelhead DPS

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult and smolt life stages of the Upper Columbia River steelhead DPS. The marine portion of the waterway provides habitat for adult steelhead throughout the year. The lower Columbia River provides habitat for migrating adults throughout the year, with seasonal peaks in activity. Out-migrating smolts pass through the lower Columbia River between March and June (Bell Fisheries Handbook, 1973). The Upper Columbia River steelhead DPS does not have spawning or rearing habitat along the waterway.

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Upper Columbia River steelhead DPS (70 Federal Register 52630 – 52858). The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation.

Upper Willamette River Steelhead DPS

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult and smolt life stages of the Upper Willamette River steelhead DPS. The marine portion of the waterway provides habitat for adult steelhead throughout the year. The lower Columbia River provides habitat for migrating adults throughout the year, with seasonal peaks in activity. Out-migrating smolts

pass through the lower Columbia River between March and July (Bell Fisheries Handbook, 1973). The Upper Willamette River steelhead DPS does not have spawning or rearing habitat along the waterway.

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Upper Willamette River steelhead DPS (70 Federal Register 52630 – 52858). However, as described above, no rearing occurs along the portion of the lower Columbia River affected by LNG carrier transit. The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation.

Snake River Basin Steelhead DPS

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for adult and smolt life stages of the Snake River Basin steelhead DPS. The marine portion of the waterway provides habitat for adult steelhead throughout the year. The lower Columbia River provides habitat for migrating adults throughout the year, with seasonal peaks in activity. Out-migrating smolts pass through the lower Columbia River between March and June (Bell Fisheries Handbook, 1973). The Snake River Basin steelhead DPS does not have spawning or rearing habitat along the waterway.

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Snake River Basin steelhead DPS (70 Federal Register 52630 – 52858). However, as described above, no rearing occurs along the portion of the lower Columbia River affected by LNG carrier transit. The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation.

North American Green Sturgeon

Occurrence along the Waterway – The waterway for LNG marine traffic provides habitat for the adult life stage of North American green sturgeon. Green sturgeon occur within the marine portion of the waterway and in the lower reaches of the Columbia River (NOAA, 2006G; Israel et al, 2004). Within the lower Columbia River, sturgeon concentrate during the late summer and early fall (Adams et al, 2006).

Critical Habitat – Critical habitat has not been designated for the North American green sturgeon.

Impacts and Mitigation

During operation of the Bradwood Landing Project, LNG marine traffic could potentially affect federally listed fish species and/or their designated critical habitat through various activities including:

- fish strandings;
- shoreline erosion;
- ship engine cooling water appropriations and discharges;
- accidental spill or leak of hazardous materials; and
- accidental or intentional breach of an LNG carrier.

Potential impacts and mitigation from each of these factors are summarized in table 4.6.2-1. Potential impacts on aquatic resources (including salmonids and sturgeon) from LNG marine traffic are discussed in section 4.5.1.1. As noted previously, the FERC staff is currently revising its BA and EFH Assessment for the Bradwood Landing Project, which will be resubmitted to the NMFS with a request to initiate formal consultation in compliance with section 7 of the ESA and the MSA. The FERC would not allow construction of the project to proceed until after we have concluded formal consultation with the NMFS and FWS.

TABLE 4.6.2-1

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
LNG Marine Traffic					
Fish strandings ^b	Salmonids and sturgeon - Mortality of sub-yearlings.	Existing deep-draft vessel traffic on the lower Columbia River.	125 LNG carriers per year.	Avoid	<ul style="list-style-type: none"> The speed of LNG carriers on the Columbia River would be limited by the tethered tug to speeds below which most wake stranding occurs.
				Minimize	<ul style="list-style-type: none"> LNG carriers would only traverse the lower 38 miles of the Columbia River where very little wake stranding has been documented. We have recommended in section 4.5.1.1 that NorthernStar coordinate with the NMFS to determine appropriate LNG carrier speed, or other applicable measures, to avoid or minimize wake stranding impacts.
Shoreline erosion ^b	Salmonids and sturgeon - Resuspension of material in water column.	Shoreline erosion along the Columbia River is caused by river currents, wind waves, and ship wakes. Ship wakes breaking on shore can cause erosion along the shoreline and resuspend the eroded material with the water column.	125 LNG carriers per year would contribute ship wakes similar to other deep draft vessels on the lower Columbia River.	Minimize	<ul style="list-style-type: none"> The speed of LNG carriers on the Columbia River would be limited by the tethered tug, thus reducing the potential for shoreline erosion. We have recommended in section 4.5.1.1 that NorthernStar coordinate with the NMFS to determine appropriate LNG carrier speed, or other applicable measures, to avoid or minimize shoreline erosion impacts. We have recommended in section 4.1.3.3 that NorthernStar prepare a <i>Shoreline Monitoring Plan</i> for the west end of Puget Island.
Ship ballast and cooling water appropriations and discharges ^b	Salmonids and sturgeon - Entrainment, introduction and spread of exotic species, changes in water temperature. Discharge of warm water that has been treated with biocide.	NA	125 LNG carriers per year would appropriate and discharge water for engine cooling and as ballast.	Minimize	<ul style="list-style-type: none"> NorthernStar changed its original project design to provide screened water to ships at dock for cooling engines and filling ballast tanks, thus minimizing entrainment impacts on juvenile salmonids. NorthernStar would offer contract incentives for ships to retrofit in order to utilize the system.

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project				
Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a Description
Transiting of LNG marine vessels	Sea turtles, whales, and Steller sea lion - Increased noise levels, vessel strikes.	Existing vessel traffic.	125 LNG carriers per year.	<ul style="list-style-type: none"> While docked, LNG carriers that are retrofitted would recirculate ballast water through the engines for cooling after the shore-based water supply is turned off and until the ship is ready to leave the wharf to avoid additional water intake and discharging heated water within the LNG wharf and maneuvering area. We have recommended in section 4.3.2.3 that NorthernStar develop performance standards for water temperature impacts and biocide use associated with LNG carrier water intakes and discharges. We have recommended in section 4.5.2.1 that NorthernStar conduct post-installation water flow mapping through all intake screens at the LNG terminal, and develop and implement a monitoring program to assess the effects of impingement and entrainment from use of the screened water supply system on juvenile salmonids during terminal operations. We have recommended in section 4.5.2.1 that NorthernStar either require LNG carriers to be retrofitted or develop an alternative system meeting the same standard that does not require vessel retrofitting. LNG carrier operators would follow industry standard hull plating surface treatments and mandatory ballast management practices required by the Coast Guard and IMO to minimize possible introduction or spread of exotic species. LNG carriers push a considerable bow wave when underway on the open ocean, which would likely push sea turtles away from the vessel.

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
				Minimize	<ul style="list-style-type: none"> NorthernStar would minimize impacts on whales by contractually requiring that the LNG carriers travel in a defined area that would narrow to 10 nautical miles in width between 126 degrees to the marshalling area off the mouth of the Columbia River. We have recommended in section 4.6.2.1 that NorthernStar coordinate with the NMFS to determine appropriate LNG carrier speed and seasonal restrictions, or other applicable measures to avoid or minimize impacts on whales. All LNG carriers are constructed with double hulls, which increases the structural integrity of the hull system and provides protection for the cargo tanks in case of an accident. Each LNG carrier would maintain a SOPEP, which would contain measures to be implemented in the event of a spill or release. The presence of vessels involved in spill control and clean-up would discourage aquatic species from approaching the area. The risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed with appropriate safety and security measures.
Accidental spill or leak of hazardous materials	Salmonids, sturgeon, sea turtles, whales, and Steller sea lion - Direct impacts, changes in food sources, water contamination.	Existing vessel traffic.	125 LNG carriers per year.	Avoid	
				Minimize	
Accidental or intentional breach of an LNG carrier	Salmonids, sturgeon, sea turtles, whales, Steller sea lion, Columbian white-tailed deer, brown pelican, marbled murrelet, northern spotted owl, streaked horned lark, western snowy plover, Kincaid's lupine, and Nelson's checker-mallow - Mortality.	Existing vessel traffic.	125 LNG carriers per year.	Minimize	

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
In-water Construction Activities					
Dredging of the berth and maneuvering area; dredge material placement ^b	Salmonids and sturgeon - Alteration of habitat, increased suspended sediment and turbidity levels, removal of benthic organisms, resuspension of contaminated sediments, entrainment of eggs and juvenile salmonids, increased noise, and altered sediment transport and deposition rates. Steller sea lion - Displacement.	Nearshore habitat with water depths ranging from 21 to 42 feet. Designated as critical habitat for 12 species of salmonids. The Wahkiakum County Sand Pit site is similar in function to the LNG terminal site, but has been affected by previous and ongoing dredged material placement.	46 acres of habitat would be dredged to a depth of 42 feet CRD, making the area deeper and more uniform.	Avoid Minimize	<ul style="list-style-type: none"> Site location was chosen where no shallow water habitat would be dredged. Site location was chosen where only water deeper than 21 feet would be dredged. Dredging during the NMFS recommended in-water work window would minimize impacts on salmonids. NorthernStar would use BMPs to minimize sedimentation impacts from dredging, resulting in only minor, non-lethal effects. We have recommended in section 4.2.2.2 that NorthernStar prepare a plan to monitor the side slopes of the maneuvering area after dredging; the plan shall include slope protection measures, should such mitigation be necessary. We have recommended in section 4.10.2.2 that NorthernStar file a finalized dredging noise mitigation plan that would identify all measures to be implemented during dredging to reduce noise levels. NorthernStar would implement their terminal ESC Plan to minimize impacts on water quality. Following construction, shoreline would be replanted with native vegetative communities and monitored annually for 5 years. Pile driving would occur during the NMFS recommended in-water work window, minimizing impacts on salmonids. NorthernStar revised the project design to use larger than normal piles to minimize the number of piles required. Piles would be installed vertically, which allows the use of bubble curtains (caissons full of bubbles) to minimize sound pressure levels during pile driving.
Development of the river shoreline	Salmonids and sturgeon - Increased suspended sediment and turbidity levels.	The site was used as a rough saw mill until 1962. The site has most recently been used as a dredged material disposal site by the COE.	Site would be raised to 25 feet NAVD 88 and surrounded by a 5-foot perimeter berm.	Minimize	
Pile driving	Salmonids, sturgeon, Steller sea lions, Columbian white-tailed deer, and streaked horned larks - Increased sound pressure levels and noise.	NA	NA	Minimize	

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
Filling log pond	Salmonids and sturgeon - Loss of rearing habitat.	Off-channel refugia and rearing habitat. Designated as critical habitat for 12 species of salmonids.	Log pond would be filled during construction of the LNG terminal.	Avoid	<ul style="list-style-type: none"> • We have recommended in section 4.5.2.1 that NorthernStar continue to consult with the appropriate federal and state agencies to develop a revised Bubble Curtain Contingency Plan that establishes a performance standard to assess whether or not bubble curtains are adequately working. The plan would describe specific noise attenuation methods to be implemented if monitoring indicates poor noise attenuation performance. • NorthernStar would use a pile cap between the hammer and the pile during impact pile driving to further reduce underwater noise levels if monitoring indicates the bubble cushion within the caisson is not achieving the desired sound pressure reduction. • NorthernStar would use vibratory pile drivers as conditions allow to lower sound pressure levels during pile driving. • NorthernStar would monitor for Steller sea lions within the established Safety Zone and not start pile driving until any Steller sea lions have moved outside the Safety and Buffer Zones. • NorthernStar selected a previously developed industrial location to avoid impacts on less disturbed sites.
				Minimize	<ul style="list-style-type: none"> • NorthernStar would implement its <i>Fish Salvage Plan</i> to capture, record, and release as many salmonids as possible. • We have recommended in section 4.5.2.1 that during fish collection efforts, NorthernStar place nets at the outlet of the log pond that only allow emigration from the pond.

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
Placement of wharf and piles in nearshore portion of the Columbia River	Salmonids and sturgeon - Loss of rearing and migratory habitat; behavioral changes, increased predation, alterations to water quality.	Nearshore habitat, depths ranging from 20 to 40 feet. Designated as critical habitat for 12 species of salmonids.	Pilings would occupy about 0.4 acre of nearshore habitat. Current would go around pilings, changing microhabitats locally. Unloading platform would occupy a total area of about 0.5 acre; shading associated with the platform could alter the microhabitat within this area.	Minimize	<ul style="list-style-type: none"> The number of pilings would be minimized by using larger diameter piles.
HDD stream crossings	Salmonids and sturgeon - Loss of drilling mud to river (frac-out) and related water quality impacts.	Undisturbed stream-bottom habitats.	NA	Avoid	<ul style="list-style-type: none"> The HDD method is the preferred method for avoiding impacts on listed species.
Open-out stream crossings	Salmonids and sturgeon - Increased suspended sediment and turbidity levels, vegetation removal, increased water temperature, decreased LWD and the associated reduction in habitat, mass failures, streambank erosion, and physical damage.	Undisturbed stream-bottom habitats.	Flume or dam and pump methods would minimize suspended sediment and turbidity levels.	Avoid	<ul style="list-style-type: none"> NorthernStar would implement its <i>HDD Contingency Plan</i> to minimize potential impacts from a frac-out, if one were to occur. NorthernStar would use the HDD or bore method to cross all 12 waterbodies known to contain listed salmonids.
				Minimize	<ul style="list-style-type: none"> NorthernStar would implement our Procedures and its pipeline ESC Plan in Oregon and SWPPP in Washington to minimize potential impacts. NorthernStar would allow a riparian buffer at least 25 feet wide to permanently revegetate with native woody plant species across the entire right-of-way after construction is completed.

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
Habitat Modification					
Conversion of existing habitats to industrial use at the LNG terminal site	Columbian white-tailed deer - Habitat loss.	The LNG terminal site has patches of potentially suitable foraging, resting, and fawning habitat for the Columbian white-tailed deer.	Potentially suitable habitat for the Columbian white-tailed deer would be limited to riparian vegetation along the shoreline of the Columbia River; however, fencing around the facility and the infrastructure would preclude use of the site.	Avoid	<ul style="list-style-type: none"> • We have recommended in section 4.3.2.4 that NorthernStar continue to consult with the COE, NMFS, FWS, and appropriate federal agencies to finalize its <i>Waterbody and Wetland Construction and Mitigation Procedures Plan</i>. • NorthernStar selected a former industrial site to avoid preferred or more pristine habitats. • We have recommended in section 4.6.2.3 that pipeline construction activities shall not occur in potential habitat during the fawning season (between June 1 and July 15).
Power line construction	Salmonids and sturgeon - Change in water temperature, loss of LWD, sediment runoff. Columbian white-tailed deer - Habitat modification.	Forested habitat that is predominately commercially managed stands of Douglas-fir.	About 17.8 acres of forested habitat would be cleared for construction of the proposed power line. Of this, 5.0 acres would be maintained in a grassland/herbaceous cover type.	Minimize	<ul style="list-style-type: none"> • The LNG terminal site has been minimized and is smaller than existing LNG terminals. • During early project planning, NorthernStar rerouted the proposed power line to avoid impacts on old-growth forest. • PacifiCorp would implement BMPs to minimize erosion.
Hunt Creek Bridge Replacement	Salmonids and sturgeon - Erosion, displacement, acoustic shock and noise, increased suspended sediment and turbidity levels.	Existing bridge across Hunt Creek.	New pre-cast concrete bridge.	Avoid	<ul style="list-style-type: none"> • The proposed bridge would be located 2.4 feet above the 100-year floodplain and the concrete abutments would be installed above the MHHW and from the adjacent uplands to avoid impacts on Hunt Creek. • Existing wooden piles would remain in place; only the piers and piles that interfere with the new bridge would be cut.
				Minimize	<ul style="list-style-type: none"> • NorthernStar would implement its terminal ESC Plan to minimize potential impacts on Hunt Creek. • Bridge demolition and construction would occur during the ODFW recommended in-water work window for Hunt Creek.

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
Railroad realignment	Salmonids and sturgeon - Erosion, displacement, acoustic shock and noise, increased suspended sediment and turbidity levels.	Existing PWRR railroad.	Removal and realignment of a 4,200-foot-long portion of the existing PWRR line.	Minimize	<ul style="list-style-type: none"> • Project design would minimize sedimentation by allowing water to drain toward vegetated areas before entering Hunt Creek. • Banks disturbed by construction would be revegetated with native vegetation that is typical of the area and a riparian buffer at least 30 feet wide would be allowed to permanently revegetate. • We have recommended in section 4.3.2.3 that NorthernStar conduct water quality monitoring at points both 100 feet downstream and 100 feet upstream from the bridge during demolition or construction activities. • NorthernStar would implement its terminal ESC Plan to minimize potential impacts on Hunt Creek. • Project design would minimize sedimentation by allowing water to drain toward vegetated areas before entering Hunt Creek. • Water quality monitoring would be conducted during the construction periods most likely to result in increased suspended sediments and turbidity. • Banks disturbed by construction would be revegetated with native vegetation that is typical of the area and a riparian buffer at least 30 feet wide would be allowed to permanently revegetate. • NorthernStar would construct a 2-foot-high berm of earth covered with native grass between the Hunt Creek oxbow and the railroad tracks. The berm would extend for 100 feet centered on the apex of the oxbow. • NorthernStar would use concrete railroad ties in place of treated railroad ties within 100 feet of Hunt Creek.

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
Upland pipeline construction	Salmonids and sturgeon - Increased erosion resulting in increased suspended sediment and turbidity levels. Columbian white-tailed deer - Habitat modification, disruption of fawning. Kincaid's lupine, Nelson's checker-mallow - Removal.	Various.	Construction right-of-way would be replanted and allowed to fully revegetate.	Avoid	<ul style="list-style-type: none"> • Vegetative clearing during construction would be scheduled outside of the Columbian white-tailed deer fawning season.
				Minimize	<ul style="list-style-type: none"> • NorthernStar would implement our Procedures and its pipeline ESC Plan in Oregon and SWPPP in Washington to minimize potential impacts on water quality. • NorthernStar would allow a riparian buffer at least 25 feet wide to permanently revegetate with native woody plant species across the entire right-of-way after construction is completed. • We have recommended in section 4.4.2.3 that NorthernStar revise its <i>Noxious Weeds and Soil-borne Plant Disease Control Plan</i>. • We have recommended in section 4.6.2.2 that NorthernStar conduct additional botanical surveys before construction of the proposed pipeline.
Miscellaneous Construction Activities					
Water appropriation and discharge	Salmonids and sturgeon - Entrainment, impingement, reduced downstream flows, changes in water quality.	NA	Withdrawal of up to 84 million gallons of water from the Columbia River.	Minimize	<ul style="list-style-type: none"> • NorthernStar would install screens on all water intakes using NMFS and ODFW fish-screen criteria. • We have recommended in section 4.5.2.1 that NorthernStar conduct post-installation water flow mapping through all intake screens at the LNG terminal, and develop and implement a monitoring program to assess the effects of impingement and entrainment from use of the screened water supply system on juvenile salmonids.

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
Construction lighting of the LNG terminal site.	Salmonids and sturgeon, and Columbian white-tailed deer - Avoidance, predator attraction.	NA	Lighted construction area.	Minimize	<ul style="list-style-type: none"> We have recommended in section 4.5.2.1 that NorthernStar continue to consult with the FWS, NMFS and ODFW to finalize its <i>Terminal Lighting Plan</i> for construction and operation of the LNG terminal.
Blasting	Salmonids, sturgeon, and Steller sea lions – Changes in behavior, decreased perception, and damage to body tissue.	NA	Blasting at the quarry could generate noise levels of 115 dB.	Avoid	<ul style="list-style-type: none"> The estimated maximum noise exposure to salmonids and pinnipeds from blasting at the Bradwood quarry (115 dB) would be less than the noise thresholds for pinnipeds and salmonids (160dB_{rms} and 150 dB_{rms}). Therefore, adverse impacts on federally listed species as a result of blasting at the LNG terminal site are not expected.
				Minimize	<ul style="list-style-type: none"> We have included a recommendation that NorthernStar consult with the NMFS, FWS, ODFW, and other appropriate agencies when developing its Blasting Management Plan.
Accidental spills or leaks of hazardous materials	Salmonids and sturgeon - Water quality, direct and indirect effects on organisms.	NA	NA	Avoid	<ul style="list-style-type: none"> NorthernStar would prohibit liquid transfer as well as refueling of vehicles and equipment within 100 feet of waterbodies.
				Minimize	<ul style="list-style-type: none"> NorthernStar would implement our Procedures and its ESC Plans in Oregon and SWPPP in Washington to minimize the likelihood of an accidental spill or leak of hazardous materials occurring.
Collisions with vehicle or railway traffic	Columbian white-tailed deer - Increased likelihood of collisions between vehicles or trains and deer.	Current use of Clifton Road is estimated at about 50 vehicle trips per day. Railway is not currently in use.	Up to 1,500 vehicle trips per day would occur along Clifton and Bradwood roads during construction of the proposed project. Railway use is expected to be infrequent.	Minimize	<ul style="list-style-type: none"> NorthernStar would post speed limit and deer warning signs on all roads. NorthernStar would implement a training and awareness program for all personnel accessing the LNG terminal site. NorthernStar would make information available to train operators about the risk of collision and importance of protecting the Columbian white-tailed deer. NorthernStar would bus construction workers to the terminal site from a temporary parking lot southeast of the Taylorville interchange at Highway 30.

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
LNG Terminal Operation					
Stormwater runoff	Salmonids and sturgeon - Increased suspended sediment and turbidity levels.	The proposed LNG site currently consists of highly permeable soils (typical drainage is greater than 14 inches per hour).	About 6 acres at the proposed LNG terminal site would be impervious surface. The remainder would be either landscaping or loosely packed gravel overlying dredged materials. Modifications to Bradwood and Clifton Roads as well as the Hunt Creek Bridge replacement would increase the total impervious surface.	Avoid	<ul style="list-style-type: none"> We have recommended that NorthernStar develop a traffic management plan to reduce traffic impacts. Drainage basins described in NorthernStar's <i>Stormwater Management Plan</i> would contain stormwater runoff generated by a 100-year storm event. Curb extensions would discharge stormwater into small rock flow spreader structures before flowing through vegetation. NorthernStar would construct a bioswale on the west side of the bridge to increase this distance between the new bridge and Hunt Creek and provide storage necessary to promote infiltration. NorthernStar would install additional culverts and drainage ditches would be installed to improve stormwater drainage from Clifton Road.
Accidental spills or leaks of hazardous materials	Salmonids and sturgeon - Water quality, direct and indirect effects on organisms.	NA	NA	Avoid	<ul style="list-style-type: none"> Perimeter berm would contain any potential spills or leaks of hazardous materials at the LNG terminal.
Maintenance dredging ^b	Salmonids and sturgeon - Alteration of habitat, increased suspended sediment and turbidity levels, removal of benthic organisms, resuspension of contaminated sediments, entrainment of eggs and juvenile salmonids, increased noise, and alteration sediment transport and deposition rates. Steller sea lions - Displacement.	LNG carrier berth and maneuvering area would have developed benthic invertebrate communities due to influx from areas immediately upriver. Proposed dredge disposal site is similar in function to the LNG terminal site, but has been affected by previous and ongoing dredged material disposal.	Dredging would result in a depth of -42 feet CRD within the LNG carrier berth and maneuvering area.	Avoid	<ul style="list-style-type: none"> Loss of sediment for downstream habitat would be partially avoided by placing dredged material back into the river system.

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
				Minimize	<ul style="list-style-type: none"> Dredging during the NMFS recommended in-water work window would minimize impacts on salmonids. NorthernStar would use BMPs to minimize sedimentation impacts from dredging, resulting in only minor, non-lethal effects. NorthernStar would neutralize SCV discharge water as required under its NPDES permit prior to discharge to the Columbia River.
Routine discharge of condensate water from the SCVs	Salmonids and sturgeon - Increased acidity, temperature, and dissolved solids in water in the vicinity of the LNG terminal.	NA	Discharge of 160 gpm of water to the Columbia River.	Avoid	
				Minimize	<ul style="list-style-type: none"> NorthernStar would discharge SCV water using an outfall/diffuser system mounted below the water level. Measurable increases of dissolved solids would be contained within a 10-foot mixing zone. Water used for fire suppression system testing would be returned to the Columbia River essentially unchanged.
Routine discharge of condensate water from the fire suppression system	Salmonids and sturgeon - Increased water temperature.	NA	Discharge of 260,000 gallons of water per week to the Columbia River.	Avoid	
Operation of noise-producing equipment	Salmonids, sturgeon, Columbian white-tailed deer, and streaked horned larks - Increased sound pressure levels and noise.	Existing noise levels at the nearest noise sensitive areas range from about 44 to 48 L _{dn} (dBA).	Noise levels at the nearest noise sensitive areas would range from about 40 to 50 L _{dn} (dBA).	Minimize	<ul style="list-style-type: none"> To minimize noise generated during operation of the LNG terminal, NorthernStar would incorporate noise barriers or enclosures to block sound transmission from operating equipment; valves with "low-noise" trims, acoustical insulation for aboveground piping, and selection of equipment types with the least noise emissions. We have recommended in section 4.10.2.2 that NorthernStar make all reasonable efforts to ensure its predicted noise levels from the LNG terminal are not exceeded at noise sensitive areas.

TABLE 4.6.2-1 (cont'd)

Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Action	Species - Potential Impact	Baseline Condition	Proposed Condition	Resolution ^a	Description
Lighting of the ship berth and unloading facilities	Salmonids, sturgeon, and Columbian white-tailed deer - Avoidance of the area, predator attraction.	NA	Lighted LNG import terminal.	Minimize	<ul style="list-style-type: none"> NorthernStar's final LNG terminal lighting design would include light reduction techniques (e.g., directed lighting, timers, motion sensors) to avoid unnecessary lighting. We have recommended in section 4.5.2.1 that NorthernStar continue to consult with the FWS, NMFS and ODFW to finalize its <i>Terminal Lighting Plan</i> for construction and operation of the LNG terminal.
Pipeline Operation					
Vegetative clearing for maintenance of the right-of-way	Salmonids and sturgeon - Change in water temperature, loss of LWD, sediment runoff. Columbian white-tailed deer - Habitat modification, disruption of fawning.	Variable	Maintenance of 50-foot-wide right-of-way in uplands.	Avoid	<ul style="list-style-type: none"> Vegetative clearing would be conducted outside of the Columbian white-tailed deer fawning season.
				Minimize	<ul style="list-style-type: none"> NorthernStar would implement our Procedures and its pipeline ESC Plan in Oregon and SWPPP in Washington to minimize potential impacts on water quality. NorthernStar would allow a riparian buffer adjacent to waterbodies at least 25 feet wide to permanently revegetate with native woody plant species across the entire right-of-way after construction is completed. NorthernStar would minimize the disturbance to upland forested communities by replanting the right-of-way in-kind with trees, with the exception of a 30-foot strip centered along the pipeline, which would be maintained as an herbaceous community. We have recommended in section 4.3.2.4 that NorthernStar continue to consult with the COE, NMFS, FWS, and appropriate federal agencies to finalize its <i>Waterbody and Wetland Construction and Mitigation Procedures Plan</i>.
^a Unavoidable impacts would be resolved through implementation of NorthernStar's final Compensatory Mitigation Plan.					
^b Potential impacts on federally listed species due to wake stranding, shoreline erosion, entrainment and impingement, and habitat modification due to dredging continues to be studied and will be discussed in additional detail in the revised BA and EFH Assessment.					

Sea Turtles

Occurrence along the Waterway

As discussed in section 4.6.1.1, although sea turtles are generally considered a warm temperate marine reptile, green, olive ridley, leatherback, and loggerhead sea turtles have been recorded off the coasts of Oregon and Washington in the last 10 years (Green et al., 1992). Most (62.5 percent) of these sightings occurred over the continental slope waters, with the remainder found over the continental shelf. Sea turtles would not likely occur within the lower Columbia River; however, they may occur in marine portions of the LNG carrier route.

Critical Habitat

Designated critical habitat for the sea turtles does not occur within the Zones of Concern associated with LNG carrier transit. Critical habitat has been designated for the green sea turtle in waters off of Puerto Rico and for the leatherback sea turtle in waters near the U.S. Virgin Islands (63 Federal Register 46693 – 46701 and 44 Federal Register 17711 – 17712, respectively). Critical habitat has not been designated for olive ridley or loggerhead sea turtles.

Impacts and Mitigation

As discussed in section 2.1, construction and operation of the Bradwood Landing Project would result in the addition of 125 vessel trips per year on the Columbia River and off the coasts of Oregon and Washington. Potential impacts on sea turtles as a result of increased vessel traffic include increases in underwater noise generated by engines, vessel-sea turtle strikes, and possible spills or leaks of hazardous materials.

Engine-noise produced by LNG carriers would result in temporary increases in underwater noise levels near the transiting ships. However, because sea turtles are mobile, it is anticipated that they would avoid areas with high noise levels during operation of the proposed project. Sea turtles could also be vulnerable to vessel strikes as a result of the proposed project. Vulnerability to collision with an LNG carrier would be greatest while sea turtles feed, swim, and rest near the surface of the water. In areas of intense ship traffic, sea turtles can experience propeller or collision injuries; however, most of these injuries are caused by small, fast moving vessels (NMFS, 2004b). In contrast, LNG carriers push a considerable bow wave when underway on the open ocean because of their design and large displacement tonnage. This wave pushes water, flotsam, and other small objects (such as sea turtles) away from the vessel. Therefore, sea turtles are not likely to be struck by LNG carriers as a result of the project.

If a sea turtle were to encounter a spill, leak, or accidental release of fuels, lubricants, or other hazardous substance from an LNG carrier, a turtle would be at risk due to impacts on respiratory system, skin, blood chemistry, and salt gland function (NMFS, 2004b). Sea turtles are susceptible to the effects of spills either by direct encounter or ingestion of contaminated prey. Fuel (e.g., diesel) used for vessel propulsion or auxiliary/emergency generators could potentially spill or leak. However, fuel on each ship is protected by the vessel's double hull. Furthermore, each LNG carrier would maintain a SOPEP which would contain measures to be implemented in the event of a petroleum release (see section 4.3.2.2). In addition, the presence of the vessels involved in spill control and clean-up would discourage sea turtles from approaching spill areas.

The potential exists for an LNG spill and associated fire during transit of the LNG carriers to the LNG terminal that could affect sea turtles present at the ocean surface at the time of the spill. As described in section 4.11.5.3, the released LNG would vaporize rapidly upon contact with the air and

water. Because LNG is not soluble in water and the LNG would completely vaporize shortly after being spilled, there would be no liquid left that could mix and/or contaminate the water. However, the greatest threat to sea turtles from an LNG spill would be thermal stress from coming into contact with the cryogenic liquid (before the LNG vaporizes) or the fire associated with the ignited vapors. Any sea turtles in the immediate vicinity of the LNG or the fire would probably experience a sudden thermal shock that would be lethal. Sea turtles in the general area of a spill would most likely detect the temperature change and avoid the area. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Whales

Occurrence along the Waterway

Seven species of whales potentially occur off the coasts of Oregon and Washington, including the blue, fin, humpback, North Pacific right, sei, Southern Resident killer, and sperm whales. Whales tend to feed during the summer in the northern latitudes and migrate to the tropical southern latitudes in the winter for breeding. Some whales do not migrate as far north as the rest of the population; therefore, whales can be encountered throughout the year off the coasts of Oregon and Washington.

Critical Habitat

Critical habitat has not been designated for any of the species potentially occurring along the LNG carrier route. However, designated critical habitat for the Southern Resident killer whale DPS has been designated in three specific areas: the Summer Core Area in Haro Strait and waters around the San Juan Islands; Puget Sound; and the Strait of Juan de Fuca (71 Federal Register 69054 – 69070).

Impacts and Mitigation

Construction of the Bradwood Landing Project would not result in impacts on whales. However, operation of the project would result in increased vessel traffic as LNG carriers move through the EEZ to and from the proposed LNG import terminal on the Columbia River. The Columbia River currently supports between 1,800 and 2,000 vessel trips per year. The project would increase vessel traffic into the Columbia River by an additional 125 roundtrip vessel trips, annually. The increase of 125 vessels trips per year from the Bradwood Landing Project represents a 7 percent increase over the current volume. Potential impacts on whales resulting from increased vessel traffic could include: increases in underwater noise generated by engines, vessel-whale strikes, and spills or leaks of hazardous materials.

Noise – Operation of the Bradwood Landing Project has the potential to impact whales due to periodic increases in both underwater and surface noise. This noise would be generated by ship engines as they transit to and from their port of origin (LNG export facility), through the EEZ, to and from the proposed LNG import terminal on the Columbia River.

Noise in the aquatic environment is defined as sound from an array of sources that does not convey biologically significant information. The marine environment contains many natural and anthropogenic sources of noise. Natural noise includes surf, wind, earthquakes, and biological activity. Anthropogenic sources include noise generated to locate submerged objects, measure environmental features, and conduct industrial activities. Noise can be neutral background acoustical clutter, or can impede acoustic communication or other biological functions (NMFS, 2005b).

Cargo ships are the largest component of commercial vessel traffic and also generate higher levels of low frequency noise than other vessels. Over the last few decades, vessel operation statistics indicate steady growth in vessel traffic with an increase in both the number of vessels and in the tonnage of goods shipped (Mazzuca, 2001). Along the Pacific Coast, the bulk of commercial vessel traffic is concentrated through a few major ports, including Los Angeles, Long Beach, Oakland, Seattle, and Tacoma. Noise from shipping is concentrated into the regions adjacent to these ports and their approaches (Hildebrand, 2004). For example, between 1950 and 2000, the overall increase in low-frequency noise was 16 dB (Mazzuca, 2001). During this period, the number of ships worldwide tripled (from about 30,000 to 87,000) and the gross tonnage increased by a factor of 6.5 (from about 85 to 550 million gross tons) (NRC, 2003; Hildebrand, 2004).

LNG carriers are in the category of cargo and tanker vessels, which are increasing in numbers world wide. Cargo vessels are known to emit high levels of low frequency sound (6.8 to 7.7 hertz (Hz) at 181 to 190 dB, re: 1 μ Pa) capable of traveling long distances (Richardson et al., 1995). Noise generated by LNG carriers is generally omni-directional, emitting from all sides of the vessel. Noise levels are greater on the sides of the vessel and weaker on the front and rear of the ship. The omni-directional, moving sound source may be the reason that whales do not always avoid oncoming ships and are thus struck and either injured or killed.

Whales tend to either react strongly or not at all to the noise generated by oncoming ships. These reactions often occur in response to changes in engine and propeller speed. Baleen whales generally avoid approaching vessels and exhibit a greater tendency to avoid vessels moving at higher speeds. In order to avoid an approaching vessel, baleen whales may move to an area more than 1 mile from their original location.

Vessel-whale Strikes –Whales are seasonally present predominantly where the continental shelf and the continental slope occur (Green et al., 1991). Green et al. (2001) also found that whales are not randomly distributed off the Oregon and Washington coasts: humpback whales tend to travel north and south over the continental slope and outer continental shelf during summer; sperm whales have a wider distribution, but are generally found outside the continental slope; and fin whales are primarily found over the continental slope. In addition, some species tend to concentrate in certain areas off the Oregon and Washington coasts. Numerous surveys have been conducted in the waters off of Oregon and Washington to determine whale species distribution, abundance, and habitat use patterns. In addition, data compiled by the NMFS National Marine Mammal Laboratory's POP database was used to assess whale distribution. Based on the distribution data from both the POP database and available survey data, at any point beyond the base of the continental slope, whale sightings become increasingly rare and not as likely as a sighting along either the slope or shelf. The exception to this would be sperm and sei whales, which are known to have a more oceanic (deeper depth) distribution than other whale species. Therefore, collisions between LNG carriers and whales are less likely in the open ocean over the abyssal plain or ocean floor than they are along the continental shelf and slope. Figure 4.6.1-1 shows the confirmed whale sightings off the coasts of Oregon and Washington in relation to the continental slope and shelf.

The ship strike database indicates that large and fast moving vessels (greater than 12 knots) are most typically associated with whale strikes. Some species of whales have been found to exhibit behaviors that increase their susceptibility to collision when approached by vessels. These behaviors include startle responses, more erratic surface movements, reduced surface time, fewer blows per surfacing, shorter intervals between successive blows, and increased frequency of dives without raised flukes (Whitehead et al., 1990; Cawthorn, 1992; Gordon et al., 1992).

When in the open ocean, LNG carriers are expected to travel at approximately 20 knots. Vessels in the open ocean are not subject to any speed restrictions and generally transit along the Great Circle

Route, which is about 300 miles offshore. This open ocean area is considered outside of the project area and within the range of existing conditions because the LNG carriers would be present with all other commercial vessels in the open ocean, regardless of its specific port. However, on approach to ports, vessel traffic is concentrated over the continental shelf and slope, which is also where many whale species congregate off the coasts of Oregon and Washington, especially during the summer months.

Within the Columbia River navigation channel (CRM -3 to CRM 100) and in the marine waters approaching the entrance/exit of the navigation channel (at least out to CRM -8) the Columbia River Bar and River Pilots would determine the ship speed. The decision about proper LNG carrier speed is founded on prudent seamanship and sound marine practice and is targeted toward safe navigation and maneuvering of the vessel. The appropriate speed for given circumstances is highly dependent on the navigation channel characteristics, weather conditions, tide, type of ship, existing vessel traffic and any other maneuvering constraints. LNG carrier speeds would accordingly vary depending on current conditions, but would be limited to approximately 12 knots. This limitation is due to the escort tugboat on stern tether during transit. At present, there is no known speed restriction to reduce vessel collisions with marine mammals within the Columbia River shipping channel. However, given the nature of the entrance to the Columbia River, LNG carriers would be operating at controlled speeds such that large whales and other marine mammals should have sufficient time to avoid the carrier in this location.

Based on information provided by the NMFS, 11 vessel strikes were either reported in the region or detected by necropsy by the Northwest Marine Mammal Stranding Network between January 2002 and January 2008 (NMFS, 2007a; 2008). Strikes were observed in every month except March, April, and December; therefore, we cannot predict whether a vessel strike would be more likely during certain times of the year. Of the reported whale-vessel strikes, fin whales were encountered most frequently (six strikes), and blue, sei, humpback, sperm, and gray whales each had one strike. Jensen and Silber (2003) note that many strikes likely go undetected or unreported as they may occur in remote areas or struck whales may drift out to sea. Thus, the actual number of whale strikes is undoubtedly much greater than reported (Jensen and Silber, 2003). Using the ship trip database for the area between the Strait of Juan de Fuca and Humboldt Bay, approximately 7,931 vessel trips (including LNG carriers) occurred along the coastline in 2002 (Pacific States/British Columbia Oil Spill Task Force, 2002). Because there is no vessel traffic data for any prior or subsequent years, NorthernStar used the number of transits in 2002 as representative of the volume of traffic in this area. This resulted in a total of about 47,586 vessel trips in this region over the same time period that resulted in 11 recorded whale strikes. Based on the available information presented above, statistically, every 7,931 vessel trips would result in a reported fin whale strike and every 47,586 vessel trips would result in a reported blue, sei, humpback, sperm, and gray whale strike. However, as noted above, the number of ship trips per whale strike is likely lower than current information suggests.

The Bradwood Landing Project would result in about 125 LNG carriers calling on the LNG terminal per year, which would result in about 250 vessel trips (to and from the terminal) per year. Based on the number of vessel trips calling on the LNG terminal annually and an estimated operating life 40 years for the LNG terminal (see section 2.9), approximately 10,000 vessel trips would occur during operation of the Bradwood Landing Project. Therefore, our analysis indicates that statistically, LNG carriers associated with the Bradwood Landing Project would strike 1.25 fin whales. The likelihood of an LNG carrier striking a blue, sei, or humpback whale would be about 20 percent.

Based on comments made by the NMFS in its May 11, 2007 letter to the FERC, NorthernStar submitted an analysis of the potential for a vessel-whale strike to occur due to operation of the Bradwood Landing Project. The information provided by NorthernStar states that the statistical likelihood of a vessel-whale strike during operation of the project (40 years) would be less than one whale. However,

based on the assumptions used in NorthernStar's analysis and on feedback received from the NMFS, we feel that the FERC staff's analysis more accurately represents the likelihood of a vessel strike.

NorthernStar would minimize impacts on whales by contractually requiring that the LNG carriers travel in a defined area that would narrow to 10 nautical miles in width between 126 degrees (west of the toe of the continental slope) to the marshalling area off the mouth of the Columbia River (see figure 4.6.1-1). Traveling at an angle that is perpendicular to the continental slope and shelf would minimize the transit through areas where whales would be most likely to occur. This route would avoid known feeding concentration areas and National Marine Sanctuaries. However, because the project would be statistically likely to strike a fin whale, additional measures are necessary to minimize potential impacts on whales. Therefore, **we recommend that:**

- **NorthernStar should coordinate with the NMFS to determine appropriate LNG carrier speed and seasonal restrictions, or other restrictions to be implemented, to avoid or minimize impacts on whales. Results of the coordination, including a discussion of restrictions to be implemented, should be filed with the Secretary, prior to commencing operation of the LNG terminal.**

As noted previously, the FERC staff is currently revising its BA and EFH Assessment for the Bradwood Landing Project, which will be resubmitted to the NMFS with a request to initiate formal consultation in compliance with section 7 of the ESA. The FERC would not allow construction of the project to proceed until we have completed formal consultation.

Spills or Leaks of Hazardous Materials – Spills, leaks, or accidental releases of fuels, lubricants, or other hazardous substances could potentially occur during operation of the proposed project. A spill, leak, or accidental release of hazardous materials to offshore waters could impact whales directly or indirectly through changes in food sources or contamination of the water. However, as discussed above under sea turtles, each vessel would maintain a SOPEP.

The potential exists for an LNG spill and associated fire during transit of the LNG carriers to the LNG terminal that could affect whales present in the area at the time of the spill. As stated in section 4.11.5.3, the released LNG would vaporize rapidly upon contact with the air and water. Because LNG is not soluble in water and the LNG would completely vaporize shortly after being spilled, there would be no liquid left that could mix with and/or contaminate the water. The greatest threat to whales from an LNG spill would be thermal stress from coming into contact with the cryogenic liquid (before the LNG vaporizes) or the fire associated with the ignited vapors. Any whales that came into direct contact with the LNG or the fire would probably experience a sudden thermal shock that could be lethal. Whales in the general area of a spill would most likely detect the temperature change and avoid the area. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Steller Sea Lion

Occurrence along the Waterway

Two pinniped haulouts occur along the waterway for LNG marine traffic, the South Jetty and the docks at the Astoria East Mooring Basin. The South Jetty is located near the mouth of the Columbia River and is used by hundreds of Steller sea lions every year (LCFRB, 2004). Steller sea lions have also been documented hauling out at the Astoria East Mooring Basin (Brown, 2008). Use of the haulouts is lowest in the spring and summer (during the breeding season) and increases in fall and winter when animals move to haulouts and forage on salmonids and eulachon. Recent surveys by the WDFW

documented 1,500 Steller sea lions near the mouth of the Columbia River (WDFW, 2007; Jeffries, 2008). The nearest rookery is Three Arch Rocks, which is located about 60 miles south of the mouth of the Columbia River.

Critical Habitat

Designated critical habitat for the Steller sea lion does not occur within the Zones of Concern associated with LNG carrier transit. The nearest occurrence of designated critical habitat for the Steller sea lion is at Orford Reef near Port Orford, approximately 280 miles south of the Columbia River mouth (58 Federal Register 45269 – 45285).

Impacts and Mitigation

During operation of the Bradwood Landing Project, Steller sea lions could be impacted by increased LNG marine traffic and accidental spills or leaks of hazardous materials along the LNG carrier route. To date, the various impacts on Steller sea lions from human disturbance have not been studied. Close approach by humans and boats has been shown to cause sea lions at haulouts to go into the water (NMFS, 1992). Repeated disturbance by humans could result in abandonment of the South Jetty haulout site (Kenyon, 1962). However, due to the Steller sea lions' tolerance of current large vessel traffic along the Columbia River, it is expected that an increase of about 7 percent in large vessel traffic during operation of the proposed project would not significantly increase disturbance to Steller sea lions. Similarly, the wakes from LNG carriers moving to and from the proposed LNG import terminal would not significantly increase wave heights and the potential to disturb sea lions at the South Jetty haulout site. Collisions with Steller sea lions would not be expected from the LNG marine traffic because Steller sea lions are highly maneuverable and fast swimmers and they are accustomed to ship traffic in this area. There are no known reports of collisions between Steller sea lions and vessels.

Spills, leaks, or accidental releases of fuels, lubricants, or other hazardous substances could potentially occur during operation of the proposed project. A spill, leak, or accidental release of hazardous materials could result in mortality to the Steller sea lion. However, as indicated above under the discussion of sea turtles, each vessel would maintain a SOPEP.

The potential exists for an LNG spill and associated fire during transit of the LNG carriers to the LNG terminal that could affect Steller sea lions present in the area at the time of the spill. The greatest threat to Steller sea lions occurring adjacent to the shipping route from an LNG spill would be thermal stress from coming into contact with the cryogenic liquid (before the LNG vaporizes) or the fire associated with the ignited vapors. This could be particularly damaging if the LNG spill were near the South Jetty or the Large Navigation Buoy during the fall or winter months when use of these sites as haulouts by Steller sea lions is greatest. Any sea lions that came into direct contact with the LNG or the fire would probably experience a sudden thermal shock that could be lethal. Sea lions in the general area of a spill would most likely detect the temperature change and avoid the area. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Columbian White-tailed Deer

Occurrence along the Waterway

Columbian white-tailed deer typically inhabit forested areas located along waterways and generally select areas that offer both food and cover (Davison, 1979; Verts and Carraway, 1998). Based

on current distribution, Columbian white-tailed deer would only occur between CRM 33 and the LNG terminal.

Critical Habitat

Critical habitat has not been designated for the Columbian white-tailed deer.

Impacts and Mitigation

During operation of the proposed project, impacts on Columbian white-tailed deer from LNG marine traffic would be limited to an accidental or intentional breach of an LNG carrier. Potential impacts on Columbian white-tailed deer from a release of LNG and associated fire include habitat modification, injury, or mortality. In the event of a collision or allision of sufficient magnitude to rupture an LNG cargo tank, it is likely that sparks or flames would ignite the flammable vapors at the spill site. In the unlikely event that ignition did not occur, an LNG spill would rapidly vaporize on water and form a potentially flammable cloud. If the flammable vapor cloud encountered an ignition source, the cloud would burn back to the spill site, rather than outward towards shoreline habitats. In the unlikely event of an LNG spill on water, ignition of the LNG vapors could contribute to a forest fire in areas where the ship route is adjacent to forested habitat. The intensity and extent of a potential forest fire and the resulting damage to Columbian white-tailed deer and its habitat would be highly dependent on a number of variables including the extent of the LNG spill, available fuel (e.g., woody material), moisture and temperature, fuel composition, wind, and topography. Nearly 11,000 acres of essential habitat (both privately owned and part of the JBHNWR) are found within the Zones of Concern, a portion of which could be affected if an accidental or intentional breach of an LNG carrier were to occur during transit. Due to the deer's limited routes of egress from islands along the LNG transit route (e.g., Tenasillahe, Crims, and Wallace Islands), it is possible that a catastrophic event involving an LNG carrier could result in adverse impacts on a subpopulation of Columbian white-tailed deer. However, as discussed in section 4.11.5.3, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Brown Pelican

Occurrence along the Waterway

The brown pelican primarily occurs in coastal habitats; they are rarely seen inland or far out at sea (FWS, 2006g). Therefore, brown pelicans occurring along the waterway would be concentrated in the area near the mouth of the Columbia River during the late spring, summer, and early fall months (FWS, 2008).

Critical Habitat

Critical habitat has not been designated for the brown pelican.

Impacts and Mitigation

During operation of the proposed project, impacts on brown pelicans from LNG marine traffic would be limited to an accidental or intentional breach of an LNG carrier. If a brown pelican were to be in the vicinity of an LNG carrier in the event of an accidental or intentional breach, the pelican would likely be injured, killed, or displaced from the area. The potential exists for an LNG spill and associated fire during transit of the LNG carriers to the LNG terminal that could affect brown pelicans present in the area at the time of the spill. The greatest threat to brown pelicans occurring along the waterway from an

LNG spill would be thermal stress from coming into contact with the cryogenic liquid (before the LNG vaporizes) or the fire associated with the ignited vapors. This could be particularly damaging if the LNG spill were near East Sand Island between late spring and early fall when brown pelicans concentrations are highest. Any pelicans that came into direct contact with the LNG or the fire would probably experience a sudden thermal shock that could be lethal. Brown pelicans in the general area of a spill would most likely detect the temperature change and avoid the area. However, as discussed in section 4.11.5.3, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Marbled Murrelet

Occurrence along the Waterway

Marbled murrelets may occur in old-growth forest and nearshore habitats along the LNG carrier route throughout the year. In addition, about 176 acres of designated critical habitat for the marbled murrelet occur within the Zones of Concern.

Critical Habitat

Designated critical habitat for the marbled murrelet does not occur within the Zones of Concern associated with LNG carrier transit. The closest critical habitat unit to the LNG carrier route is OR-01-a, which is about 2.5 miles southeast of the LNG terminal site near Wauna, in Clatsop County, Oregon (61 Federal Register 26255 – 26320).

Impacts and Mitigation

During operation of the proposed project, impacts on marbled murrelets from LNG marine traffic would be limited to an accidental or intentional breach of an LNG carrier. Potential impacts on the marbled murrelet and its designated critical habitat from a release of LNG and associated fire include habitat modification, injury, or mortality. In the unlikely event of an LNG spill on water, ignition of the LNG vapors could contribute to a forest fire in areas where the ship route is adjacent to marbled murrelet habitat. This could be particularly damaging if a spill were to occur during the marbled murrelet nesting season. Given the relatively high precipitation in the region, large forest fires in the area are infrequent but they can be severe when they do occur. The intensity and extent of a potential forest fire and the resulting damage to marbled murrelet habitat would be highly dependent on a number of variables including the extent of the LNG spill, available fuel (e.g., woody material), moisture and temperature, fuel composition, wind, and topography. However, as discussed in section 4.11.5.3, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Northern Spotted Owl

Occurrence along the Waterway

Northern spotted owl may occur in old-growth coniferous and mixed conifer-hardwood forests along the LNG carrier route throughout the year.

Critical Habitat

Designated critical habitat for the northern spotted owl does not occur within the Zones of Concern associated with LNG carrier transit. The closest critical habitat unit to the LNG carrier route is

WA-39 (57 Federal Register 1796 – 1838), which is located about 24.4 miles east of the pipeline interconnect with the Williams Northwest pipeline system in eastern Cowlitz County (FWS, 1992b).

Impacts and Mitigation

During operation of the proposed project, impacts on northern spotted owls from LNG marine traffic would be limited to an accidental or intentional breach of an LNG carrier. If a northern spotted owl were to be in the vicinity of an LNG carrier in the event of an accidental or intentional breach, the risk and impacts would be similar to those described above for the marbled murrelet.

Short-tailed Albatross

Occurrence along the Waterway

Because the short-tailed albatross is a pelagic species, this species may occur in waters off the coasts of Oregon and Washington.

Critical Habitat

Critical habitat has not been designated for the short-tailed albatross.

Impacts and Mitigation

During operation of the proposed project, impacts on short-tailed albatross from LNG carrier traffic would be limited to an accidental or intentional breach of an LNG carrier. If a short-tailed albatross were to be in the vicinity of an LNG carrier in the event of an accidental or intentional breach, the albatross would likely be injured, killed, or displaced from the area. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Streaked Horned Lark

Occurrence along the Waterway

Streaked horned lark breeding and wintering areas occur along the waterway for LNG marine traffic on five dredge spoil islands along the lower Columbia River, including Rice Island, Miller Sands, Pillar Rock Island, West Wallace Island, and an unnamed island located just upstream of Tenasillahe Island (Pearson and Altman, 2005). Although some streaked horned larks are migratory, these sites may be occupied throughout the year.

Critical Habitat

Critical habitat has not been designated for the streaked horned lark.

Impacts and Mitigation

During operation of the proposed project, impacts on streaked horned larks from LNG carrier traffic would be limited to possible increased shoreline erosion and an accidental or intentional breach of an LNG carrier. If a streaked horned lark were to be in the vicinity of an LNG carrier in the event of an accidental or intentional breach, the lark would likely be injured, killed, or displaced from the area. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is

extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Western Snowy Plover

Occurrence along the Waterway

The western snowy plover historically occurred within the coastal areas of the lower Columbia River; however, plovers have not been documented along the lower Columbia River since 1985 (69 Federal Register 75617). In addition, there is no evidence that indicates the western snowy plover occurs or has occurred upstream of the mouth of the Columbia River (Pacific Coast Joint Venture, 1994).

Critical Habitat

Designated critical habitat for the western snowy plover does not occur within the Zones of Concern associated with LNG carrier transit. The nearest designated critical habitat unit to the waterway for LNG marine traffic is WA-4, which is located about 40 miles northwest of the LNG terminal in Pacific County, Washington (64 Federal Register 68507 – 68544).

Impacts and Mitigation

During operation of the proposed project, impacts on western snowy plovers from LNG carrier traffic would be limited to an accidental or intentional breach of an LNG carrier. If a western snowy plover were to be in the vicinity of an LNG carrier in the event of an accidental or intentional breach, the plover would likely be injured, killed, or displaced from the area. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Oregon Silverspot Butterfly

Occurrence along the Waterway

Within the counties located adjacent to the LNG carrier route, the Oregon silverspot butterfly is only known to occur within the coastal dune habitat in Clatsop County, Oregon. While potential habitat may be present, Oregon silverspot butterflies are not known to occur along the LNG carrier route.

Critical Habitat

Designated critical habitat for the Oregon silverspot butterfly does not occur within the Zones of Concern associated with LNG carrier transit. The nearest designated critical habitat unit to the waterway for LNG marine traffic is located about 175 miles south of the LNG terminal in Lane County, Oregon (45 Federal Register 44935 – 44939).

Impacts and Mitigation

During operation of the proposed project, impacts on Oregon silverspot butterflies from LNG carrier traffic would be limited to an accidental or intentional breach of an LNG carrier. If an Oregon silverspot butterfly were to be in the vicinity of an LNG carrier in the event of an accidental or intentional breach, the butterfly would likely be injured, killed, or displaced from the area. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Kincaid's Lupine

Occurrence along the Waterway

While potential habitat may be present, no Kincaid's lupine plants are known to occur within the Zones of Concern along the waterway for LNG marine transit.

Critical Habitat

Critical habitat has not been designated for Kincaid's lupine. However, critical habitat was proposed for this species in 2005 (70 Federal Register 66491 – 66599). The nearest proposed critical habitat unit for this species is located in Lewis County, Washington, which is approximately 30 miles northeast of the proposed LNG terminal site.

Impacts and Mitigation

During operation of the proposed project, impacts on Kincaid's lupine from LNG carrier traffic would be limited to an accidental or intentional breach of an LNG carrier. In the unlikely event that an accidental or intentional breach of an LNG carrier resulted in a forest fire, the resulting damage to Kincaid's lupine and its habitat would be highly dependent on a number of variables including the extent of the LNG spill, available fuel (e.g., woody material), moisture and temperature, fuel composition, wind, and topography. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Nelson's Checker-mallow

Occurrence along the Waterway

While potential habitat may be present, no Nelson's checker-mallow plants are known to occur within the Zones of Concern along the waterway for LNG marine transit.

Critical Habitat

Critical habitat has not been designated for Nelson's checker-mallow.

Impacts and Mitigation

During operation of the proposed project, impacts on Nelson's checker-mallow from LNG carrier traffic would be limited to an accidental or intentional breach of an LNG carrier. The risks and impacts associated with an accidental or intentional breach of an LNG carrier on Nelson's checker-mallow would be similar to those described for Kincaid's lupine.

State Listed Threatened and Endangered Species

NorthernStar consulted with the ODFW, ORNHIC, WDFW, and WNHP to identify state listed endangered and threatened species with the potential to occur within the proposed project area. Many state listed endangered or threatened species are also federally listed; these species were discussed above (see *Waterway for LNG Marine Traffic, Federally Listed Species*). The remaining state listed threatened or endangered species are discussed below.

Gray Whale

Gray whales occur off the coasts of Oregon and Washington during their northern migration between March and June and their southern migration, beginning in November and December. Potential impacts on gray whales as a result of LNG carrier traffic associated with the Bradwood Landing Project are discussed above (see *Whales*).

Bald Eagle

Bald eagle nesting, foraging, and wintering areas occur along the waterway for LNG marine traffic in the form of mature riparian forested and upland forested habitats. Bald eagles occur along the lower Columbia River throughout the year. During operation of the proposed project, impacts on bald eagles from LNG marine traffic would be limited to an accidental or intentional breach of an LNG carrier. Potential impacts on bald eagles from a release of LNG and associated fire include habitat modification, injury, or mortality. In the unlikely event of an LNG spill on water, ignition of the LNG vapors could contribute to a forest fire in areas where the ship route is adjacent to bald eagle habitat. This could be particularly damaging if a spill were to occur during the bald eagle nesting season. Given the relatively high precipitation in the region, large forest fires in the area are infrequent but they can be severe when they do occur. The intensity and extent of a potential forest fire and the resulting damage to bald eagle habitat would be highly dependent on a number of variables including the extent of the LNG spill, available fuel (e.g., woody material), moisture and temperature, fuel composition, wind, and topography. However, as discussed in section 4.11.5.3, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Other Special Status Species

Sensitive Species

In addition to the species listed under the ESA or by the States of Oregon and Washington, five species that are candidates for listing as endangered or threatened or species of special concern have been identified by state agencies as having the potential to occur in the vicinity of the proposed project. The ODFW also expressed concerns regarding several other sensitive species, including the coastal cutthroat trout, red-legged frog, tailed frog, western painted turtle, American peregrine falcon, and olive-sided flycatcher. These sensitive species are discussed below.

Coastal Cutthroat Trout

During operation of the Bradwood Landing Project, potential impacts on coastal cutthroat trout from LNG marine traffic would be similar to those associated with aquatic species (Section 4.5.1.1).

Eulachon

During operation of the Bradwood Landing Project, potential impacts on eulachon from LNG marine traffic would be similar to those associated with aquatic species (Section 4.5.1.1).

Lampreys

During operation of the Bradwood Landing Project, potential impacts on lampreys from LNG marine traffic would be similar to those associated with aquatic species (see section 4.5.1.1).

Red-legged Frog

If a red-legged frog were to be within the Zones of Concern in the event of an accidental or intentional breach, the frog would likely be injured, killed, or displaced from the area. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Tailed Frog

If a tailed frog were to be within the Zones of Concern in the event of an accidental or intentional breach, the frog would likely be injured, killed, or displaced from the area. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

Western Painted Turtle

If a western painted turtle were to be within the Zones of Concern in the event of an accidental or intentional breach, the turtle would likely be injured, killed, or displaced from the area. However, the risk of an accidental or intentional release of LNG during transit of the LNG carriers is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR (Appendix G).

American Peregrine Falcon

American peregrine falcons may occur in cliffs, riverbanks, and trees and on the ledges of vertical structures within the Zones of Concern throughout the year (FWS, 2006n). If an American peregrine falcon were in the vicinity of an LNG carrier in the event of an accidental or intentional breach, the risks and impacts would be similar to those described above for the bald eagle.

Northern Goshawk

If a northern goshawk were to be in the vicinity of an LNG carrier in the event of an accidental or intentional breach, the risks and impacts would be similar to those described above for the bald eagle.

Olive-sided Flycatcher

If an olive-sided flycatcher were to be in the vicinity of an LNG carrier in the event of an accidental or intentional breach, the risks and impacts would be similar to those described above for the bald eagle.

Purple Martin

If a purple martin were to be in the vicinity of an LNG carrier in the event of an accidental or intentional breach, the risks and impacts would be similar to those described above for the bald eagle.

Marine Mammals

As described in section 4.6.1.1, thirty-one species of marine mammals have been recorded off the coasts of Oregon and Washington, including 6 species of baleen whales; 19 species of toothed whales, beaked whales, dolphins, and porpoises; 5 species of pinnipeds (seals and sea lions); and the sea otter (Caretta et al., 2007; Angliss and Outlaw, 2008). Of these, five species of baleen whales, two species of

toothed whales, and one pinniped are either state- or federally listed and are discussed in sections 4.6.1.1 and 4.6.1.2.

The 22 remaining species include 11 whales, 4 dolphins, 4 pinnipeds, 2 porpoises, and the sea otter. As described in section 4.6.1.3, occurrence of whales, dolphins, and porpoises would be limited to marine portions of the waterway. Northern fur seals and Northern elephant seals are occasionally present along the waterway, but not in great numbers or for very long (NMFS, 2008b). In contrast, Pacific harbor seals and California sea lions frequent the lower Columbia River and adjacent nearshore marine areas along the LNG carrier route.

Potential impacts on marine mammals as a result of LNG marine traffic would be limited to spills or leaks of hazardous materials, disturbance due to increased noise and ship traffic levels, and vessel strikes. Impacts on other marine mammals due to spills or leaks of hazardous materials would be similar to those described for the Steller sea lion.

To date, the various impacts on Pacific harbor seals, California sea lions, northern fur seals, and elephant seals from human disturbance have not been studied extensively. Close approach by humans and boats has been shown to cause sea lions and Pacific harbor seals at haulouts to go into the water (NMFS, 1992; Matthews, 2000). Repeated disturbance by humans could result in abandonment of the South Jetty of the Columbia River haulout site (Kenyon, 1962). However, due to marine mammals tolerance of current large vessel traffic along the Columbia River, it is expected that an increase of about 7 percent in commercial vessel traffic during operation of the proposed project would not significantly increase disturbance to Steller sea lions. In recent years, there are no known reports of collisions between vessels and either Pacific harbor seals or northern fur seals; however, boat collisions have resulted in the deaths of three California sea lions and two elephant seals (Caretta et al., 2007).

Within the marine portion of the waterway, increased vessel traffic could increase the risk of minimal long-term intermittent impacts on dolphins, porpoises, and whales. Vessels could collide with marine mammals regardless of vessel size and type. However, the most vulnerable cetaceans include slow-moving species or species that spend extended periods of time at the surface. In contrast, dolphins often change their behavior in response to vessels, approaching vessels to ride the wake, extending interbreath intervals, decreasing inter-animal distance, changing headings, or increase swimming speed. Dolphins might be struck by vessels due to inattentiveness, age or health, or voluminous vessel traffic (MMS, 2002). NorthernStar has stated that it will apply for an Incidental Harassment Authorization pursuant to MMPA section 101(a)(5)(D); therefore, potential impacts would be addressed as part of NorthernStar's consultation with NMFS.

Migratory Bird Treaty Act

During operation of the proposed project, an accidental or intentional breach of an LNG carrier while in transit could affect migratory birds and their habitats. Because the Columbia River estuary is one of the most important sites on the Pacific Flyway for migratory birds, the risks and impacts on migratory birds as a result of an accidental or intentional breach of an LNG carrier would be similar to those described above for the brown pelican, which is concentrated within portions of the lower Columbia River during parts of the year.

4.6.2.2 LNG Terminal

Federally Listed Species

Fish

Lower Columbia River Chinook Salmon ESU

Occurrence at the LNG Terminal – The Lower Columbia River Chinook salmon ESU may occur in the following areas associated with the proposed LNG terminal: the Columbia River, Hunt Creek, and the log pond. The Columbia River at the proposed LNG terminal site provides habitat for migrating spring- and fall-run adults from March and June and August and October, respectively (NMFS, 2005c). Spring-run out-migrating smolts occur during their second spring/summer, and fall-run out-migrating smolts occur as sub-yearlings from April through June (NMFS, 2005c; ODFW, 2005; Wade, 2000, 2002). In addition, juvenile Chinook salmon rear throughout the year in nearshore habitat of the Columbia River mainstem.

Hunt Creek, which is adjacent to the LNG terminal site, is one of three streams of the lower Columbia-Clatskanie subbasin that have been designated as containing habitat for spawning of fall Chinook salmon (Kostow, 1995). In addition, juvenile Chinook salmon rear in Hunt Creek throughout the year. The log pond potentially provides at least seasonal refugia during high flow for juvenile Chinook salmon.

Juvenile salmon entering the Columbia River upstream of Bradwood Landing are subject to a flow split upstream of Puget Island between the Columbia River shipping channel (Oregon side of Puget Island) and Cathlamet Channel (Washington side of Puget Island). Juvenile fish migrating along the Oregon side of Puget Island would pass near the proposed LNG terminal at Bradwood Landing. While the out-migrating patterns of juvenile salmonids are relatively well understood, the distribution of out-migrants as they pass Puget Island, and therefore the proposed terminal location, are less so. The majority of flow through the area is associated with the navigation channel which is along the Oregon side of Puget Island. Therefore, at a minimum, the channel oriented species such as yearling Chinook, sockeye, steelhead and Coho would likely be exposed to potential impacts at the terminal. Schreck et al. (2005) determined that smolt-sized Chinook salmon predominately occur in the main shipping channel. Additionally, Carlson et al. (2001) observed a greater percentage of fish along the channel margin on the Oregon side of the channel than the Washington side, both above and below the flow split at Puget Island. Similarly, based on sampling efforts documented by Dawley et al. (1986), fewer sub-yearling Chinook salmon appear to migrate along the Washington shore of the Columbia River just upstream of Puget Island than along the Oregon shore.

The percentage of fish that would be exposed to impacts associated with construction and operation of the LNG terminal is not clear; however, it appears that a higher percentage of out-migrating juvenile salmonids would occur on the Oregon side of Puget Island and therefore be exposed to impacts associated with LNG terminal construction (e.g., dredging) and operation (e.g., ballast and ship engine cooling water intake) activities. As described in section 4.5.2.1, additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – The lower Columbia River is designated as critical habitat (rearing, migratory corridor, and spawning PCEs) for the Lower Columbia River Chinook salmon ESU. As described above, salmon migrate through the Columbia River estuary and past the LNG terminal site en route to their spawning grounds upstream. In addition, critical habitat for juvenile rearing has been designated within nearshore habitats of the Columbia River mainstem and Hunt Creek (70 Federal Register 52630 – 52858).

The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation. The proposed LNG terminal would affect 63 acres of designated critical habitat for the Lower Columbia River Chinook salmon ESU, including 58 acres within the Columbia River and 5 acres within the log pond.

Impacts and Mitigation – The Bradwood Landing LNG terminal would affect salmonids and/or their designated critical habitat through various activities including:

- in-water construction activities such as:
 - dredging;
 - development of the river shoreline;
 - pile driving; and
 - log pond filling;
- terrestrial/riparian habitat modification such as:
 - bridge construction and railroad realignment; and
 - power line construction;
- water appropriation activities such as:
 - ship ballast and engine cooling water;
 - hydrostatic testing; and
 - fire suppression system testing;
- LNG terminal lighting;
- accidental spills and leaks of hazardous materials; and
- LNG terminal operations activities such as:
 - maintenance dredging;
 - routine discharge of condensate water from the SCVs; and
 - operational acoustic effects.

Potential impacts and mitigation from each of these factors are summarized in table 4.6.2-1 and described in detail in section 4.5.2.1. NorthernStar's proposed mitigation measures are summarized below (see *Compensatory Mitigation*).

Construction of the proposed LNG terminal would affect 68.5 acres of designated critical habitat for the Lower Columbia River Chinook salmon ESU. Of these, 5.0 acres would be permanently impacted by filling the log pond at the LNG terminal site. The remaining 63.5 acres within the ship berth and maneuvering area would be permanently modified by the addition of piles and other over-water structures as well as dredging.

Upper Columbia River Spring-run Chinook Salmon ESU

Occurrence at the LNG Terminal – Occurrence of the Upper Columbia River Spring-run Chinook salmon ESU at the LNG terminal site would be limited to seasonal migrations within the lower Columbia River and occasional use of Hunt Creek during summer months by juveniles. The life stages present and seasonal occurrence of the Upper Columbia River Spring-run Chinook Salmon ESU along the lower Columbia River are described in section 4.6.2.1. As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – The Columbia River is designated as critical habitat (rearing and migratory corridor PCEs) for the Upper Columbia River Spring-run Chinook salmon ESU (70 Federal Register 52630 – 52858). The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation. The proposed LNG terminal

would affect 63 acres of designated critical habitat for the Upper Columbia River Chinook salmon ESU, including 58 acres within the Columbia River and 5 acres within the log pond.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Migration of Upper Columbia River Spring-run Chinook salmon past the project site and occasional use of Hunt Creek by juveniles would occur outside of the in-water work window, thus excluding them from being present during pile driving, dredging, or other in-water construction activities that may cause an avoidance reaction or result in adverse affects. Impacts on designated critical habitat for the Upper Columbia River Spring-run Chinook salmon ESU would be similar to those described above for the Lower Columbia River Chinook Salmon ESU.

Upper Willamette River Chinook Salmon ESU

Occurrence at the LNG Terminal – The Upper Willamette River Chinook salmon ESU may occur in the following areas associated with the proposed LNG terminal: the Columbia River, Hunt Creek, and the log pond. The Columbia River at the proposed LNG terminal site provides habitat for migrating adults primarily between April and May, with a peak in mid-May, and for juvenile rearing throughout the year (ODFW, 2005; Kostow, 1995; NMFS, 2005c). According to the NMFS (2005c), out-migration has been found to occur in recently emerged juveniles during the winter through early spring, in sub-yearlings during the fall through early winter, and as yearlings in the late winter through spring. Hunt Creek provides rearing habitat for juvenile Chinook salmon throughout the year. The log pond potentially provides at least seasonal refugia during high flow for juvenile Chinook salmon. As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – The Columbia River is designated as critical habitat (rearing and migratory corridor PCEs) for the Upper Willamette River Chinook salmon ESU. As described above, salmon migrate through the lower Columbia River and past the LNG terminal site en route to their spawning grounds upstream. In addition, critical habitat for juvenile rearing has been designated within nearshore habitats of the Columbia River mainstem and Hunt Creek (70 Federal Register 52630 – 52858). The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation. The proposed LNG terminal would affect 63 acres of designated critical habitat for the Upper Willamette River Chinook salmon ESU, including 58 acres within the Columbia River and 5 acres within the log pond.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Impacts on designated critical habitat for the Upper Willamette River Chinook salmon ESU would be similar to those described above for the Lower Columbia River Chinook Salmon ESU.

Snake River Spring/Summer-run Chinook Salmon ESU

Occurrence at the LNG Terminal – Occurrence of the Snake River Spring/Summer-run Chinook salmon ESU at the LNG terminal site would be limited to seasonal migrations within the lower Columbia River and occasional use of Hunt Creek during summer months by juveniles. The life stages present and seasonal occurrence of the Snake River Spring/Summer-run Chinook salmon ESU along the lower Columbia River are described in section 4.6.2.1. As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – The Columbia River is designated critical habitat (migratory corridor PCE) for the Snake River Spring/Summer-run Chinook salmon ESU (58 Federal Register 68543 – 68554). Adjacent riparian zones are included in the designation, defined as those areas within 300 feet of the normal line of high water of a stream channel. Based on this designation, the proposed LNG terminal would affect 79 acres of designated critical habitat for the Snake River Spring/Summer-run Chinook salmon ESU, including 58 acres within the Columbia River, 5 acres within the log pond, and 16 acres along the shoreline of the Columbia River.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Migration of Snake River Spring/Summer-run Chinook salmon past the project site and occasional use of Hunt Creek by juveniles would occur outside of the in-water work window, thus excluding them from being present during pile driving, dredging, or other in-water construction that may cause an avoidance reaction or result in adverse affects. This species does not rear in the nearshore areas and would not be affected by those activities.

As described above, the Columbia River and adjacent riparian zone, defined as those areas within 300 feet of the normal line of high water of a stream channel, are designated critical habitat. Based on this designation, construction of the proposed LNG terminal would affect 84.5 acres of designated critical habitat for the Snake River Spring/Summer-run Chinook salmon ESU. Of these, 5 acres would be permanently impacted by filling the log pond at the LNG terminal site, and 63.5 acres within the ship berth and maneuvering area would be permanently modified by the addition of piles and other over-water structures as well as dredging. The remaining 16 acres would occur along the shoreline of the Columbia River at the proposed LNG terminal site. Although NorthernStar has committed to restoration of a portion of this area (see section 4.4.2.2), permanent conversions of designated critical habitat along the shoreline of the Columbia River are anticipated. NorthernStar's proposed mitigation measures are summarized below (see *Compensatory Mitigation*).

Snake River Fall-run Chinook Salmon ESU

Occurrence at the LNG Terminal – The Snake River Fall-run Chinook salmon ESU may occur in the following areas associated with the proposed LNG terminal: the Columbia River, Hunt Creek, and the log pond. The Columbia River at the proposed LNG terminal site provides habitat for migrating adults between August and December, out-migrating smolts between April and June, and for juvenile rearing throughout the year (Myers et al., 1998; Good et al., 2005; Bell Fisheries Handbook, 1973). Hunt Creek provides rearing habitat for juvenile Chinook salmon throughout the year. The log pond potentially provides at least seasonal refugia during high flow for juvenile Chinook salmon. As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated as critical habitat (rearing and migratory corridor PCEs) for the Snake River Fall-run Chinook salmon ESU. In addition, critical habitat for juvenile rearing has been designated within nearshore habitats of the Columbia River mainstem and Hunt Creek (70 Federal Register 52630 – 52858). Adjacent riparian zones are included in the designation, defined as those areas within 300 feet of the normal line of high water of a stream channel. Based on this designation, the proposed LNG terminal would affect 79 acres of designated critical habitat for the Snake River Fall-run Chinook salmon ESU, including 58 acres within the Columbia River, 5 acres within the log pond, and 16 acres along the shoreline of the Columbia River.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon*

ESU). Impacts on designated critical habitat for the Snake River Fall-run Chinook salmon ESU would be similar to those described above for the Snake River Spring/Summer-run Chinook salmon ESU.

Columbia River Chum Salmon ESU

Occurrence at the LNG Terminal – The Columbia River chum salmon ESU has migration corridors and both spawning and rearing habitats within the Columbia River at the proposed LNG terminal site and occasional use of Hunt Creek during summer months by juveniles. The life stages present and seasonal occurrence of the Columbia River chum salmon ESU along the lower Columbia River are described in section 4.6.2.1. As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated as critical habitat (rearing, migratory corridor, and spawning PCEs) for the Columbia River chum salmon ESU (70 Federal Register 52630 – 52858). The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation. The proposed LNG terminal would affect 63 acres of designated critical habitat for the Columbia River chum salmon ESU, including 58 acres within the Columbia River and 5 acres within the log pond.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Impacts on designated critical habitat for the Columbia River chum salmon ESU would be similar to those described above for the Lower Columbia River Chinook Salmon ESU.

Lower Columbia River Coho Salmon ESU

Occurrence at the LNG Terminal – The Lower Columbia River coho salmon ESU may occur in the following areas associated with the proposed LNG terminal: the Columbia River, Hunt Creek, and the log pond. The Columbia River at the proposed LNG terminal site provides habitat for migrating adults between late August and February, peaking in October; out-migrating smolts between March and July; and for juvenile rearing throughout the year (ODFW, 2005; Good et al., 2005; Wade, 2000, 2002; Bell Fisheries Handbook, 1973). Hunt Creek provides rearing habitat for juvenile coho salmon throughout the year. The log pond potentially provides at least seasonal refugia during high flow for juvenile coho salmon. As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – Critical habitat has not been designated for the Lower Columbia River coho salmon ESU.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Although critical habitat has not been designated for the Lower Columbia River coho salmon ESU, impacts on the Lower Columbia River coho salmon ESU would be similar to those described above for the Lower Columbia River Chinook Salmon ESU.

S Snake River Sockeye Salmon ESU

Occurrence at the LNG Terminal – Occurrence of the Snake River sockeye salmon ESU at the LNG terminal site would be limited to seasonal migrations within the lower Columbia River (Gustafson et al., 1997; Good et al., 2005). The life stages present and seasonal occurrence of the Snake River

sockeye salmon ESU along the lower Columbia River are described in section 4.6.2.1. As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated critical habitat (migratory corridor PCE) for the Snake River sockeye salmon ESU (58 Federal Register 68543 – 68554). Critical habitat includes the adjacent riparian zone defined as those areas within 300 feet of the normal line of high water of a stream channel. The proposed LNG terminal would affect 79 acres of designated critical habitat for the Snake River sockeye salmon ESU, including 58 acres within the Columbia River, 5 acres within the log pond, and 16 acres along the shoreline of the Columbia River.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Migration of Snake River sockeye salmon and occasional use of Hunt Creek by juveniles would occur outside of the in-water work window, thus excluding them from being present during pile driving, dredging, or other in-water construction that may cause an avoidance reaction or result in adverse affects. This species does not rear in the nearshore areas of the lower Columbia River and would not be affected by those activities. Impacts on designated critical habitat for the Snake River sockeye salmon ESU would be similar to those described above for the Snake River Spring/Summer-run Chinook salmon ESU.

Lower Columbia River Steelhead DPS

Occurrence at the LNG Terminal – The Lower Columbia River steelhead DPS may occur in the following areas associated with the proposed LNG terminal: the Columbia River, Hunt Creek, and the log pond. As described in section 4.6.2.1, the Columbia River at the proposed LNG terminal site provides habitat for migrating adults throughout the year, with seasonal peaks in activity; out-migrating smolts occur from March to June with a peak in April or May; and rearing juveniles throughout the year (Good et al., 2005; NMFS, 2005c). Hunt Creek and the log pond potentially provide at least seasonal refugia for juvenile steelhead. As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated as critical habitat (rearing and migratory corridor PCEs) for the Lower Columbia River steelhead DPS (70 Federal Register 52630 – 52858). The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation. The proposed LNG terminal would affect 63 acres of designated critical habitat for the Lower Columbia River steelhead DPS, including 58 acres within the Columbia River and 5 acres within the log pond.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Impacts on designated critical habitat for the Lower Columbia River steelhead DPS would be similar to those described above for the Lower Columbia River Chinook Salmon ESU.

Middle Columbia River Steelhead DPS

Occurrence at the LNG Terminal – Occurrence of the Middle Columbia River steelhead DPS at the LNG terminal site would be limited to migration within the lower Columbia River and occasional use of Hunt Creek during summer months by juveniles. As described in section 4.6.2.1, the Columbia River at the proposed LNG terminal site provides habitat for migrating adults throughout the year, with seasonal peaks in activity, and out-migrating smolts occur during March to June (NMFS, 2005c). As described

above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Middle Columbia River steelhead DPS (70 Federal Register 52630 – 52858). However, this DPS is not known to rear within the Columbia River at the proposed LNG terminal site. The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation. The proposed LNG terminal would affect 63 acres of designated critical habitat for the Middle Columbia River steelhead DPS, including 58 acres within the Columbia River and 5 acres within the log pond.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Impacts on designated critical habitat for the Middle Columbia River steelhead DPS would be similar to those described above for the Lower Columbia River Chinook Salmon ESU.

Upper Columbia River Steelhead DPS

Occurrence at the LNG Terminal – Occurrence of the Upper Columbia River steelhead DPS at the LNG terminal site would be limited to migration within the lower Columbia River and occasional use of Hunt Creek during summer months by juveniles. As described in section 4.6.2.1, the Columbia River at the proposed LNG terminal site provides habitat for migrating adults throughout the year, with seasonal peaks in activity, and out-migrating smolts March and June (Bell Fisheries Handbook, 1973). As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Upper Columbia River steelhead DPS (70 Federal Register 52630 – 52858). However, this DPS is not known to rear within the Columbia River at the proposed LNG terminal site. The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation. The proposed LNG terminal would affect 63 acres of designated critical habitat for the Upper Columbia River steelhead DPS, including 58 acres within the Columbia River and 5 acres within the log pond.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Impacts on designated critical habitat for the Upper Columbia River steelhead DPS would be similar to those described above for the Lower Columbia River Chinook Salmon ESU.

Upper Willamette River Steelhead DPS

Occurrence at the LNG Terminal – Occurrence of the Upper Willamette River steelhead DPS at the LNG terminal site would be limited to migration within the lower Columbia River and occasional use of Hunt Creek during summer months by juveniles. As described in section 4.6.2.1, the Columbia River at the proposed LNG terminal site provides habitat for migrating adults throughout the year, with seasonal peaks in activity, and out-migrating smolts between March and July (Bell Fisheries Handbook, 1973). As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Upper Willamette River steelhead DPS (70 Federal Register 52630 – 52858).

However, this DPS is not known to rear within the Columbia River at the proposed LNG terminal site. The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation. The proposed LNG terminal would affect 63 acres of designated critical habitat for the Upper Willamette River steelhead DPS, including 58 acres within the Columbia River and 5 acres within the log pond.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Impacts on designated critical habitat for the Upper Willamette River steelhead DPS would be similar to those described above for the Lower Columbia River Chinook Salmon ESU.

Snake River Basin Steelhead DPS

Occurrence at the LNG Terminal – Occurrence of the Snake River Basin steelhead DPS at the LNG terminal site would be limited to migration within the lower Columbia River and occasional use of Hunt Creek during summer months by juveniles. As described in section 4.6.2.1, the Columbia River at the proposed LNG terminal site provides habitat for migrating adults throughout the year, with seasonal peaks in activity, and out-migrating smolts pass through the lower Columbia River between March and June (Bell Fisheries Handbook, 1973). As described above (see *Lower Columbia River Chinook Salmon ESU*), additional analysis of salmonid occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Snake River Basin steelhead DPS (70 Federal Register 52630 – 52858). However, this DPS is not known to rear within the Columbia River at the proposed LNG terminal site. The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation. The proposed LNG terminal would affect 63 acres of designated critical habitat for the Snake River Basin steelhead DPS, including 58 acres within the Columbia River and 5 acres within the log pond.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on salmonids are described above (see *Lower Columbia River Chinook Salmon ESU*). Impacts on designated critical habitat for the Snake River Basin steelhead DPS would be similar to those described above for the Lower Columbia River Chinook Salmon ESU.

North American Green Sturgeon

Occurrence at the LNG Terminal – As described in section 4.6.1.1, the North American green sturgeon is the most marine-oriented of sturgeons occurring in North America. They are known to concentrate in the Columbia River estuary during the late summer and fall months. As described in section 4.5.2.1, additional analysis of fish occurrence at the LNG terminal site will be included in the revised BA and EFH Assessment.

Critical Habitat – Critical habitat has not been designated for the North American green sturgeon.

Impacts and Mitigation – Potential impacts from construction and operation of the Bradwood Landing LNG terminal on the North American green sturgeon would be similar to those described above for Lower Columbia River Chinook Salmon ESU.

Compensatory Mitigation

As summarized in table 4.6.2-1, project design, construction, and operation plans have been modified to avoid or minimize impacts on salmonid ESU/DPSs and their designated critical habitat. These efforts would be ongoing during construction in order to capitalize on avoidance and minimization opportunities that cannot be predicted. However, both direct and indirect impacts on salmonids would result from construction and operation of the proposed project. NorthernStar has committed to provide an overall net benefit to the environment of the lower Columbia River ecosystem.

Following construction of the LNG terminal, habitat and ecosystem function would be restored in place. Permanent impacts on aquatic resources would be mitigated by restoring habitat with similar ecological function. The FERC received numerous comments stating that the mitigation proposed by NorthernStar does not adequately compensate for impacts on aquatic resources associated with the project. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. To ensure that the mitigation proposed for the Bradwood Landing Project adequately compensates for project-related impacts, we have recommended that NorthernStar continue to consult with the appropriate natural resource agencies to finalize its Compensatory Mitigation Plan. The final Compensatory Mitigation Plan will be filed along with agency comments and applicable approvals with the Secretary prior to construction of the project.

Salmon Enhancement Initiative

As part of the Bradwood Landing Project, NorthernStar proposes to implement an SEI to contribute to the recovery of salmon and the lower Columbia River ecosystem. NorthernStar proposed the SEI as a voluntary action that would be above and beyond the mitigation measures used to avoid, minimize, rectify, reduce, and/or compensate for environmental impacts that are required by the regulations. However, various permit requirements would ensure its implementation if the project is authorized. NorthernStar's SEI would potentially contribute significantly to the conservation and recovery of salmonids (and other species) protected under the ESA.

The SEI would entail providing funding for salmon preservation, enhancement, and restoration projects on the lower Columbia River that would likely total more than \$50 million over the life of the Bradwood Landing Project. Of these monies, \$7 million would be available for an Early Action Plan to be implemented during the period between the start of project construction and the start of project operation. The remainder of the monies would be available for long-term measures that would be funded through yearly installments of \$1.3 million beginning after the project becomes operational. The National Fish and Wildlife Foundation's (NFWF) Western Partnership Office in Portland, Oregon would serve as the fiscal agent for SEI funds.

NorthernStar would work with the LCFRB to develop the SEI. The SEI would include initial and ongoing outreach to, and consultation with, watershed and estuary restoration groups, tribes, agencies, and other entities involved in preservation, restoration, and other salmon and ecological enhancement efforts on the lower Columbia River. The LCFRB would lead and facilitate this outreach and consultation process to:

- design and develop SEI processes and procedures, including the criteria for project selection, processes for allocating funds, and means of evaluating performance;
- establish a Steering Committee to help develop the Early Action Plan;

- authorize the allocation of SEI funding upon approval of funding allocation plans by the Steering Committee; and
- evaluate the ecological and salmon benefits of SEI proposals and actions with the goal of measuring progress and adaptively improving performance of the SEI to ensure the highest value and resource benefit for SEI investments.

The LCFRB would convene, administer, and chair the Steering Committee. Those invited to participate on the Steering Committee would include, but not be limited to, representatives of the LCFRB, other regional watershed and estuary restoration groups, NMFS, FWS, ODFW, WDFW, and tribes.

Allocation of SEI funds would be guided by project selection criteria, the application of best available science and plans, and a collaborative process facilitated by the LCFRB. This process is designed to serve the SEI, but it could also demonstrate the concept of using best available science and plans, and a collaborative process, to optimize the investment of other funds (e.g., mitigation and environmental fines, judgments, and settlements) for better efficiency and ecological effectiveness.

The LCFRB and the Steering Committee would prepare and submit to NorthernStar and the NFWF an annual implementation plan and budget that identifies recommended actions and projected funding allocations for the upcoming year. Funds would be released after the Steering Committee's plan and budget have been approved by the NFWF. The LCFRB and the Steering Committee would prepare and make available to the public an annual progress report that describes the activities of the SEI, including funding allocations and project summaries that describe the status and ecological outcomes of individual projects.

Project Selection Criteria. The following selection criteria regarding geographic scope, focal species, biological criteria, and other considerations would guide selection of specific SEI salmon and ecosystem preservation, restoration, and enhancement projects for both the Early Action Plan and long-term funding program.

SEI projects would be located within the lower Columbia River watershed, which includes the Columbia River estuary, mainstem area, and associated Oregon and Washington tributaries. Although the Steering Committee would have final authority to determine the geographical extent of the scope of the SEI, the lower Columbia River has been defined as that portion of the river below Bonneville Dam to the mouth.

The primary purpose of SEI projects would be the recovery of ESA-listed salmon and steelhead stocks as well as the general ecological enhancement of the lower Columbia River ecosystem. However, SEI projects would also benefit other aquatic and terrestrial listed and non-listed species such as the Pacific and river lampreys, bull trout, smelt, bald eagle, and Columbian white-tailed deer.

Projects would be designed to accomplish one or more of the following functions:

- protect existing functional habitats and the processes that sustain them;
- strive for no further degradation of habitat or supporting processes;
- re-connect isolated habitat;
- restore watershed and estuarine processes (ecosystem function);
- restore habitat structure, including developing LWD banks for restoration materials;
- create new habitat where previous habitat is not recoverable; and/or
- reduce mortality of ESA-listed fish species and improve abundance.

Other considerations in project design would include:

- leverage, and be combined with, other monies to maximize benefits;
- seize time-limited opportunities;
- support research that addresses critical uncertainties and informs restoration decision-making, as well as programs that improve the ability to monitor, evaluate, and enhance the performance of restoration efforts;
- support efforts to use watershed and salmon recovery science and plans to inform and improve regulatory processes and decision-making (e.g., mitigation) for net resource benefit; and
- address specific recovery needs identified for lower Columbia salmonids in the following plans:
 - the (Washington) *Lower Columbia River Salmon Recovery and Fish & Wildlife Plan* (LCFRB, 2004), adopted by the NMFS as the *Interim Regional Recovery Plan of the Washington Management Unit for the Lower Columbia River* on February 3, 2006;
 - future revisions, enhancements, and additions to the above plans and supporting documents, including the final *Lower Columbia River Salmon Recovery and Fish & Wildlife Plan* (Oregon and Washington) when completed and adopted by the NMFS;
 - the *Northwest Power and Conservation Council Fish and Wildlife Program Subbasin Plan for the Lower Columbia Mainstem and Estuary* (Northwest Power and Conservation Council, 2004); and
 - the *Lower Columbia River Estuary Program Comprehensive Conservation and Management Plan* (Lower Columbia River Estuary Partnership, 1999).

Early Action Plan. The SEI would include an Early Action Plan to be implemented between the period after the start of construction and prior to operation of the LNG terminal. NorthernStar's initial \$7 million commitment would be payable, through the NFWF, for projects, programs, and administrative expenses contained in the Early Action Plan upon its approval by the Steering Committee. The Early Action Plan would be designed to:

- employ the project selection criteria, emphasizing use of best available science and plans to develop a prioritized list of high-value, short-term measures (projects, programs, and other efforts) to support recovery of salmon and the lower Columbia River ecosystem;
- outline a 3-year implementation work plan to fully utilize the SEI's initial funding with a schedule for short-term measures and administrative costs on a year-by-year basis;
- execute the Early Action Plan year by year, evaluating performance, new information and opportunities, and the need to adaptively revise the plan with the benefit of this evaluation;
- allocate the funds for projects in both Oregon and Washington; and

- address a potentially wide range of projects and initiatives that may include focused research that informs restoration and recovery decision-making (such as fish mortality issues and strategies), an LWD bank, and control of invasive species, as well as habitat preservation and restoration.

Although the Steering Committee would need to evaluate individual project proposals under the Early Action Plan, the following examples are the kinds of projects and programs that could be funded through the SEI:

- establishment of an LWD bank program to support habitat restoration projects on the lower Columbia River. This would include development of the program plan and procedures and establishment of the infrastructure necessary for implementation;
- implementation of high priority estuarine restoration and enhancement projects identified in the *Columbia River Estuary Recovery Plan Module* (NMFS, 2006d). Project priorities would focus on the following: restoration of riparian habitat, modification of in-water structures to improve estuarine processes and reduce predation effects, and breaching or lowering of dikes/levees to restore access to off-channel habitats;
- implementation of key restoration and enhancement projects on the lower 12 miles of the Grays River, based upon high priority needs and locations identified in the *Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan*. Projects would complement ongoing restoration efforts and would focus on key habitat parameters for chum, Chinook, winter steelhead, and coho;
- acquisition of and restoration of portions of Svensen Island not dedicated to compensatory mitigation (upper Svensen Island);
- implementation projects identified by Oregon Watershed Councils that address restoration needs identified by initial limiting factors analysis performed by the ODFW as part of its Recovery Plan process;
- implementation of one or more comprehensive restoration projects on Mill, Abernathy, and Germany Creeks, focusing on in-stream habitat complexity and diversity. The project(s) would implement a primary restoration component of the Intensively Monitored Watershed program and would be designed to test the effectiveness and biological response of habitat restoration actions; and
- support development and implementation of innovative mitigation strategies and programs, including mitigation banks, that further the purpose and intent of the SEI and maximize net resource benefits and integrate processes associated with mitigation actions.

Long-Term Annual Funding. After the LNG terminal begins operation, NorthernStar would fund its SEI through an annual contribution of \$1.3 million for as long as the LNG terminal operates, approximately 30 to 40 years (see section 2.9). Long-term funding for the SEI would be paid to the NFWF or its successor in a lump sum of \$1.3 million annually upon approval by the Steering Committee of an annual funding allocation package. The long-term funding would also be used to develop and implement annual funding allocation packages employing the criteria described above (which emphasize use of best available science and plans) to develop a prioritized list of high-value projects, programs, and other efforts to support recovery of salmon and the lower Columbia River ecosystem. If, in the judgment

of the chair/convenor of the Steering Committee, broad agreement on a funding allocation package may not be achieved, funding decisions may be deferred to the next cycle.

Projects covered under the long-term funding program would be similar in nature to projects covered under the Early Action Plan, but may, at the discretion of the Steering Committee, put relatively greater emphasis on adaptive management and restoration project maintenance, support for monitoring, and mortality reduction measures. In fact, it is likely that the list of example projects listed under the Early Action Plan is longer than initial funding could support. Therefore, projects on that list not funded under the Early Action Plan would be immediate candidates for funding under the long-term funding program.

Another category of beneficial actions likely to attract funding from the long-term funding component of the SEI is the ongoing maintenance and further incremental adaptive management of projects either funded by the Early Action Plan or by others. In many cases, some low level of ongoing funding may be critical to achieving original goals for the project or for attaining newly recognized opportunities. These funds are often difficult to get through other funding mechanisms because they must compete for funding with projects that appear to have higher increments of value. The lack of funding or the timing of funding opportunities may allow problems to persist and benefits to languish or disappear. The Steering Committee could be given the flexibility to allocate meaningful funding to ongoing needs so that a reasonable level of funding is available, as needed, to meet these priorities.

Evaluation of Enhancement Efforts. The LCFRB and Steering Committee would evaluate and, where feasible, quantify both proposed SEI actions for their potential benefit to focal species and the lower Columbia River ecosystem as well as the performance of SEI actions after they have been implemented. The monitoring, modeling, research, analysis, and adaptive management associated with evaluation should be considered priority measures by the Steering Committee and could be included in funding allocation packages.

Steller Sea Lion

Occurrence at the LNG Terminal

As described in section 4.6.1.1, although Steller sea lions generally occur downstream of Tongue Point (CRM 19), recent tagging efforts have shown that Steller sea lions move between the mouth of the Columbia River and the Bonneville Dam, foraging for food from mid-December through February, and as late as May (Stansell et al., 2007). In 2002, no Steller sea lions were observed at the Bonneville Dam; however, since that time, documented occurrences of Steller sea lions have increased. As described in table 4.6.2-2, during the 2007 hazing observation period (January 1 through May), nine individual Steller sea lions were documented. As of March 16, observers have documented 42 individual Steller sea lions hauled out at Phoca Rock (10 miles downstream of Bonneville Dam) in 2008, thus representing just over a four-fold increase from the number of individuals counted in 2007 (Stansell, 2008). Steller sea lions present at the Bonneville Dam and Phoca Rock would transit past the LNG terminal at least twice (once on the way up to the dam, and once to return to the ocean). Biologists visiting the proposed LNG terminal site on March 13, 2006 observed a single sea lion foraging in the Columbia River, but it is not known if this individual was a Steller sea lion or the more common California sea lion. The sea lion was eating and “playing” with a large silver fish in the area between the proposed LNG terminal and the upstream end of Tenasillahe Island.

TABLE 4.6.2-2							
Numbers of Pinnipeds Observed at Bonneville Dam by Year							
	2002	2003	2004	2005	2006	2007	2008
Maximum number of pinnipeds	31	111	105	85	85	80	Not yet complete
Maximum number of California sea lions	30	106	101	80	72	69	Not yet complete
Maximum number of Steller sea lions	0	3	2	4	10	9	42 ^b
Maximum number of Pacific harbor seals	1	2	2	1	3	2	Not yet complete
Date of first California sea lion observation ^a	March 20	March 14	February 22	February 20	February 9	January 8 November 8	November 8
Date of last California sea lion observation ^a	May 17	May 27	May 26	June 10	June 5	May 26	Still observing
Date of first Steller sea lion observation ^a	--	March 23	April 17	December 6	December 10	November 6	November 6
Date of first Pacific harbor seal observation ^a	unknown	unknown	unknown	December 12	December 12	January 18 August 28	August 28
^a The dedicated study period occurs between January and May, and possibly into June. All sightings outside this time frame are incidental observations by dam personnel.							
^b Sightings in 2008 accurate through March 16, 2008.							
Source Stansell, 2008							

It is unknown if individual Steller sea lions stay at the dam from November through mid-May, or if they transit back to the ocean during these months, as they are neither branded nor satellite-tagged (Jeffries, 2008). It is speculated that Steller sea lions are not moving up and down the river like the satellite tagged California sea lions, because they return to the dam the day following hazing activities; however, it is difficult to be certain which animals are present (Jeffries, 2008; Stansell, 2008; Brown, 2008). In addition, the general patterns are neither consistent nor constant, and there is variability with each individual animal (Brown, 2008).

If individuals do transit back and forth between the ocean and the dam, they would pass by the LNG terminal location during the in-water construction period when pile driving and dredging activities would occur. Potential disturbance from noise impacts would not be expected to be significant because the Steller sea lions are hazed along with the California sea lions in the ongoing effort to protect threatened and endangered salmon as they arrive at and pass the dam (Jeffries, 2008). Hazing, which involves both underwater and air noise deterrents, begins at different times, depending on several factors (Jeffries, 2008). In 2007, hazing began in late February and ended in late May (Stansell et al., 2007). Some animals start to leave the dam area when they hear the sound of the vessel engines (Jeffries, 2008).

It is important to note that Steller sea lions that move upriver as far as Bonneville Dam endure daily (or multiple days per week) hazing events that change their behavior and yet they continue to return to the area to feed. There are no known sturgeon concentration areas in the Columbia River near the terminal that would provide the same feeding opportunity as the situation at the dam. Therefore, it is likely that pinnipeds, and specifically California sea lions and Steller sea lions, occurring in the vicinity of the LNG terminal site would be in transit to the dam or back down to the ocean and would not be expected to linger near the LNG terminal.

Critical Habitat

As described in section 4.6.2.1, the nearest occurrence of designated critical habitat for the Steller sea lion is at Orford Reef, approximately 280 miles south of the Columbia River mouth (58 Federal Register 45269 – 45285).

Impacts and Mitigation

Since Steller sea lions are expected to move through the area near the LNG terminal site, it is possible that underwater sound pressure levels during construction activities at the LNG terminal could adversely impact any sea lions occurring in the area. In addition, construction and operation of the LNG terminal could result in accidental spills or leaks of hazardous materials or result in use of the LNG terminal site as a haulout by Steller sea lions.

Noise – Noise from dredging, general construction, and pile driving activities would be generated at the proposed LNG terminal site. Although dredges are major sources of underwater noise in the Columbia River, Steller sea lions show a high degree of site fidelity to the haulout located at the South Jetty of the Columbia River despite the COE conducting regular maintenance dredging of the navigation channel. Therefore, dredging activities would not be expected to affect the Steller sea lion.

The portion of the river near Bradwood is subject to frequent vessel traffic from tugs, barges, and large container ships headed upstream to other ports of call (e.g., Longview, Kalama, Portland). In an opportunistic recording of a tug pushing a barge in the Snohomish River, Washington, the broadband level reached a maximum value of 146 dB in a 1-second period and a sustained average of 137 dB over a period of 50 seconds at 40 meters (131 feet) (Burgess et al., 2005). Furthermore, Steller sea lions transiting past the LNG terminal site are often enroute to the Bonneville Dam to feed, where background levels may be much higher there as a result of the dam operations. Once pinnipeds (including Steller sea lions) arrive at the dam in winter through May, hazing operations take place almost daily; that level of underwater and air noise harassment does not discourage these animals from returning to the site the same day or the next day (Stansell, 2008; Gearin, 2008; Jeffries, 2008).

As described in section 4.5.2.1, pile driving activities would occur between the hours of 7:00 AM and 10:00 PM for about 60 days spread over the NMFS-recommended in-water work window (between November 1 and February 28). Using an impact hammer to drive 96-inch-diameter steel piles may generate underwater sound pressure levels up to 227 dB (re: 1 μ Pa) at 16 feet. Close to piles, the RMS is typically about 10 to 15 dB lower than the peak. However, this level is dependent not only on the pile and hammer characteristics, but also on the geometry and boundaries of the surrounding underwater environment (Hastings and Popper, 2005). This is above the threshold for injury to Steller sea lions (190 dB_{rms}) and the threshold for disturbance (160 dB_{rms}). To minimize potential impacts on Steller sea lions due to increased noise during construction and pile driving activities, NorthernStar would establish a construction safety zone, buffer zone, and a noise impact zone around pile driving and construction activities at the LNG terminal site.

Based on a 4.5 dB practical spreading loss, the distance to the 160 dB_{rms} re: 1 μ Pa isopleth would be 3,281 feet. The use of bubble curtains, dewatered cofferdams, and special noise-reducing pile caps would assist with minimizing the distance to the 160 dB_{rms} (re: 1 μ Pa) isopleth. As discussed in section 4.5.2.1, in-water monitoring would be completed to document the effectiveness of the pile driving noise mitigation and to determine if additional noise mitigation measures are needed to reduce the distance to the 160 dB_{rms} (re: 1 μ Pa) isopleth.

Safety Zone – A Safety Zone would initially be established within a 500-foot radius around pile driving activities. Once pile driving begins, a qualified underwater acoustic monitor would record sound pressure levels to determine the 190 dB_{rms} isopleth (a continuous line on a map connecting equal points). That would become the new Safety Zone boundary. No pile driving would be initiated until a qualified marine mammal monitor surveys the Safety Zone. If the monitor sights a Steller sea lion in the Safety Zone, pile driving start-up would be delayed until the monitor determines, through sighting or by waiting approximately 15 minutes, that the animal or animals have likely moved beyond the Safety Zone. Once pile driving begins on an individual pile, however, that segment would be completed without cessation notwithstanding any pinniped presence in the Safety Zone, since continuous sound is considered more protective than stopping and starting, which might allow pinnipeds to return to the area where they would be subject to additional start-up sounds.

Because of the potential that pile driving may be carried out if pinnipeds are present in the Safety Zone (i.e., the animals may be exposed to sound pressures in excess of 160 dB), NorthernStar has stated that it will apply for an Incidental Harassment Authorization pursuant to MMPA section 101(a)(5)(D). The NMFS and NorthernStar suggested that the level of detail required for the issuance of an Incidental Harassment Authorization be included in this final EIS. NorthernStar submitted additional information to the FERC relating to potential impacts on marine mammals on April 17, 2007. However, this information was not submitted at a date that allowed sufficient time for independent verification by the FERC staff prior to inclusion in this document.

The NMFS may elect to use relevant portions of the final EIS in order to facilitate the application and permitting process. In some instances, the NMFS may require additional mitigation and monitoring measures to ensure that the taking would result in the least practicable adverse impact on affected marine mammal species or stocks. These could include measures considered but eliminated in this final EIS or as yet undeveloped measures. The public will have an opportunity to provide information to the NMFS through the MMPA process during the comment period following the NMFS's Notice of Receipt of the application for an Incidental Harassment Authorization or request for the implementation of regulations governing incidental taking (i.e., Letter of Authorization). In addition, the public will also have an opportunity to provide information following publication of the proposed rule. Any mitigation measures not considered in the final EIS but required through the MMPA process may require evaluation by NMFS in accordance with the NEPA.

The exact sequence of pile driving cannot be known until a contractor is hired and develops a construction sequence. The sound monitoring to establish the 190 dB_{rms} isopleth or 200 dB instantaneous peak sound pressure level would either be done with the largest pilings at the beginning, and the protective zones established at that point and used for all the pilings (most protective approach), or if the pilings have to be driven from the shore out, progressing from smaller to larger and shallower to deeper water, then monitoring and establishment of the protective zones would be done for each size of piling.

Buffer Zone – In addition to the Safety Zone described above, NorthernStar proposes to establish a Buffer Zone for Steller sea lions. The Buffer Zone would be established by monitoring once pile driving begins. It would be established at the 160 dB_{rms} isopleth. No pile driving would be initiated until a qualified marine mammal monitor surveys the Buffer Area. If the qualified marine mammal monitor observes a Steller sea lion in the Buffer Area on a line of movement toward the Safety Zone, pile driving would be delayed until the monitor determines, through sighting or by waiting approximately 15 minutes, that the Steller sea lion is on a line of movement that will take it away from the Safety Zone. Once pile driving begins on an individual pile, however, that segment would be completed without cessation notwithstanding any Steller sea lion presence in the Buffer Zone, since continuous sound is considered more protective than stopping and starting, which might allow Steller sea lions to return to the area where they would be subject to additional start-up sounds.

Other In-water and On-shore Equipment Noise Impact Zone – Construction activities not related to pile driving would also be expected to generate noise that could disturb pinnipeds in the unlikely event they are in the vicinity of LNG terminal construction activities. Therefore, NorthernStar proposes to establish a 50-foot radius Impact Zone around ongoing construction activities (the Impact Zone would include any areas of the Columbia River within a 50-foot radius of construction). Each day before non-pile driving construction begins, a qualified marine mammal monitor would search the Impact Zone for Steller sea lions. If a Steller sea lion is sighted within the Impact Zone, construction within the Impact Zone would be delayed until the monitor determines that no Steller sea lion is present within the Impact Zone.

Accidental Spill or Leaks of Hazardous Materials – Spills, leaks, or accidental releases of fuels, lubricants, or other hazardous substances could potentially occur during construction or operation of the proposed LNG terminal. A spill, leak, or accidental release of hazardous materials could result in mortality to the Steller sea lion. NorthernStar would minimize potential impacts associated with spills or leaks of hazardous materials during construction by implementing the spill prevention and response procedures in its terminal ESC Plan (see section 4.3.2.3). As discussed in section 4.3.2.3, a 5-foot-high perimeter berm would surround the portion of the LNG terminal containing the LNG storage tanks and vaporization units. The berm would provide containment in the unlikely event of a tank rupture; thus minimizing impacts on Steller sea lions.

Use of the LNG Terminal Site as a Haulout – Steller sea lions have been documented using various manmade objects as haulouts (e.g., navigation buoys, jetties, and docks). However, Steller sea lion haulout sites do not occur along the Columbia River upriver from the South Jetty. Following construction, the proposed LNG terminal site would be well above the water surface, leaving only vertical pilings in the water. The primary shoreline modification would be the construction of the perimeter berm above the high water mark, which would have a steeper slope than the existing shoreline. Therefore, Steller sea lions would not be expected to use the LNG terminal as a haulout site during operation of the proposed project.

Columbian White-tailed Deer

Occurrence at the LNG Terminal

The ORNHIC provided two database records of the Columbian white-tailed deer in the vicinity of the proposed LNG terminal site, about 0.5 mile southeast along the Bradwood cliffs and about 0.8 mile northwest on Tenasillahe Island. Columbian white-tailed deer are also known to occur on Puget Island, which is across the Columbia River (about 0.4 to 0.5 mile to the east) from the proposed LNG terminal.

Critical Habitat

Critical habitat has not been designated for the Columbian white-tailed deer.

Impacts and Mitigation

Potential impacts on Columbian white-tailed deer from construction and operation of the proposed LNG terminal include habitat modification; increased noise and disturbances; and collisions with vehicle or railway traffic. These impacts are discussed below.

Habitat Modification – About 59 acres of potentially suitable habitat for the Columbian white-tailed deer would be temporarily or permanently impacted by the LNG terminal facilities. The LNG terminal facility would be surrounded by an 8-foot-high fence, and thus would permanently exclude

Columbian white-tailed deer. Potentially suitable habitat for Columbian white-tailed deer at the LNG terminal site and its associated facilities includes forest (coniferous, deciduous, riparian, and early seral forests as well as forested wetlands), scrub shrub (upland scrub-shrub and palustrine scrub-shrub wetland), and palustrine emergent wetlands. These habitats are discussed below.

Construction and operation of the LNG terminal facilities would temporarily or permanently impact about 33.5 acres of forested habitats (22.9 acres temporary removal and 10.6 acres permanent removal). About 8.6 acres of this impact would be on commercially managed coniferous forest that could be harvested within 5-15 years and 5.6 acres are seral coniferous forests that are likely to be harvested in 20-40 years. Due to the location of these habitats in the hills above the LNG terminal site where the power line would be located, these habitats provide only marginally suitable habitat for Columbian white-tailed deer. The remaining 19.3 acres (12.7 acres temporary removal and 6.6 acres permanent removal) impacted by construction and operation provides potentially suitable foraging, resting, and fawning habitat for Columbian white-tailed deer. Following construction, the 22.9 acres of temporarily impacted forest habitats would be replanted in-kind with native trees as described in NorthernStar's terminal ESC Plan. However, as described in section 4.4.2.2, impacts on forested communities would be considered long-term because of the time required to restore the woody vegetation to its preconstruction condition. NorthernStar has developed a monitoring plan and performance standards to measure successful revegetation of the site. If necessary, NorthernStar would take steps to control and remove noxious and invasive species.

In addition, construction and operation of the LNG terminal facilities would impact about 19.0 acres of scrub-shrub habitats (12.3 acres temporary removal and 6.7 acres permanent removal). Of these, 10.7 acres of temporarily affected habitats are upland communities dominated by non-native Scotch broom. The remaining 8.3 acres provide potentially suitable foraging, fawning, and resting habitat for Columbian white-tailed deer. Similar to forested areas, restoration would follow the terminal ESC Plan. Due to the time required to restore the woody vegetation to its preconstruction condition, restoration is expected to be complete within 3 to 5 years.

About 11.3 acres of palustrine emergent wetland habitat (1.1 acres temporary removal and 10.2 acres permanent removal) would be impacted by construction and operation of the LNG terminal facilities. Loss of these wetland habitats could displace deer that forage and seek cover in these areas. However, it is unknown if this species uses these habitats at the proposed LNG terminal site and additional potentially suitable habitat occurs about 1,500 feet downstream of the proposed LNG terminal site. As discussed in section 4.4.1.2, restoration of wetland areas would be in accordance with NorthernStar's terminal ESC Plan. These areas would be expected to recover fully within 1 to 3 years.

The LNG terminal site would occupy a narrow strip of bottomland habitat that separates the Columbia River from forested hills that may provide a migratory corridor for Columbian white-tailed deer moving between the Wauna-Westport area, Tenasillahe Island, and/or Brownsmead. In addition, Columbian white-tailed deer moving between Tenasillahe and Puget Islands may use this corridor. Although movements between subpopulations may be infrequent, they are important for maintaining gene flow between the subpopulations. Because each subpopulation of Columbian white-tailed deer is small (less than 200 individuals), the risk of inbreeding depression within any subpopulation occurs unless there is occasional genetic exchange between members of other subpopulations. Both construction and operation of the LNG terminal could block or interfere with movement of Columbian white-tailed deer between these subpopulations.

Increased Noise and Disturbances – Increased noise and physical disturbances associated with construction and operation of the proposed LNG terminal could adversely affect Columbian white-tailed deer by disruption of foraging and resting behaviors and temporary displacement in response to

construction disturbance if this species is present during construction. As described in section 4.10.2.2, NorthernStar conducted noise attenuation modeling to predict noise levels that would be generated by construction and operation of the LNG terminal. Results of this modeling found that the average increase in ambient noise during construction would range from 5 to 24 dBA (depending on the use of selective noise mitigation measures). During operation, noise levels are estimated to increase by 5 dBA over ambient conditions. This impact would be long-term in duration, but with time, any Columbian white-tailed deer using the area would likely become habituated to the changed environment.

Collisions with Vehicle or Railway Traffic – As discussed in section 4.8.2.7, construction workers traveling to and from the proposed LNG terminal could generate up to 1,500 vehicle trips per day. During operation, the LNG terminal would generate an average of 125 daily trips, or 75 daily trips over baseline conditions. Although Columbian white-tailed deer have not been confirmed to use either Clifton or Bradwood Roads, some level of use is assumed in the lowlands that surround the LNG terminal. Elevated traffic levels would increase the likelihood of collisions between Columbian white-tailed deer and vehicles transiting to or from the LNG terminal. This impact would be greatly reduced by posting speed limit and deer warning signs on all roads. To further reduce potential impacts on deer, NorthernStar would implement a training and awareness program for all personnel constructing or accessing the LNG terminal. This program would teach personnel about the natural history and endangerment factors for the Columbian white-tailed deer, the reasons for protecting this species, and the responsibilities of personnel in preventing impacts on this species. In addition, construction workers would be bussed from a temporary parking lot located southeast of the Taylorville interchange at Highway 30, thereby reducing traffic along Clifton and Bradwood Roads.

The existing railway, which is currently in service but not in use, may be used to transport construction materials to the LNG terminal site. Rail service would likely be infrequent and the risk of collision would be low due to the expectedly low frequency of traffic on the railway and the short-term use of the line (during construction). Once construction has been completed, exposure would be eliminated. Potential for collisions would be greatly reduced by requiring that train operators sound the horn on approach to alert Columbian white-tailed deer that may be present. In addition, NorthernStar would make information available to train operators about the risk of collision and the importance of protecting Columbian white-tailed deer.

Marbled Murrelet

Occurrence at the LNG Terminal

The Priority Habitats and Species (PHS) and ORNHIC have no records of the marbled murrelet within 2 miles of the proposed LNG terminal (ORNHIC, 2004 and 2006). Forests in the vicinity of the proposed LNG terminal are relatively young and generally lack characteristics that contribute to nesting, foraging, and roosting habitats for marbled murrelets. However, marginally suitable late-successional habitat for this species is located within a narrow fringe of mature conifers on the bluffs just upstream of the LNG terminal.

Critical Habitat

The closest critical habitat unit to the proposed LNG terminal is OR-01-a, which is about 2.5 miles southeast of the LNG terminal site near Wauna, in Clatsop County, Oregon (61 Federal Register 26255 – 26320).

Impacts and Mitigation

In its April 20, 2007 letter to the FERC, the FWS commented that suitable nesting habitat for the marbled murrelet may occur in several locations within the project area. Furthermore, the FWS recommended that, unless there are documented reasons to conclude that nesting is not occurring, NorthernStar should conduct surveys to determine the nesting status of marbled murrelets in the project area. In response to this letter, NorthernStar has stated that it will conduct field investigations to confirm that potentially suitable habitat occurs in the project area. If suitable habitat is identified, NorthernStar would either conduct surveys to determine presence of marbled murrelets or would simply assume presence of marbled murrelets in the project area.

If present, marbled murrelets could potentially be affected by construction and operation of the proposed LNG terminal if nest trees and surrounding habitat were to be removed, or if construction were to occur in the vicinity of an active nest. Indirect impacts could include short-term avoidance of foraging habitat and increased visual and auditory disturbance due to construction activities. In addition, increased noise and other physical disturbances associated with operation of the LNG terminal could temporarily cause marbled murrelets to avoid the area. As noted previously, the FERC staff is currently revising its BA and EFH Assessment for the Bradwood Landing Project, which will be resubmitted to the FWS with a request to initiate formal consultation in compliance with section 7 of the ESA. Additional analysis of the potential for occurrence of and potential impacts on marbled murrelets in the vicinity of the LNG terminal site will be included in the revised BA and EFH Assessment. The FERC would not allow construction of the project to proceed until after we have completed formal consultation.

Northern Spotted Owl

Occurrence at the LNG Terminal

A search of the ORNHIC and PHS databases found no northern spotted owl nest site records within a 2-mile search radius of the proposed LNG terminal. The nearest known active spotted owl nest is located between 3 and 4 miles south of the LNG terminal in the Clatsop State Forest (ORNHIC, 2006). Forests in the vicinity of the proposed LNG terminal site are relatively young and generally lack characteristics that contribute to nesting, foraging, and roosting habitats for spotted owls. Marginally suitable late-successional habitat for this species is limited to a narrow fringe of mature conifers that occurs on the bluffs just upstream of the LNG terminal.

Critical Habitat

The closest critical habitat unit to the proposed LNG terminal is WA-39 (57 Federal Register 1796 – 1838), which is located over 50 miles east of the LNG terminal in eastern Cowlitz County (FWS, 1992b).

Impacts and Mitigation

Because there are no known occurrences of northern spotted owls in the vicinity of the LNG terminal, only marginally suitable habitat occurs within the areas affected by the LNG terminal facilities, and the distance to the nearest critical habitat unit (50 miles east), it is unlikely that northern spotted owls would be affected by construction or operation of the LNG terminal.

Streaked Horned Lark

Occurrence at the LNG Terminal

As described in section 4.6.1.1, streaked horned larks are known to occupy breeding sites on five dredge spoil islands along the lower Columbia River. The nearest breeding site occurs on an unnamed island located just upstream of Tenasillahe Island about 1 mile north of the proposed LNG terminal site (Pearson and Altman, 2005). In addition, dredge spoil areas associated with the LNG terminal and the Wahkiakum County Sand Pit site on Puget Island provide potentially suitable nesting habitat for the streaked horned lark. Although some streaked horned larks are migratory, potential habitat may be occupied throughout the year.

Critical Habitat

Critical habitat has not been designated for the streaked horned lark.

Impacts and Mitigation

The greatest potential for activities associated with construction and operation of the LNG terminal to adversely impact this species would be during the nesting season. Project activities at the LNG terminal site would begin before the nesting season and would occur between November and February at the Wahkiakum County Sand Pit site. Because streaked horned larks would not be likely to initiate nesting within an active construction site, impacts on nesting activities would not be anticipated.

Western Snowy Plover

Occurrence at the LNG Terminal

A search of the ORNHIC and PHS databases found no western snowy plover nest site records within a 2-mile search radius of the proposed LNG terminal. Although potential nesting habitat for the western snowy plover exists on dredge spoil areas at the LNG terminal, the nearest known nesting location is over 150 miles south of the LNG terminal site.

Critical Habitat

The nearest critical habitat unit to the proposed LNG terminal is WA-4, which is located about 40 miles northwest in Pacific County, Washington (64 Federal Register 68507 – 68544).

Impacts and Mitigation

Given the lack of observations of this species in the vicinity, it is unlikely that the western snowy plover would be affected by construction or operation of the LNG terminal.

Kincaid's Lupine

Occurrence at the LNG Terminal

The ORNHIC has no record of Kincaid's lupine within a 2-mile radius of the proposed LNG terminal. Although potentially suitable habitat for Kincaid's lupine is present at the LNG terminal site within the grassy openings that are interspersed in upland scrub-shrub habitat, a botanical survey conducted by NorthernStar in June 2006 did not identify Kincaid's lupine in areas that would be disturbed by project activities. However, the FWS raised concerns regarding terrestrial habitat survey methods in

their April 20, 2007 letter to the FERC requesting additional information for the BA and EFH Assessment. To confirm that listed endangered or threatened plants do not occur in the project area and would not likely be adversely affected by project activities, **we recommend that:**

- **Prior to construction of the LNG terminal and pipeline facilities, NorthernStar should conduct additional botanical surveys, where necessary, for federally listed endangered and threatened plants in the appropriate habitats within the project area during the appropriate survey period. Before the initiation of surveys, NorthernStar should consult with the FWS for appropriate survey methods and periods for each species. If project facilities are not constructed within 1 year from the date of issuance of authorizations, NorthernStar should consult with the appropriate offices of the FWS to update the species list and to determine if additional surveys are required. The survey reports and any FWS comments on the survey and its conclusions should be filed with the Secretary. The survey reports should include the following information:**
 - a. **name(s) and qualifications of the person(s) conducting the survey;**
 - b. **method(s) used to conduct the survey;**
 - c. **date(s) of the survey;**
 - d. **area surveyed (include the mileposts surveyed); and**
 - e. **proposed mitigation measures that would substantially minimize or avoid potential impacts on listed endangered or threatened plants found in the project area.**

NorthernStar must receive written approval from the Director of OEP before implementing any mitigation measures.

Critical Habitat

Critical habitat has not been designated for Kincaid's lupine. However, critical habitat was proposed for this species in 2005 (70 Federal Register 66491 – 66599). The nearest proposed critical habitat unit for this species is located in Lewis County, Washington, which is approximately 30 miles northeast of the proposed LNG terminal site.

Impacts and Mitigation

Because there are no known occurrences of Kincaid's lupine in the vicinity of the LNG terminal and the nearest proposed critical habitat unit for Kincaid's lupine is located approximately 30 miles northeast of the LNG terminal, with the implementation of our recommendation to complete any necessary follow-up surveys, it is unlikely that Kincaid's lupine would be affected by construction or operation of the LNG terminal.

Water Howellia

Occurrence at the LNG Terminal

The ORNHIC has no record of water howellia within a 2-mile radius of the proposed LNG terminal. Although potentially suitable habitat for water howellia is present at the LNG terminal site, water howellia was not identified during a botanical survey conducted by NorthernStar in June 2006 in areas that would be disturbed by project activities. However, the FWS raised concerns regarding terrestrial habitat survey methods in their April 20, 2007 letter to the FERC requesting additional information for the BA and EFH Assessment. Therefore, we have recommended that NorthernStar conduct additional botanical surveys for federally listed endangered and threatened plants in the appropriate habitats within the project area during the appropriate survey period (see *Kincaid's lupine*).

Critical Habitat

Critical habitat has not been designated for water howellia.

Impacts and Mitigation

Because there are no known occurrences of water howellia in the vicinity of the LNG terminal, and with the implementation of our recommendation to complete any necessary follow-up surveys, it is unlikely that water howellia would be affected by construction or operation of the LNG terminal.

State Listed Threatened and Endangered Species

NorthernStar consulted with the ODFW, ORNHIC, WDFW, and WNHP to identify state listed endangered and threatened species with the potential to occur at the LNG terminal. Many state listed endangered or threatened species are also federally listed and were previously described. The remaining species (bald eagle) is discussed below.

Bald Eagle

During field visits to the proposed LNG terminal site, eagles were observed flying over the area near the proposed LNG terminal site; however no bald eagle nests occur within 0.5 mile of the proposed LNG terminal. The WDFW has also mapped bald eagle communal winter roost sites, which may be found along the Columbia River in the vicinity of the proposed LNG terminal and are most likely to be occupied from November through March.

Breeding bald eagles could potentially be affected by construction and operation of the proposed LNG terminal if nest trees and surrounding habitat are removed, or if construction were to occur in the vicinity of an active nest or communal roost. Indirect impacts on bald eagles could include short-term displacement of aquatic prey populations due to in-water activities, increased visual and auditory construction disturbance, and potentially increased suspended sediment and turbidity levels. Displacement of aquatic prey could indirectly affect bald eagles that may utilize these species as a portion of their diet. In addition, increased noise and other physical disturbances associated with operation of the LNG terminal could temporarily cause bald eagles to avoid the area.

To minimize impacts on bald eagles before and during construction and operation of the LNG terminal, NorthernStar has agreed to implement the following measures:

- Review the most recent Isaacs and Anthony annual bald eagle nesting survey database for current nest locations. This document is generally available each December; however, current nesting season activity can usually be obtained by contacting Frank Isaacs directly. Direct contact would be made to access data before each construction season to update new nest locations.
- Minimize construction, operation, and maintenance activities within 0.5 mile of any nest (or 0.25 mile if any nest is within line-of-sight of the project), or to non-breeding season (October 31 to December 31).
- Avoid removal of potentially suitable bald eagle nest or roost trees (e.g., mature deciduous or coniferous trees that offer an unobstructed view of the surrounding area).
- Restore large areas of estuarine habitat suitable for salmonid rearing, and other measures that would increase fish production and ecosystem health in the lower Columbia River area.

To minimize impacts on bald eagles before and during construction of the project, **we recommend that:**

- **NorthernStar should conduct a survey for bald eagles, where necessary, prior to construction of the LNG terminal and pipeline facilities. Before the initiation of surveys, NorthernStar should consult with the FWS, ODFW, and WDFW for appropriate survey methods and periods for the surveys. The survey reports and any agency comments on the survey and its conclusions should be filed with the Secretary. The survey reports should include the following information:**
 - a. **name(s) and qualifications of the person(s) conducting the survey;**
 - b. **method(s) used to conduct the survey;**
 - c. **date(s) of the survey;**
 - d. **area surveyed (include the mileposts surveyed); and**
 - e. **proposed mitigation measures that would substantially minimize or avoid potential impacts on bald eagles found in the project area.**

NorthernStar must receive written approval from the Director of OEP before implementing any mitigation measures.

Other Special Status Species

Sensitive Species

In addition to the species listed under the ESA or by the States of Oregon and Washington, five species that are candidates for listing as endangered or threatened or species of special concern have been identified by the agencies as having the potential to occur in the vicinity of the proposed LNG terminal. The ODFW also expressed concerns regarding several other sensitive species, including the coastal cutthroat trout, red-legged frog, American peregrine falcon, and olive-sided flycatcher. The NMFS requested analysis of the North American green sturgeon. These sensitive species are discussed below.

Coastal Cutthroat Trout

Potential spawning habitat for coastal cutthroat trout exists in the portion of Hunt Creek below the falls. In addition, the mouth of Hunt Creek and main channel of the Columbia River likely provide habitat for coastal cutthroat trout. Potential impacts resulting from construction and operation of the proposed LNG terminal on coastal cutthroat trout would be similar to those discussed previously concerning federally listed salmonids. As discussed in section 4.5.2.1, NorthernStar would implement various mitigation measures to avoid, minimize, rectify, reduce, and/or compensate for impacts on salmonids; these measures would also benefit coastal cutthroat trout.

Eulachon

The WDFW expressed concern about potential impacts on eulachon spawning in the mainstem Columbia River and out-migration of smelt larvae as a result of construction and operation of the proposed LNG terminal. Potential impacts on eulachon would be similar to those discussed previously concerning federally listed salmonids. Research by the WDFW and ODFW has lead to recommendations that dredging and disposal of dredged material be prohibited in the Columbia River between CRM 35 and CRM 75 from March through June, which is the key spawning and post spawning periods for eulachon. The established ODFW in-water work window for the Columbia River (November 1 through February 28) implements these recommendations. A discussion of additional measures to avoid, minimize, rectify, reduce, and/or compensate for impacts on aquatic resources is included in section 4.5.2.1.

Lampreys

Based on general requirements for spawning habitat, potential spawning habitat for the Pacific lamprey exists below the falls on Hunt Creek. In addition, estuarine and fluvial environments at the mouth of Hunt Creek and within the main channel of the Columbia River may provide bottom habitat for juvenile lampreys. The mainstem Columbia River also serves as a migratory route for adults moving to or returning from the sea. Potential impacts resulting from construction and operation of the proposed LNG terminal on lampreys would be similar to those discussed previously concerning federally listed salmonids. As discussed in section 4.5.2.1, NorthernStar would implement various mitigation measures to avoid, minimize, rectify, reduce, and/or compensate impacts on salmonids; these measures would also benefit river and Pacific lampreys.

North American Green Sturgeon

Potential impacts resulting from construction and operation of the proposed LNG terminal on North American green sturgeon would be similar to those discussed previously concerning federally listed salmonids. As discussed in section 4.5.2.1, NorthernStar would implement various mitigation measures to avoid, minimize, rectify, reduce, and/or compensate for impacts on salmonids; these measures would also benefit North American green sturgeon.

Red-legged Frog

There is potential for the red-legged frog to occur in wetlands and waterbodies in the vicinity of the proposed LNG terminal. Potential impacts on aquatic species as a result of construction and operation of the proposed LNG terminal are discussed in section 4.5.2.1. Due to the presence of hundreds of red-legged frogs on lower Svensen Island, preservation of existing habitat and restoration of additional habitat on lower and middle Svensen Island would mitigate for any impacts on potential red-legged frog habitat lost at the LNG terminal site.

American Peregrine Falcon

Suitable habitat for the American peregrine falcon is located immediately east of the LNG terminal on basalt cliffs that border the western bank of the Columbia River. American peregrine falcons have been observed during site visits flying over the bluffs located immediately south of the LNG terminal. The ORNHIC database has one record of an active nest from this area, which is about 0.8 mile east of the LNG terminal. Given the distance and the location of the potential nesting habitat, it is unlikely that the American peregrine falcon would be adversely impacted by construction or operation of the LNG terminal.

Northern Goshawk

Forests in the vicinity of the proposed LNG terminal site are relatively young and generally lack characteristics that contribute to nesting, foraging, and roosting habitats for northern goshawks. Marginally suitable late-successional habitat for this species is limited to a narrow fringe of mature conifers that occurs on the bluffs just upstream of the LNG terminal. The ORNHIC database does not have any records of this species occurring within 5 miles of the LNG terminal site. Significant impacts on northern goshawks from construction and operation of the proposed LNG terminal would not be anticipated.

Olive-sided Flycatcher

The olive-sided flycatcher has been recorded on both of the Breeding Bird Surveys conducted near the LNG terminal site (Sauer et al., 2005). Construction and operation of the LNG terminal could potentially affect the olive-sided flycatcher due to clearing of forested habitats. Potential impacts and proposed mitigation for clearing of forested habitat are discussed in section 4.4.2.2. Migratory birds are discussed below (see *Migratory Bird Treaty Act*).

Purple Martin

A study conducted in 1998 to determine distribution, abundance, and nest site characteristics of purple martins in Oregon found that martins were locally common along the Columbia River, in some coastal estuaries, and at the Fern Ridge Reservoir (Hovarth, 1999). Purple martins have been documented on nearby river islands, and they were observed flying over the proposed LNG terminal site during a site visit in early August 2005 (ORNHIC, 2006). Potentially suitable nesting habitat for this species is present within the project area in the form of abandoned pilings. However, construction activities at the LNG terminal site would begin during the recommended in-water window (November 1 – February 28), which concludes before purple martins return to the west coast from their wintering grounds in South America. Therefore, disturbance to purple martins nesting at the LNG terminal site would not occur. To mitigate for the permanent loss of potential nesting habitat, NorthernStar proposes to install purple martin gourds at the Peterson Point and Middle Svensen Island Mitigation Sites.

Marine Mammals

As described above, both California sea lions and Pacific harbor seals are expected to occur within the Columbia River near the LNG terminal site regularly. California sea lions occur in the lower Columbia River between September and mid-June, but do not have any haulout sites in the vicinity of the proposed LNG terminal. California sea lions would travel through the project area enroute to foraging areas at Bonneville Dam and Willamette Falls where salmon congregate at these restriction points. As part of dedicated hazing efforts to discourage pinnipeds from foraging on salmon at the dam, observers have documented between 30 California sea lions at the dam (in 2002) to as many as 106 individuals (in 2003).

In contrast, harbor seals have six haulouts within 10 miles of the proposed LNG terminal site and would be expected to occur near the LNG terminal on a more regular basis during the in-water work window. Harbor seals arrive at Bonneville Dam as early as August 28 (in 2007); therefore, occurrence within the Columbia River upstream of the South Jetty could occur as early as August. However, larger numbers of harbor seals would be expected during their seasonal movements into the Columbia River between January and April (Jeffries, 2008).

Jeffries et al. (2000) documented pinniped haulouts along the lower Columbia River, including six haulout sites within 10 river miles of the proposed terminal site. These sites are predominantly or solely used by Pacific harbor seals. At the time of the survey, approximately 1,800 harbor seals were counted at these six haulout sites. Because specific foraging areas for each of the haulouts within 10 miles of the terminal are not known to exist, it is expected that harbor seals using these haulouts would likely forage near the LNG terminal site.

As described above (see *Steller Sea Lion*), it is possible that pinnipeds could be adversely impacted by dredging and pile-driving activities at the LNG terminal. NorthernStar proposes to implement protective measures including the establishment of safety, buffer, and impact zones to protect the Steller sea lion during construction activities at the LNG terminal (see *Steller Sea Lion*). To provide similar protections to other pinnipeds potentially occurring in the vicinity of the LNG terminal, **we recommend that:**

- **NorthernStar should expand the protective measures that would be used to avoid or minimize impacts on Steller sea lions during construction of the LNG terminal (e.g., safety, buffer, and noise impact zones) to include all pinnipeds.**

In addition, because of the potential that pile driving may be carried out if pinnipeds are present in the Safety Zone (i.e., the animals may be exposed to sound pressures in excess of 160 dB), NorthernStar has stated that it intends to obtain an Incidental Harassment Authorization, in consultation with the NMFS before beginning pile driving activities

Migratory Bird Treaty Act

As described in section 4.5.2.3, habitat modification, increased noise levels, terminal lighting, and vegetative clearing associated with construction and operation of the proposed LNG terminal could adversely affect migratory birds occurring in the vicinity of the LNG terminal. Although the LNG terminal would be located within a portion of the Columbia River estuary that provides important stop-over habitat for migrating birds, it is anticipated that adequate habitat is located in the vicinity of the LNG terminal to accommodate birds displaced by habitat modification and increased noise levels. In addition, restoration and preservation at the proposed mitigation sites would also provide new or enhanced areas of bird habitat.

Potential impacts on wildlife (including migratory birds) due to terminal lighting are discussed in sections 4.5.2.1 and 4.5.2.3. Due to the presence of high-quality habitats that are frequently used by shorebirds, waterfowl, and other waterbirds migrating along the Pacific Flyway, additional measures are necessary to minimize impacts from terminal lighting on migratory birds in the vicinity of the proposed project. Therefore, we have recommended in section 4.5.2.1 that NorthernStar continue to consult with the NMFS, FWS, ODFW, and other applicable agencies to finalize its Lighting Plan.

To minimize impacts on migratory birds from vegetative clearing, NorthernStar has stated that it would avoid clearing during peak nesting season and would clear for vegetation maintenance only between mid-July and October. However, due to the importance of the area for migratory birds,

additional measures are necessary to minimize impacts on nesting birds due to construction of the LNG terminal. Therefore, **we recommend that:**

- **NorthernStar should consult with the FWS and other appropriate agencies to develop a Migratory Bird Nest Avoidance Plan to minimize impacts on migratory birds during the peak nesting season. NorthernStar should file its Migratory Bird Nest Avoidance Plan along with agency comments with the Secretary prior to the commencement of clearing activities at the LNG terminal and along the pipeline.**

4.6.2.3 Pipeline Facilities

Federally Listed Species

Salmonids

Lower Columbia River Chinook Salmon ESU

Occurrence along the Pipeline Route – Lower Columbia River Chinook salmon ESU occur in the following waterbodies crossed by the proposed pipeline route: Westport Slough, Clatskanie River, Columbia River, Cameron Creek, Abernathy Creek, Germany Creek, Cowlitz River, and Ostrander Creek (ODFW, 2005; Wade, 2000, 2002). These waterbodies provide habitat for migrating spring- and fall-run adults from March to June and August to October, respectively (NMFS, 2005c). Spring-run salmon out-migrate as yearlings during the spring and summer. In contrast, fall-run salmon out-migrate as sub-yearlings from April through June (NMFS, 2005c). Juvenile rearing for both spring- and fall-run populations occurs within these waterbodies throughout the year (ODFW, 2005; Wade, 2000, 2002).

Critical Habitat – Within the waterbodies crossed by the proposed pipeline route, the Lower Columbia River Chinook salmon ESU has designated critical habitat (migratory corridor PCE) within the lower Columbia River mainstem. As described in section 4.6.2.1, adult salmon from this ESU migrate through the lower Columbia River en route to their spawning grounds in upstream and smolts out-migrate through the lower Columbia River. In addition, critical habitat (spawning PCE) has been designated at the proposed crossings of the Columbia River, Abernathy Creek, Germany Creek, and Ostrander Creek. Finally, critical habitat (rearing PCE) has been designated within nearshore habitats of the Columbia River mainstem, Columbia River islands, and the accessible low gradient reaches of Columbia River floodplain sloughs, Hunt Creek, Westport Slough, Clatskanie River, Cameron Creek, Abernathy Creek, Germany Creek, Cowlitz River, and Ostrander Creek (70 Federal Register 52630 – 52858). The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation.

Upper Columbia River Spring-run Chinook Salmon ESU

Occurrence along the Pipeline Route – Occurrence of the Upper Columbia River Spring-run Chinook salmon ESU within waterbodies crossed by the proposed pipeline route would be limited to seasonal migrations within the lower Columbia River. The life stages present and seasonal occurrence of the Upper Columbia River Spring-run Chinook Salmon ESU along the lower Columbia River are described in section 4.6.2.1.

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated as critical habitat (rearing and migratory corridor PCEs) for the Upper Columbia River Spring-run Chinook salmon ESU (70 Federal Register 52630 – 52858). The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation.

Upper Willamette River Chinook Salmon ESU

Occurrence along the Pipeline Route – Upper Willamette River Chinook salmon occur in the following waterbodies crossed by the proposed pipeline route: Westport Slough; Columbia River; and the tidal reaches of the Clatskanie River, Abernathy Creek, Germany Creek, and Cowlitz River (ODFW, 2005; Kostow, 1995). The Columbia River provides habitat for migrating adults between April and May, with a peak in mid-May, (NMFS, 2005c). According to the Biological Review Team (2005), out-migration has been found to occur in recently emerged juveniles during the winter through early spring, in sub-yearlings during the fall through early winter, and as yearlings in the late winter through spring (NMFS, 2005c). In addition, juvenile sub-yearling Chinook salmon from the Upper Willamette River Chinook salmon ESU rear over-winter in nearshore habitats, of the Columbia River mainstem, Westport Slough, and the tidal reaches of the Clatskanie River, Abernathy Creek, Germany Creek, and the Cowlitz River, after juveniles emerge between February and June (NMFS, 2005c).

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated as critical habitat (rearing and migratory corridor PCEs) for the Upper Willamette River Chinook salmon ESU (70 Federal Register 52630 – 52858). The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation.

Snake River Spring/Summer-run Chinook Salmon ESU

Occurrence along the Pipeline Route – Occurrence of the Snake River Spring/Summer-run Chinook salmon ESU within waterbodies crossed by the proposed pipeline route would be limited to seasonal migrations within the lower Columbia River. The life stages present and seasonal occurrence of the Snake River Spring/Summer-run Chinook salmon ESU along the lower Columbia River are described in section 4.6.2.1.

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated critical habitat (migratory corridor PCE) for the Snake River Spring/Summer-run Chinook salmon ESU (58 Federal Register 68543 – 68554). Adjacent riparian zones are included in the designation, defined as those areas within 300 feet of the normal line of high water of a stream channel.

Snake River Fall-run Chinook Salmon ESU

Occurrence along the Pipeline Route – Snake River Fall-run Chinook salmon occur in the following waterbodies crossed by the proposed pipeline route: Westport Slough; Columbia River; and the tidal reaches of the Clatskanie River, Abernathy Creek, Germany Creek, and Cowlitz River (ODFW, 2005; Kostow, 1995). As described in section 4.6.2.1, the Columbia River provides habitat for migrating adults between August and December and for out-migrating smolts between April and June (Bell Fisheries Handbook, 1973). In addition, juvenile sub-yearling Chinook salmon from the Snake River Fall-run Chinook salmon ESU rear in nearshore habitats of the Columbia River mainstem, Westport Slough, and the tidal reaches of the Clatskanie River, Abernathy Creek, Germany Creek, and the Cowlitz River for up to 1 year before out-migrating (Bell Fisheries Handbook, 1973).

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated as critical habitat (rearing and migratory corridor PCEs) for the Snake River Fall-run Chinook salmon ESU. Adjacent riparian zones are included in the designation, defined as those areas within 300 feet of the normal line of high water of a stream channel.

Columbia River Chum Salmon ESU

Occurrence along the Pipeline Route – Columbia River chum salmon occur in the following waterbodies crossed by the proposed pipeline route: Westport Slough; Columbia River; and the tidal reaches of the Clatskanie River, Abernathy Creek, Germany Creek, and the Cowlitz River (Ehlke and Keller, 2002). Chum salmon populations in tributaries crossed by the proposed pipeline route in Oregon are extirpated and the few fish observed in these tributaries are strays from runs returning to Washington tributaries of the lower Columbia River (ODFW, 2005). The Columbia River, Abernathy Creek, Germany Creek, and the Cowlitz River provide habitat for migrating and spawning adults between mid-October and December and for out-migrating smolts between March and May, with a peak from mid-April through early May (NMFS, 2005c). In addition, out-migrating smolts from Washington tributaries of the lower Columbia River and spawning areas in the Columbia River upstream of the project area rear in nearshore habitat of the Columbia River mainstem and the tidal reaches of the Clatskanie River, Abernathy Creek, Germany Creek, and the Cowlitz River between December and May (Bell Fisheries Handbook, 1973).

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated as critical habitat (rearing, migratory corridor, and spawning PCEs) for the Columbia River chum salmon ESU (70 Federal Register 52630 – 52858). In addition, critical habitat (rearing and migratory corridor PCEs) has been designated at the proposed crossings of Abernathy Creek, Germany Creek, and the Cowlitz River (70 Federal Register 52630 – 52858). The designation defines the lateral extent of critical habitat for each designated stream reach as the width of the stream channel as defined by its bankfull elevation.

Lower Columbia River Coho Salmon ESU

Occurrence along the Pipeline Route – The Columbia River coho salmon ESU may occur in the following waterbodies crossed by the proposed pipeline route: Westport Slough, Clatskanie River, Columbia River, Cameron Creek, Abernathy Creek, Germany Creek, Tributary 5 to Coal Creek, Coal Creek, Cowlitz River, Ostrander Creek, and Ostrander Creek Tributary 1 (ODFW, 2005; Good et al., 2005; Wade, 2000, 2002). Within the waterbodies listed above, adult migration occurs between June and February, smolt out-migration occurs between April and August, and juvenile rearing occurs throughout the year (ODFW, 2005; Good et al., 2005; Wade, 2000, 2002).

Critical Habitat – Critical habitat has not been designated for the Lower Columbia River coho salmon ESU.

Snake River Sockeye Salmon ESU

Occurrence along the Pipeline Route – Occurrence of the Snake River sockeye salmon ESU within waterbodies crossed by the proposed pipeline route would be limited to seasonal migrations within the lower Columbia River. The life stages present and seasonal occurrence of the Snake River sockeye salmon ESU along the lower Columbia River are described in section 4.6.2.1.

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated critical habitat (migratory corridor PCE) for the Snake River sockeye salmon ESU (58 Federal Register 68543 – 68554). Critical habitat includes the adjacent riparian zone defined as those areas within 300 feet of the normal line of high water of a stream channel; therefore, the log pond at the LNG terminal is included in the critical habitat designation.

Lower Columbia River Steelhead DPS

Occurrence along the Pipeline Route – The Lower Columbia River steelhead DPS may occur in the following waterbodies crossed by the proposed pipeline route: the Columbia River, the Cowlitz River, Ostrander Creek, and Tributary 1 to Ostrander Creek (Wade, 2000, 2002). Due to the variability in the lifecycle of steelhead, adult migration within the waterbodies listed above occurs throughout the year, with seasonal peaks in activity; smolts out-migrate between March and June, with a peak in April or May; and juvenile rearing occurs throughout the year (Wade, 2000, 2002; NMFS, 2005c).

Critical Habitat – Within the waterbodies crossed by the proposed pipeline route, critical habitat (rearing and migratory corridor PCEs) has been designated for the Lower Columbia River steelhead DPS in the Columbia River, the Cowlitz River, and Ostrander Creek (70 Federal Register 52630 – 52858). The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation.

Middle Columbia River Steelhead DPS

Occurrence along the Pipeline Route – Occurrence of the Middle Columbia River steelhead DPS within waterbodies crossed by the proposed pipeline would be limited to migration within the lower Columbia River. As described in section 4.6.2.1, the lower Columbia River provides habitat for migrating adults throughout the year, with seasonal peaks in activity, and out-migrating smolts between March and June (NMFS, 2005c).

Critical Habitat – As described in section 4.6.2.1, the Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Middle Columbia River steelhead DPS (70 Federal Register 52630 – 52858). The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation.

Upper Columbia River Steelhead DPS

Occurrence along the Pipeline Route – Occurrence of the Upper Columbia River steelhead DPS within waterbodies crossed by the proposed pipeline route would be limited to migration within the lower Columbia River. As described in section 4.6.2.1, the lower Columbia River provides habitat for migrating adults throughout the year, with seasonal peaks in activity, and out-migrating smolts between March and June (Bell Fisheries Handbook, 1973).

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Upper Columbia River steelhead DPS (70 Federal Register 52630 – 52858). The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation.

Upper Willamette River Steelhead DPS

Occurrence along the Pipeline Route – Occurrence of the Upper Willamette River steelhead DPS within waterbodies crossed by the proposed pipeline route would be limited to migration within the lower Columbia River. As described in section 4.6.2.1, the lower Columbia River provides habitat for migrating adults throughout the year, with seasonal peaks in activity, and out-migrating smolts between March and July (Bell Fisheries Handbook, 1973).

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Upper Willamette River steelhead DPS (70 Federal Register 52630 – 52858). The

lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation.

Snake River Basin Steelhead DPS

Occurrence along the Pipeline Route – Occurrence of the Snake River Basin steelhead DPS within the waterbodies crossed by the proposed pipeline route would be limited to migration within the lower Columbia River. As described in section 4.6.2.1, the lower Columbia River provides habitat for migrating adults throughout the year, with seasonal peaks in activity, and out-migrating smolts between March and June (Bell Fisheries Handbook, 1973).

Critical Habitat – The Columbia River is designated critical habitat (rearing and migratory corridor PCEs) for the Snake River Basin steelhead DPS (70 Federal Register 52630 – 52858). The lateral extent of critical habitat for each designated stream reach is the width of the stream channel as defined by its bankfull elevation.

Impacts and Mitigation

The pipeline facilities associated with the Bradwood Landing Project would affect federally listed salmonids and sturgeon and/or their designated critical habitat through various activities including:

- in-water pipeline construction;
- terrestrial/riparian habitat modification associated with construction;
- accidental spills and leaks of hazardous materials; and
- maintenance vegetation clearing.

Potential impacts and mitigation from each of these factors are summarized in table 4.6.2-1 and discussed in detail in section 4.5.3.1. The FERC received numerous comments stating that the mitigation proposed by NorthernStar does not adequately compensate for impacts on aquatic resources associated with the project. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. To ensure that the mitigation proposed for the Bradwood Landing Project adequately compensates for project-related impacts, we have recommended that NorthernStar continue to consult with the appropriate natural resource agencies to finalize its Compensatory Mitigation Plan. The final Compensatory Mitigation Plan would be filed along with agency comments and applicable approvals with the Secretary prior to construction of the project.

Columbian White-tailed Deer

Occurrence along the Pipeline Route

During the investigation for this project, biologists observed Columbian white-tailed deer from the Oregon lowlands subpopulation along the proposed pipeline route at commercial poplar plantations between Westport Slough and the Clatskanie River. Within the known range of the Oregon lowlands subpopulation, the proposed pipeline would cross lands designated by the FWS as Essential Habitat for the Columbian white-tailed deer between MPs 5.3 and 7.1. Essential Habitat is also located within 0.5 mile of the pipeline between MP 10.5 and MP 13.7 (FWS and the Columbian White-tailed Deer Recovery Team, 1983).

Critical Habitat

Critical habitat has not been designated for the Columbian white-tailed deer.

Impacts and Mitigation

Potential impacts on Columbian white-tailed deer from construction and operation of the proposed pipeline include habitat modification and increased noise and disturbances. These impacts are discussed below.

Habitat Modification – About 178.5 acres of potentially suitable habitat for the Columbian white-tailed deer would be temporarily impacted by construction of the pipeline facilities within areas known to support Columbian white-tailed deer. In general, impacts on Columbian white-tailed deer habitat would occur between MPs 4 and 19 of the proposed route. Potentially suitable habitats for Columbian white-tailed deer along the proposed pipeline route are categorized as forest (coniferous, deciduous, mixed, riparian, and early seral forests as well as forested wetlands), scrub shrub (upland scrub-shrub and palustrine scrub-shrub wetland), and herbaceous (pastures, open fields, commercial poplar plantations and palustrine emergent wetlands). These habitats are discussed below.

Within areas known to support Columbian white-tailed deer, construction and operation of the proposed pipeline would impact about 31.6 acres of forested habitats (24.0 acres temporary removal and 7.6 acres permanent removal). Of this, 21.3 acres (14.9 acres temporary removal and 6.4 acres permanent removal) consist of commercially managed coniferous forest, which would likely be harvested within 5 to 15 years. Due to the location of these habitats in the hills above the LNG terminal site, these habitats provide only marginally suitable habitat for Columbian white-tailed deer, which prefer lowland habitats.

In addition, about 32.0 acres (22.4 acres temporary removal and 9.6 acres permanent removal) of designated essential habitat would be affected due to removal of forested vegetation within construction right-of-way and extra work areas. Most of the essential habitat within the proposed pipeline route consists of young hybrid poplar plantations (classified as palustrine emergent wetlands), with lesser amounts of pastures/open fields, riparian forest, and emergent wetlands. Columbian white-tailed deer have been observed using commercial poplar plantations where it occurs along the proposed pipeline route between the communities of Westport and Port Westward.

Removal of forested habitats could temporarily reduce cover and forage opportunities for Columbian white-tailed deer or lead to displacement into adjacent habitats. As described in section 4.4.2.3, upland forested habitats would be replanted in-kind with trees, with the exception of the portion of the right-of-way within 15 feet of the pipeline (30 feet total), and forested wetlands would be replanted in-kind with trees, with the exception of the portion of the right-of-way within 5 feet of the pipeline (10 feet total), thereby minimizing the extent of disturbance. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Plan and Procedures. The corridor centered on the pipeline would be planted with a native grass seed mix and maintained in an herbaceous state to facilitate maintenance and inspection. Nearly complete canopy coverage over the pipeline would be expected to develop in most areas within approximately 20 years. The resulting corridor of herbaceous corridor could provide potential foraging or movement habitat for Columbian white-tailed deer.

About 9.6 acres of scrub-shrub habitats (all temporary) within areas known to support Columbian white-tailed deer would be impacted by construction and operation of the proposed pipeline. These habitats may provide suitable fawning, resting, and foraging habitat. As described above, the recovery time for impacts on scrub-shrub habitats would be significantly less than that required in forested habitats. With the exception of the herbaceous corridor centered on the pipeline, scrub-shrub habitats would be expected to recover to preconstruction conditions within 3 to 5 years.

In addition, 137.4 acres of herbaceous habitats (99.6 acres temporary removal and 37.8 acres permanent removal) would be affected by construction of the proposed pipeline within areas known to

support Columbian white-tailed deer. Due to the early successional stage of these habitats, they would be expected to recover very quickly from construction-related disturbance. Fields cleared early in the growing season may recover by the end of the growing season; whereas, fields cleared later in the growing season would be expected to recover the following spring.

During construction of the pipeline, Columbian white-tailed deer may avoid or abandon areas within about 1,000 feet of active work sites (U.S. Department of the Interior, 2007). During the first 2 to 4 weeks of life, fawns rely entirely on remaining motionless to avoid predators. Therefore, if construction activities were to occur during this period, fawns would be vulnerable to being crushed by construction vehicles. Furthermore, fawns need to nurse between five and six times per day. Because Columbian white-tailed deer would be expected to avoid or abandon areas within 1,000 feet of construction activities, fawns hidden near construction areas would not likely be nursed for the entire length of time each day that activities occurred, which could negatively impact their survival. To minimize disturbances to Columbian white-tailed deer, NorthernStar has stated that ground disturbing activities in suitable Columbian white-tailed deer habitat would be scheduled outside of the fawning season where possible. However, because fawns are highly vulnerable during the fawning season, the U.S. Department of the Interior recommended that no construction activities of any kind occur between MPs 4 and 19 during the fawning season. In order to provide the protection requested by the U.S. Department of the Interior, **we recommend that:**

- **Pipeline construction activities should not occur within potential habitat for Columbian white-tailed deer (MPs 4 to 19) between June 1 and July 15.**

Maintenance vegetation clearing along the pipeline route would be conducted between August 1 and April 15, thus avoiding the fawning season.

NorthernStar would compensate for habitat impacts through enhancing and protecting suitable habitats at the Peterson Point Mitigation Site, an area used extensively by the Oregon lowlands subpopulation of Columbian white-tailed deer. The FERC received numerous comments stating that the mitigation proposed by NorthernStar does not adequately compensate for impacts associated with the project. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. To ensure that the mitigation proposed for the Bradwood Landing Project adequately compensates for project-related impacts, we have recommended that NorthernStar continue to consult with the appropriate natural resource agencies to finalize its Compensatory Mitigation Plan. The final Compensatory Mitigation Plan would be filed along with agency comments and applicable approvals with the Secretary prior to construction of the project.

Increased Noise and Disturbances – Increased noise and physical disturbances associated with construction and operation of the proposed pipeline and associated facilities could adversely affect Columbian white-tailed deer by disruption of foraging and resting behaviors, and temporary displacement in response to construction disturbance if this species is present during construction. Pipeline maintenance would result in periodic increases in noise and other physical disturbances; however, NorthernStar would schedule ground disturbing activities in suitable Columbian white-tailed deer habitat outside of the fawning season where possible.

Marbled Murrelet

Occurrence along the Pipeline Route

The PHS and ORNHIC have no records of the marbled murrelet within 2 miles of the proposed pipeline route (ORNHIC, 2004 and 2006). Forests in the vicinity of the proposed pipeline are relatively

young and generally lack characteristics that contribute to nesting habitats, foraging, and roosting areas for marbled murrelets.

Critical Habitat

Within the counties crossed by the Bradwood Landing pipeline, critical habitat units for the marbled murrelet have been designated within Clatsop County, Oregon and Cowlitz County, Washington. The closest critical habitat unit to the Bradwood Landing pipeline is in Clatsop County about 0.4 mile southwest of MP 2.5 (FWS, 1996a).

Impacts and Mitigation

As described in section 4.6.2.2, in its April 20, 2007 letter to the FERC, the FWS commented that suitable nesting habitat for the marbled murrelet may occur in several locations within the project area. A total of 21.6 acres of potentially suitable habitat for marbled murrelets occurs within areas impacted by the proposed pipeline. Of this, 12.5 acres would be permanently converted to herbaceous habitat. Specifically, approximately 3.3 acres of category 2 coniferous forest (based on the State of Oregon's HMP) would be permanently impacted by the proposed pipeline in Oregon. In addition, construction and operation of the proposed pipeline in Washington would impact about 12.2 acres of high quality coniferous forest habitats (6.1 acres would be permanent), 5.8 acres of high quality mixed forest habitats (2.9 acres would be permanent), and 0.3 acre of high quality riparian forest habitats (0.2 acre would be permanent).

Within areas of potentially suitable habitat, the FWS recommended that unless there are documented reasons to conclude that nesting is not occurring, NorthernStar should conduct surveys to determine the nesting status of marbled murrelets in the project area. In response to this letter, NorthernStar has stated that it will conduct field investigations to confirm that potentially suitable habitat occurs in the project area. If suitable habitat is identified, NorthernStar would either conduct surveys to determine presence of marbled murrelets or would simply assume presence in the project area.

If present, marbled murrelets could potentially be affected by construction of the proposed pipeline if nest trees and surrounding habitat were to be removed, or if construction were to occur in the vicinity of an active nest. Indirect impacts could include short-term avoidance of foraging habitat and increased visual and auditory disturbance due to construction activities. As noted previously, the FERC staff is currently revising its BA and EFH Assessment for the Bradwood Landing Project, which will be resubmitted to the FWS with a request to initiate formal consultation in compliance with section 7 of the ESA. Additional analysis of the potential for occurrence of and potential impacts on marbled murrelets in the vicinity of pipeline facilities will be included in the revised BA and EFH Assessment. The FERC would not allow construction of the project to proceed until after we have completed formal consultation.

Northern Spotted Owl

Occurrence along the Pipeline Route

A search of the ORNHIC and PHS databases found no northern spotted owl nest site records within a 2-mile search radius of the proposed project area. The nearest known active spotted owl nest is located between 3 and 4 miles south of the LNG terminal in the Clatsop State Forest (ORNHIC, 2006). Forests in the vicinity of the proposed pipeline route are relatively young and generally lack characteristics that contribute to nesting habitats, foraging, and roosting areas for spotted owls.

Critical Habitat

Within the counties crossed by the Bradwood Landing pipeline, critical habitat for the northern spotted owl has been designated in Cowlitz County, Washington. The closest critical habitat unit to the proposed pipeline route is WA-39 (FWS, 1992b), located about 24.4 miles east of the pipeline interconnect with the Williams Northwest pipeline system in eastern Cowlitz County (FWS, 1992b).

Impacts and Mitigation

Because there are no known occurrences of northern spotted owls in the vicinity of the proposed pipeline route, and the distance to the nearest critical habitat unit is over 20 miles, it is unlikely that northern spotted owls would be affected by construction or operation of the proposed pipeline.

Kincaid's Lupine

Occurrence along the Pipeline Route

The ORNHIC has no record of Kincaid's lupine within a 2-mile radius of the proposed pipeline route and there is little habitat that is potentially suitable for this species in the project area. Additionally, a botanical survey of the project area conducted by biologists contracted by NorthernStar did not identify Kincaid's lupine in the project area. Because the FWS raised concerns regarding terrestrial habitat survey methods in their April 20, 2007 letter to the FERC and the botanical survey report prepared for this project did not clearly confirm that all areas of potential habitat were surveyed during appropriate survey periods, we have recommended NorthernStar complete additional consultations with the FWS and conduct additional surveys, as necessary (see section 4.6.2.2).

Critical Habitat

Critical habitat has not been designated for Kincaid's lupine. However, critical habitat was proposed for this species in 2005 (70 Federal Register 66491 – 66599). The nearest proposed critical habitat unit for this species is located in Lewis County, Washington, which is over 20 miles north of MP 22.

Impacts and Mitigation

Because there are no known occurrences of Kincaid's lupine in the vicinity of the pipeline route and the nearest proposed critical habitat unit for Kincaid's lupine is located over 20 miles north of MP 22, with the implementation of our recommendation to complete any necessary follow-up surveys, it is unlikely that Kincaid's lupine would be affected by construction or operation of the proposed pipeline.

Nelson's Checker-mallow

Occurrence along the Pipeline Route

The ORNHIC has no record of Nelson's checker-mallow occurring within 2 miles of the project facilities. Additionally, a botanical survey of the project area conducted by NorthernStar in June 2006 did not identify Nelson's checker-mallow in the project area. However, Nelson's checker-mallow has been documented near Coal Creek Road in Cowlitz County. According to WNHP data, the Coal Creek site was first discovered in 1990 and contains two subpopulations: the northern subpopulation and the southern subpopulation. The northern subpopulation is located near the junction of Carlon Loop Road and Coal Creek Road and contains over 100 plants in a patchy distribution. The southern subpopulation

is located east of Carlon Loop Road and occupies an area approximately 10 feet by 15 feet in size. The northern subpopulation is located outside of the proposed pipeline alignment and is not likely to be impacted by construction of the proposed project. However, based on WNHP data, the southern subpopulation occurs within the proposed pipeline alignment near MP 28.0.

The southern subpopulation was not seen in a cursory look by the WNHP in 2006 (Arnett, 2006). In addition, another pipeline was installed in this location in 1992, after the last documented siting. However, based on concerns raised by the FWS, NorthernStar conducted additional surveys for Nelson's checker-mallow in June and July 2007. No Nelson's checker-mallow plants were observed at or around the pipeline crossing near Coal Creek (the historic southern subpopulation). The location of the historic southern population is now an actively grazed horse pasture, with a parcel to the south that undergoes regular herbicide spraying. However, at least 15 Nelson's checker-mallow plants were observed at the historic northern subpopulation, approximately 0.5 miles north of the pipeline right-of-way at MP 28.0.

Critical Habitat

Critical habitat has not been designated for Nelson's checker-mallow.

Impacts and Mitigation

As described above, the southern subpopulation of Nelson's checker-mallow was documented within the proposed project area near MP 28.0 in 1991, but not during surveys in 2007. Since this species has the ability to tolerate disturbances such as regular mowing and some ground disturbance, botanical surveys would be conducted prior to ground disturbing activities in the vicinity of the southern subpopulation. If the species is present, NorthernStar has stated that the area would be identified and protective fencing would be erected prior to construction and for the duration of all ground disturbing activities. If no rare plant species are found, no special precautions would be warranted. Furthermore, NorthernStar proposes to install the pipeline near the southern subpopulation of Nelson's checker-mallow using the HDD or conventional bore method. Therefore, impacts on the southern subpopulation of Nelson's checker-mallow due to construction of the proposed pipeline are not anticipated. Because the HDD method would be used to install the proposed pipeline, maintenance vegetative clearing would be avoided; therefore impacts on the southern subpopulation of Nelson's checker-mallow during operation of the pipeline are not anticipated.

Because there are no other known occurrences of Nelson's checker-mallow in the vicinity of the proposed pipeline, with the implementation of our recommendation to complete any necessary follow-up surveys, impacts on Nelson's checker-mallow due to construction or operation of the pipeline are not anticipated.

Water Howellia

Occurrence along the Pipeline Route

The FWS conducted extensive searches in Oregon but failed to locate water howellia; therefore, it is thought to be extirpated from the state (FWS, 1996b). Mincemoyer (2005) provided 18 records for populations of water howellia in western Washington. The ORNHIC and PHS databases had no record of water howellia within a 2-mile-radius search area of the proposed pipeline route. This species is not documented within the project area. Field surveys conducted in June 2006 determined that potential habitat for water howellia is located within the project area along the proposed pipeline route but did not identify any occurrences of water howellia in the project area. Because the FWS raised concerns regarding terrestrial habitat survey methods in their April 20, 2007 letter to the FERC and the botanical

survey report prepared for this project did not clearly confirm that all areas of potential habitat were surveyed during appropriate survey periods, we have recommended NorthernStar complete additional consultations with the FWS and conduct additional surveys, as necessary (see section 4.6.2.2).

Critical Habitat

Critical habitat has not been designated for water howellia.

Impacts and Mitigation

Because there are no known occurrences of water howellia in the vicinity of the pipeline route, with the implementation of our recommendation to complete any necessary follow-up surveys, it is unlikely that water howellia would be affected by construction or operation of the proposed pipeline.

State Listed Threatened and Endangered Species

NorthernStar consulted with the ODFW, ORNHIC, WDFW, and WNHP to identify state-listed endangered and threatened species with the potential to occur along the proposed pipeline route. Many state listed endangered or threatened species are also federally listed; these species were discussed previously (see *Pipeline Facilities, Federally Listed Species*). The remaining state listed threatened or endangered species are discussed below.

Western Pond Turtle

The western pond turtle has been extirpated from most of its former range in Washington, but two known populations remain in the Columbia River Gorge. Potentially suitable habitat for this species is found along the pipeline route where it crosses wetlands, sloughs, and other open water areas. However, little or no suitable upland nesting habitat is present as these areas are often densely vegetated. The ORNHIC had no records of occurrence for this species within 5 miles of the pipeline route in Oregon. With implementation of NorthernStar's SWPPP, the potential to impact the western pond turtle or its habitats would be minimal.

Bald Eagle

Bald eagle nesting, foraging, and wintering areas are known to occur within all counties affected by the proposed project in the form of mature riparian forested and upland forested habitats. Isaacs and Anthony (2005) identified five bald eagle nests within 0.5 mile of the proposed pipeline. The closest documented bald eagle nest site is approximately 0.4 mile from the proposed pipeline route near Abernathy Creek in Cowlitz County, Washington (Isaacs and Anthony, 2005). This nest site is located downstream of the Abernathy Creek crossing in heavy coniferous forest habitat. Other nest sites are located 0.5 mile from the proposed pipeline at Crims Island, Poysky Slough, Poysky Island, and Wallace Island in Columbia County, Oregon (Isaacs and Anthony, 2005). The Poysky Slough nest site is located in a stand of mature cottonwoods adjacent to a dike access road and a commercial poplar farm. The Poysky Island site was first documented in 2005 and successfully fledged two eaglets that year. During field visits to the proposed LNG terminal site and pipeline route, eagles were observed flying over the area near the proposed LNG terminal site as well as over Abernathy Creek. The WDFW has also mapped bald eagle communal winter roost sites. Such sites may be found along all of the major waterbodies crossed by the project and are most likely to be occupied from November through March.

Breeding bald eagles could potentially be affected by pipeline activities if nest trees and surrounding habitat are removed, or if construction were to occur in the vicinity of an active nest or

communal roost. The FWS (2007c) developed the *National Bald Eagle Management Guidelines* to help increase and maintain bald eagle populations by protecting important nesting and communal roosting habitat while allowing for flexibility in accommodating site-specific conditions. These guidelines call for preserving communal roost, nest, and important foraging sites; maintaining natural forested (or vegetative) buffers around nest trees; and avoiding certain activities during the nesting and roosting periods. When construction activities are within line-of-site of an active nest site, the FWS recommends maintaining a 660-foot buffer to minimize visual and auditory effects. Nests, nest trees, and habitat immediately surrounding the nest tree should not be removed at any time of the year.

Indirect impacts on bald eagles could include increased visual and auditory construction disturbance. Displacement of aquatic prey could indirectly affect bald eagles that may utilize these species as a portion of their diet. In addition, increased noise and other physical disturbances associated with construction and operation of the proposed pipeline, could temporarily cause bald eagles to avoid the area. Measures proposed by NorthernStar to minimize impacts on bald eagles before and during construction and operation of the project are discussed in section 4.6.2.2

Western Wahoo

During botanical surveys, a western wahoo population was found at the Abernathy Creek pipeline crossing in Cowlitz County, Washington (near MP 21.1). The pipeline would be installed using the HDD method at this waterbody, which would avoid disturbance of this species. Furthermore, NorthernStar would install a fence around the site to avoid any inadvertent impacts on the western wahoo plants during pipeline construction.

Other Special Status Species

Sensitive Species

In addition to the species listed under the ESA or by the States of Oregon and Washington, four species that are candidates for listing as endangered or threatened or species of special concern have been identified by state agencies as having the potential to occur in the vicinity of the proposed pipeline. The ODFW also expressed concerns regarding several other sensitive species, including the coastal cutthroat trout, red-legged frog, tailed frog, western painted turtle, American peregrine falcon, and olive-sided flycatcher. These sensitive species are discussed below.

Coastal Cutthroat Trout

Potential habitat for coastal cutthroat trout occurs along the proposed pipeline route in the main channel of the Columbia River. NorthernStar proposes to install the pipeline beneath the Columbia River using the HDD method. Therefore, any impacts on coastal cutthroat trout would be avoided unless a frac-out occurs or an HDD borehole is unsuccessful. As discussed in section 4.5.3.1, NorthernStar would implement various mitigation measures to avoid, minimize, rectify, reduce, and/or compensate impacts on salmonids; these measures would also benefit coastal cutthroat trout. Therefore, impacts on coastal cutthroat trout as a result of construction and operation of the proposed pipeline would not be significant.

Eulachon

The WDFW expressed concern about potential impacts on eulachon larvae as they migrate down the Columbia River to the Pacific Ocean. NorthernStar proposes to install the pipeline beneath the Columbia River using the HDD method. Therefore, any impacts on eulachon would be avoided unless a frac-out occurs or an HDD borehole is unsuccessful. As discussed in section 4.5.3.1, NorthernStar would

implement various mitigation measures to avoid, minimize, rectify, reduce, and/or compensate impacts on salmonids; these measures would also benefit eulachon. Therefore, impacts on eulachon as a result of construction and operation of the proposed pipeline would not be significant.

Lampreys

Potential bottom habitat for juvenile lamprey occurs within the main channel of the Columbia River. The mainstem Columbia River also serves as a migratory route for adults moving to or returning from the sea. NorthernStar proposes to install the pipeline beneath the Columbia River using the HDD method. Therefore, any impacts on lampreys would be avoided unless a frac-out occurs or an HDD borehole is unsuccessful. As discussed in section 4.5.3.1, NorthernStar would implement various mitigation measures to avoid, minimize, rectify, reduce, and/or compensate impacts on salmonids; these measures would also benefit lampreys. Therefore, significant impacts on lamprey as a result of construction and operation of the proposed pipeline are not anticipated.

Columbia Torrent (seep) Salamander

Potentially suitable habitat for this species is found at stream crossings along the proposed pipeline route. Project-related disturbances at many of the significant stream crossings would be avoided through the use of the HDD method (see section 4.3.2.4). With implementation of NorthernStar's ESC Plans and SWPPP, the potential to impact the Columbia torrent salamander or its habitats would be minimal.

Red-legged Frog

Potential habitat for the red-legged frog occurs in wetlands and waterbodies along the proposed pipeline route. Potential impacts and mitigation for waterbody crossings on aquatic species are discussed in section 4.5.3.1. Hundreds of red-legged frogs have been reported on lower Svensen Island. Restoration and preservation of lower Svensen Island would mitigate for any significant impacts on red-legged frogs or their habitats along the proposed pipeline route.

Tailed Frog

Potentially suitable habitat for tailed frogs exists within cold, shallow waterbodies crossed by the proposed pipeline route. Potential impacts and mitigation for waterbody crossings on aquatic species are discussed in section 4.5.3.1.

Western Painted Turtle

The western painted turtle could potentially occur along the proposed pipeline route in emergent wetlands and shallow waterbodies. Potential impacts and mitigation for waterbody crossings on aquatic species are discussed in section 4.5.3.1.

Townsend's Big-eared Bat

Potentially suitable foraging habitat for this species may occur along the pipeline route. However, preferred roosting habitat for the Townsend's big-eared bat does not occur in the project area. In addition, the ORNHIC had no record of this species within 5 miles of the pipeline route in Oregon. As part of its Mitigation Plan, NorthernStar proposes to enhance potential bat habitat by installing bat houses at the Peterson Point Mitigation Site. Therefore, we have determined that construction and operation of

the Bradwood Landing Project is not likely to result in significant impacts on the Townsend's big-eared bat.

American Peregrine Falcon

American peregrine falcons have been observed during site visits flying over potentially suitable habitat bordering the western bank of the Columbia River near MP 2.0. The ORNHIC database has one record of an active nest from this area, which is about 0.8 mile east of the pipeline origin at the LNG terminal. Given the distance and the location of the potential nesting habitat, it is not likely that the American peregrine falcon would be adversely impacted by construction or operation of the proposed pipeline.

Olive-sided Flycatcher

The olive-sided flycatcher has been recorded on both of the Breeding Bird Surveys conducted near the proposed pipeline route (Sauer et al., 2005). Construction and operation of the proposed pipeline could potentially affect the olive-sided flycatcher due to clearing of forested habitats. Potential impacts and proposed mitigation for clearing of forested habitat are discussed in section 4.4.2.3. Migratory birds are discussed below (see *Migratory Bird Treaty Act*).

Migratory Bird Treaty Act

During construction and operation of the proposed pipeline, habitat modification, increased noise and lighting, and vegetative clearing could adversely affect migratory birds occurring along the pipeline route. Potential impacts on terrestrial wildlife, including migratory birds, due to habitat modification as well as increased noise and lighting are discussed in section 4.5.2.3. In order to minimize potential impacts, NorthernStar has stated that vegetative clearing along the pipeline route would be conducted between August 1 and April 15, thus avoiding the peak nesting season. However, due to the importance of the area for migratory birds, additional measures are necessary to minimize impacts on nesting birds due construction and maintenance clearing along the pipeline route. Therefore, we recommended in section 4.6.2.2 that NorthernStar consult with the FWS and other appropriate agencies to develop a Migratory Bird Nest Avoidance Plan to minimize impacts on migratory birds during the peak nesting season.

4.6.3 Conclusions and Recommendations for Threatened, Endangered, and Other Special Status Species

As described above, informal consultations with the FWS and NMFS have identified 37 federally listed species as potentially occurring in the general vicinity of the Bradwood Landing Project. In addition, California sea lions and Pacific harbor seals transit past and utilize haulout sites upstream from the LNG terminal site. The Columbia River estuary is also one of the most important sites on the Pacific Flyway for migratory birds. Finally, although no longer listed under the ESA, the bald eagle is federally protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Under both laws, the disturbance of eagles, their nests, and eggs is prohibited.

A variety of measures have been proposed by NorthernStar that would avoid or minimize environmental impacts on threatened, endangered, and other special status species. These measures include:

- reducing the size of the LNG terminal footprint to avoid or minimize impacts on wetlands and Hunt Creek;

- routing the power line to avoid impacts on late-successional forest habitats;
- routing the pipeline to avoid or minimize impacts on sensitive environmental features and/or habitats;
- extensive use of the HDD or bore technique during construction of the pipeline to avoid or minimize disturbance of sensitive habitats, including waterbodies containing sensitive aquatic species or habitats;
- minimizing potential water quality impacts by using erosion control measures;
- restoring temporary construction work areas by implementing appropriate restoration and revegetation techniques;
- replanting forested habitats with in-kind tree specimens, with the exception of the portion of the right-of-way within 5 feet of the pipeline (10 feet total), thereby minimizing the extent of disturbance;
- controlling the spread of noxious and/or invasive plants;
- selecting larger than normal diameter pilings for the LNG carrier berth and unloading facilities;
- driving all piles vertically within a bubble-filled caisson to minimize acoustic impacts on aquatic species (thus minimizing the number of piles and the length of pile driving activities);
- providing screened water intakes at the LNG terminal to provide cooling and ballast water to the LNG carriers while unloading to minimize entrainment and impingement of juvenile fish; and
- minimizing the amount of water drawn from the Columbia River by filling LNG carrier ballast tanks with the same water used to cool the engines (thus also minimizing the discharge of warm water into the Columbia River).

Additionally, NorthernStar has proposed compensatory mitigation that provides new or enhanced areas of aquatic and wildlife habitats. Moreover, NorthernStar's voluntary implementation of its SEI has the potential to provide significant benefits to salmonids and the lower Columbia River ecosystem (see section 4.6.2.2). In addition to benefiting special status species, these measures would also benefit general wildlife, fisheries, and vegetation in the project area.

Beyond the mitigation proposed by NorthernStar, we have recommended that additional measures be implemented to further reduce potential impacts on protected species, including:

- continue to coordinate with the NMFS, FWS, ODFW, and/or other appropriate agencies regarding the following potential issues:
 - wake stranding of juvenile salmonids;
 - shoreline erosion;

- entrainment and impingement of juvenile salmonids;
- temperature impacts due to discharges at the LNG terminal wharf;
- LNG carrier speed, seasonal, or other restrictions to avoid or minimize impacts on whales;
- development of the final Compensatory Mitigation Plan;
- development of the final Waterbody and Wetland Construction and Mitigation Procedures Plan;
- development of a revised Bubble Curtain Contingency Plan;
- development of a revised Lighting Plan;
- agency consultation during development of a Blasting Management Plan; and
- development of a Migratory Bird Nest Avoidance Plan;
- place nets at the outlet of the log pond that only allow emigration from the pond;
- conduct post-installation water flow mapping through all intake screens at the LNG terminal, and develop and implement a monitoring program to assess the effects of impingement and entrainment from use of the screened water supply system on juvenile salmonids during terminal operations;
- conduct additional botanical surveys for federally listed endangered and threatened plants;
- conduct a survey for bald eagles prior to construction of LNG terminal and pipeline facilities;
- expand the protective measures that would be used to avoid or minimize impacts on Steller sea lions during construction of the LNG terminal to include all pinnipeds;
- avoid pipeline construction activities within potential habitat for Columbian white-tailed deer between June 1 and July 15.

Prior to and throughout construction, NorthernStar would train all personnel on procedures that should be followed to comply with proposed and required environmental mitigation measures.

We have determined that the proposed project may expose pinnipeds to sound pressures above the NMFS's threshold for injury and/or disturbance. Because of the potential impacts from pile driving activities on pinnipeds, NorthernStar has stated that it will apply for an Incidental Harassment Authorization pursuant to MMPA section 101(a)(5)(D).

The findings of effect for federally listed species included in table 4.6.3-1 are based on informal consultations with the FWS and NMFS, completed field surveys, and review of NorthernStar's proposed measures to avoid, minimize, or mitigate impacts on listed species. In compliance with section 7 of the ESA and the MSA, the FERC staff is currently revising its BA and EFH Assessment for the Bradwood Landing Project, which will be resubmitted to the NMFS and FWS with a request to initiate formal consultation.

TABLE 4.6.3-1

**Federally Listed Endangered, Threatened, or Candidate Species Potentially Occurring in the
Vicinity of the Bradwood Landing Project**

Species	Determination of Effect	
	Species	Critical Habitat
FISH		
Chinook Salmon <i>Oncorhynchus tshawytscha</i>		
• Lower Columbia River ESU	LAA	LAA
• Upper Columbia River Spring-run ESU	LAA	LAA
• Upper Willamette River ESU	LAA	LAA
• Snake River Spring/Summer-run ESU	LAA	LAA
• Snake River Fall-run ESU	LAA	LAA
Chum Salmon <i>O. keta</i>		
• Columbia River ESU	LAA	LAA
Coho Salmon <i>O. kisutch</i>		
• Lower Columbia River ESU	LAA	NA
Sockeye Salmon <i>O. nerka</i>		
• Snake River ESU	LAA	LAA
Steelhead <i>O. mykiss</i>		
• Lower Columbia River DPS	LAA	LAA
• Middle Columbia River DPS	LAA	NLAA
• Upper Columbia River DPS	LAA	NLAA
• Upper Willamette River DPS	LAA	NLAA
• Snake River Basin DPS	LAA	NLAA
Bull Trout <i>Salvelinus confluentus</i>		
• Columbia River DPS	NE	NE
North American Green Sturgeon <i>Acipenser medirostris</i>		
• Southern DPS	LAA	NA
REPTILES AND AMPHIBIANS		
Green Sea Turtle <i>Chelonia mydas</i>	NLAA	NE
Leatherback Sea Turtle <i>Dermochelys coriacea</i>	NLAA	NE
Loggerhead Sea Turtle <i>Caretta caretta</i>	NLAA	NA
Olive Ridley Sea Turtle <i>Lepidochelys olivacea</i>	NLAA	NA
Oregon Spotted Frog <i>Rana pretiosa</i>	NE	NA
MAMMALS		
Blue Whale <i>Balaenoptera musculus</i>	NLAA	NA
Fin Whale <i>Balaenoptera physalus</i>	LAA	NA
Humpback Whale <i>Megaptera novaeangliae</i>	NLAA	NA
North Pacific Right Whale <i>Eubalaena japonica</i>	NLAA	NA

TABLE 4.6.3-1 (cont'd)

**Federally Listed Endangered, Threatened, or Candidate Species Potentially Occurring in the
Vicinity of the Bradwood Landing Project**

Species	Determination of Effect	
	Species	Critical Habitat
Sei Whale <i>Balaenoptera borealis</i>	NLAA	NA
Killer Whale <i>Orcinus orca</i>		
• Southern Resident DPS	NLAA	NE
Sperm Whale <i>Physeter macrocephalus</i>	NLAA	NA
Steller Sea Lion <i>Eumetopias jubatus</i>		
• Eastern DPS	LAA	NE
Columbian White-tailed Deer <i>Odocoileus virginianus leucurus</i>		
• Columbia River DPS	LAA	NA
BIRDS		
Brown Pelican <i>Pelecanus occidentalis</i>	NLAA	NA
Marbled Murrelet <i>Brachyramphus marmoratus</i>	LAA	NLAA
Northern Spotted Owl <i>Strix occidentalis caurina</i>	NLAA	NE
Short-tailed Albatross <i>Phoebastria albatrus</i>	NE	NA
Streaked Horned Lark <i>Eremophila alpestris strigata</i>	NLAA	NA
Western Snowy Plover <i>Charadrius alexandrinus nivosus</i>		
• Pacific Coast DPS	NE	NLAA
Yellow-billed Cuckoo <i>Coccyzus americanus</i>	NE	NA
INVERTEBRATES		
Oregon Silverspot Butterfly <i>Speyeria zerene hippolyta</i>	NE	NE
PLANTS		
Kincaid's Lupine <i>Lupinus sulphureus kincaidii</i>	NLAA	NE
Nelson's Checker-mallow <i>Sidalcea nelsoniana</i>	NLAA	NA
Water Howellia <i>Howellia aquatilis</i>	NLAA	NA

Based on information included in the revised BA and EFH Assessment developed during the formal consultation process by NorthernStar, the NMFS and FWS will prepare BOs as to whether or not the federal actions associated with this project would likely jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat; summarize the information on which the opinion is based; and discuss in detail the effects of the project on listed species or designated critical habitat. The BOs may recommend reasonable and prudent measures to be implemented to minimize impacts on specific individuals or habitat and reduce the level of take associated with project activities. In addition, the BOs would include the specific terms and conditions by which the reasonable and prudent measures are to be accomplished. As described above, the FERC would not allow construction of the project until after we have completed formal consultation with the NMFS and FWS. In compliance with the ESA, **we recommend that:**

- **NorthernStar should not begin construction activities at the LNG terminal and the pipeline until:**
 - a. **the staff completes formal consultation with the NMFS and FWS;**
 - b. **NorthernStar completes consultation with the NMFS under section 101(a)(5)(D) of the MMPA; and**
 - c. **NorthernStar has received written notification from the Director of OEP that construction or use of mitigation may begin.**

4.7 LAND USE, RECREATION, AND VISUAL RESOURCES

4.7.1 Waterway for LNG Marine Traffic

4.7.1.1 Land Use

Land use along the shore of the waterway for LNG marine traffic consists primarily of forest. The lower Columbia River is mostly a rural region, with the exception of the urban areas of Cathlamet and Ilwaco in Washington, and Astoria and Warrenton in Oregon. Elsewhere along the shore of the waterway are scattered residences and commercial/industrial locations. On the northern shoreline of the Columbia River from the Long Beach peninsula eastward in Pacific County, Washington are the sparsely populated unincorporated communities of Chinook, McGowan, Megler, and Knappton, and in Wahkiakum County eastward to CRM 38 are Pigeon Bluff, Altoona, Dahlia, Pillar Rock, Brookfield, Rockland, Bayview, and Skamokawa. On the southern shore of the river in Clatsop County, Oregon between Astoria and Bradwood, are the small unincorporated communities of Burnside, Svensen, Knappa, Brownsmead, and Clifton.

During transit to the LNG terminal, the potential exists for an accidental or intentional breach of an LNG carrier resulting in a release of LNG. Being less dense than water, the LNG would float on the surface before vaporizing. As the LNG vaporizes, a vapor cloud may form that is initially heavier than air and may be dispersed by wind. An LNG vapor cloud cannot explode in the open atmosphere, but can burn if ignited. In the unlikely case of an LNG spill and associated pool fire, land uses and associated vegetation adjacent to the shipping route could be impacted. Effects on structures within Zone 1 would be most severe, while buildings within Zone 3 would be less impacted. However, with implementation of the mitigation measures described in the Coast Guard's WSR, an LNG release along the waterway would be highly unlikely and the potential impact on structures would be less than significant.

4.7.1.2 Existing Residences and Planned Developments

Existing Residences

The majority of land along the waterway within the Zones of Concern is rural, with the exception of the Warrenton/Astoria urban areas in Clatsop County, Oregon and the Cathlamet/Puget Island area of Wahkiakum County, Washington. There are about 1,799 housing units in the City of Warrenton, 4,858 housing units in the City of Astoria, and 278 housing units in the City of Cathlamet. There are other scattered residences in the sparsely populated unincorporated communities elsewhere along the waterway overlapped by the Zones of Concern. In Washington along the waterway, Pillar Rock, Rockland, and Bayview are within Zone 1; Altoona, Brookfield, and Skamokawa are within Zone 2; and Pigeon Bluff and Cathlamet are within Zone 3. In Oregon, Hammond and the waterfront areas of Warrenton and Astoria are within Zone 1; portions of Warrenton, and Astoria are in Zone 2; and part of Astoria and Clifton are overlapped by Zone 3. Population along the waterway is discussed in detail in section 4.8.1.1.

Visual impacts from LNG marine traffic passing by existing commercial and residential areas along the waterway would be short term, lasting only minutes within the viewshed. These communities already view thousands of ships traveling up and down the Columbia River.

Residential and commercial areas could be affected by an accidental or intentional breach of an LNG carrier resulting in a release of LNG during transit. In the unlikely event of an LNG release, the effects from a resulting fire would be fairly limited and the fire would be relatively short-lived. Structures within Zone 1 (e.g., along the Astoria waterfront) could be damaged in the event of a pool fire, while structures within Zone 3 would be less affected. However, with implementation of the mitigation measures described in the Coast Guard's WSR, the potential for an LNG release would be extremely unlikely and the potential impacts on residential and commercial areas would be less than significant.

Planned Developments

Based on conversations with the affected counties and communities, we identified future commercial and residential developments along the waterway to be used by LNG marine traffic for this project (see table 4.12-1). As of November 2006, several ongoing or proposed developments were noted on or near the waterfront of Astoria. Projects that were currently under construction included a restaurant, office, and retail development located at Pier 1; the Red Building renovation to accommodate small shops, banquet and conference facilities, and offices located east of Pier 1; a public park development located at 9th Street that also includes a possible expansion; the Millpond Development to accommodate housing units between 23rd and 29th Streets; and a 93-unit condominium development located East of Pier 39 that also includes a potential expansion. Proposed projects included: a public square located east of Pier 1; a condominium and associated restaurant and retail developments at several locations including Columbia Street, Pier 11, 3rd Street, 7th Street, 14th Street, and 15th Street; a 20-townhouse development on 29th Street that was scheduled to begin construction in summer 2007; an unspecified proposed development located at East Mooring Basin; and a building renovation to accommodate restaurant, office, retail, and boat rental establishments located at Pier 39. Three projects were recently completed, including: the Cannery Pier Hotel located east of Pier 1; a building to accommodate office and residential properties located on 31st Street; and a new subdivision located east of Sewer Lagoon. In addition, the River Theater development to accommodate coffee, art, and theater retail located east of Pier 1 was pending a building permit (Cook, 2006; Johnson, 2006; Larson, 2006; McCoy, 2006).

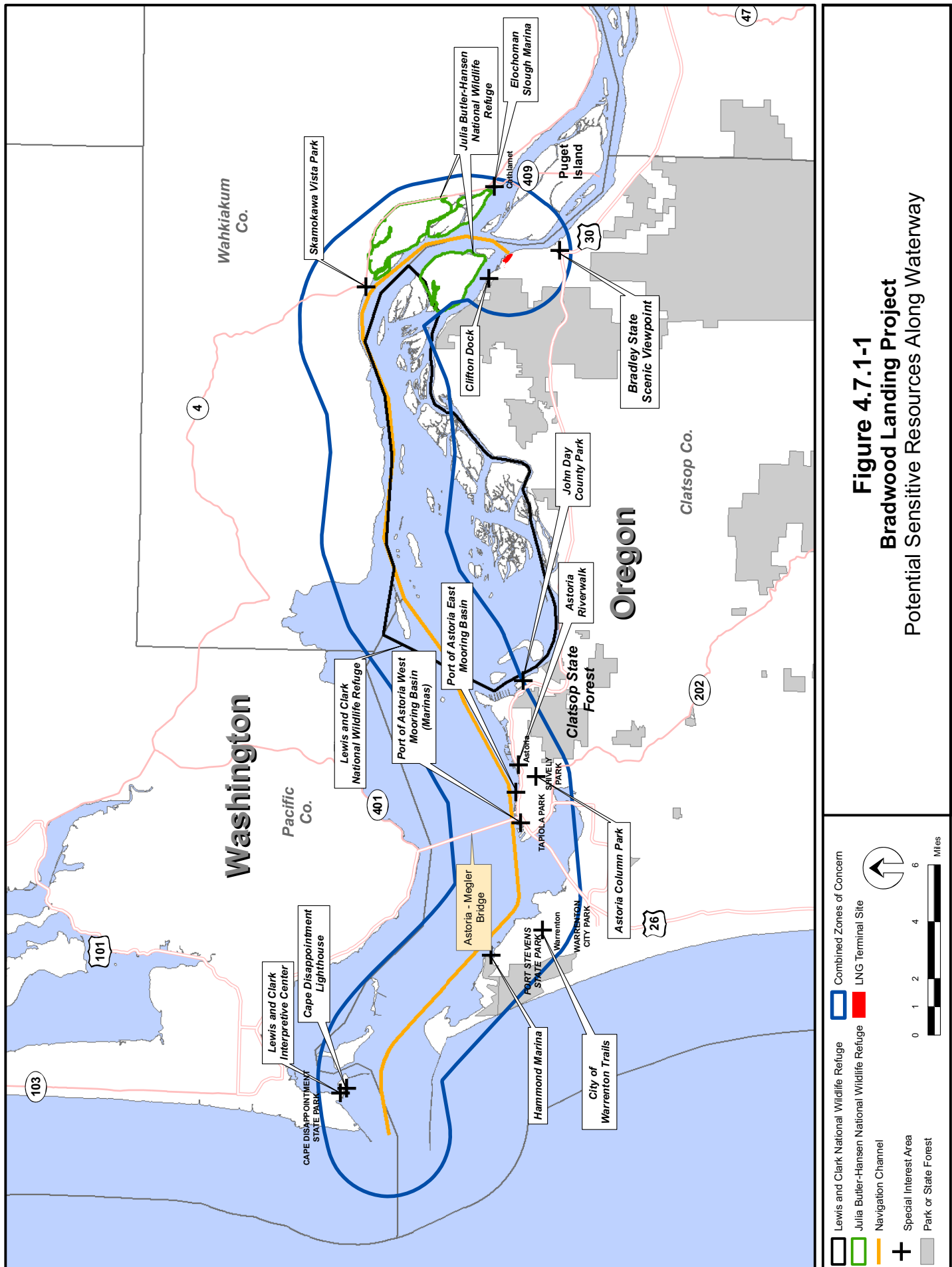
The effects of LNG marine traffic on planned residential and commercial developments along the waterway would primarily be visual. Observers would only see an LNG carrier for a few minutes at any given location as it passes by. Large vessels in the Columbia River are already a common sight within the viewshed for the proposed residential and commercial developments (see section 4.8.1.7). With the implementation of the safety and security measures outlined in the Coast Guard's WSR, it is highly unlikely that there would be a release of LNG from a passing LNG carrier that would lead to a spill and related pool fire, therefore the project should not have any significant impacts on planned commercial or residential developments along the waterway.

4.7.1.3 Coastal Zone Management

Section 4.7.2.4 addresses coastal zone management review for the Bradwood Landing Project.

4.7.1.4 Recreation, Public Interest, and Special Use Areas

A number of recreational and public interest areas are located along the waterway to be used by LNG marine traffic for this project. Potentially sensitive special use areas within the Zones of Concern are shown on figure 4.7.1-1. The potential impacts of LNG marine traffic on recreational sites along the waterway and regional tourism is further discussed in section 4.8.1.8.



Designated Recreation and Public Interest Areas

Lewis and Clark National Historic Trail

The Lewis and Clark National Historic Trail (LCNHT) was authorized by the National Trails System Act of 1978. The trail extends about 3,700 miles, crossing 11 states from Wood River, Illinois to the mouth of the Columbia River, tracing the journey of the Lewis and Clark expedition of 1804-1806. The LCNHT is administered by the National Park Service (NPS), but includes lands in federal, tribal, state, county, local, and private jurisdictions. There are 11 official interpretive centers along the LCNHT, and many other unofficial partnering centers operated by various entities. The NPS headquarters for the LCNHT is in Omaha, Nebraska. The purpose and mission of the LCNHT is to preserve remnants of the historic route of the 1804-1806 Corps of Discovery expedition, provide a comprehensive interpretation of the expedition and the trail, and allow for better public understanding and appreciation of our nation's cultural and natural heritage through opportunities at various locations for visitor enjoyment and use of trail resources (NPS, 2006). We discuss potential project-related impacts on the LCNHT in sections 4.8.1.8 and 4.9 of this EIS.

Lewis and Clark National Historic Park

The Lewis and Clark National Historic Park (LCNHP) is at the western terminus of the LCNHT. Under the umbrella of the NPS, the LCNHP is made up of 12 park sites along the Pacific Coast from Long Beach, Washington to Cannon Beach, Oregon. The LCNHP was created by Congress in 2004, expanding the Fort Clatsop National Memorial, originally established in 1958, by adding other sites at the mouth of the Columbia River related to the Lewis and Clark expedition. The purpose of the LCNHP is to preserve and interpret resources associated with the Corps of Discovery's 1805-1806 winter encampment near the Pacific Ocean at Fort Clatsop. The legislation directed the NPS to work with Oregon and Washington State Parks to promote visitor use and cooperative management (Applegate, et al., 2005). There are two state parks that form a portion of the LCNHP that would be overlapped by the Zones of Concern for LNG marine traffic along the waterway to the Bradwood Landing LNG terminal. These potentially affected elements include Fort Disappointment State Park, which contains the Lewis and Clark Interpretive Center and a memorial to Thomas Jefferson, in Washington, and Fort Stevens State Park in Oregon. The other elements of the LCNHP, including Fort Columbia State Park, Dismal Nitch, and Station Camp in Washington, and Ecola State Park, Sunset Beach State Recreation Area, Fort Clatsop, Fort to Sea Trail, Salt Works, and Netul Landing in Oregon are outside of the Zones of Concern and would not be affected by the project. Potential project related impacts on the LCNHP are discussed in sections 4.8.1.8 and 4.9 of this EIS.

Lower Columbia River Water Trail

The Lower Columbia River Water Trail stretches 146 miles in length from Bonneville Dam to the Pacific Ocean. The water trail is intended for use by people in non-motorized boats, to travel for daily or overnight excursions along the free-flowing portion of the lower Columbia River. There are multiple launches, landings, and campsites located along this segment of the river. The water trail is administered through the Lower Columbia River Water Trail Committee of the Lower Columbia River Estuary Partnership, a non-profit corporation, whose goals include protecting the ecosystem, improving habitat, reducing river pollution, and educating the public. The partnership is attempting to connect the public to the lower Columbia River by promoting the water trail as a valuable resource for recreation, education, and stewardship, and increase access to the river by improving launch and landing sites for non-motorized water craft. The partnership seeks to engage the interest of local counties, communities, businesses, and individuals to support its programs (Lower Columbia River Estuary Partnership, 2007b). The NPS has provided community assistance to this water trail under the Outdoor Recreation Act of 1963. These grants have enabled the Water Trail Committee to inventory more than 70 waypoints along the trail, and

develop an interactive web site to provide paddlers with trail information. The lower Columbia River is divided between the states of Washington and Oregon. The partnership owns no land or facilities along the trail. Instead, the water trail utilizes existing recreational facilities owned and operated by various city, county, or state government agencies. These are discussed further in section 4.8.

Cape Disappointment State Park

Cape Disappointment is a Washington State Park. It encompasses 1,882 acres on the Long Beach peninsula, between the Pacific Ocean and the Columbia River, in Pacific County, Washington. This park is one of the elements of the LCNHP and provides access to the Lower Columbia River Water Trail. Cape Disappointment State Park includes the historic location of Fort Canby, two historic lighthouses (North Head Lighthouse on the Pacific Coast and Cape Disappointment Lighthouse on the Columbia River), the Lewis and Clark Interpretive Center, Thomas Jefferson Memorial, Colbert House Museum, amphitheater, ball fields, boat ramp and dock, 20 picnic tables, campsites and cabins, and 7 miles of hiking trails. The southern portion of the park, including Fort Canby, the Cape Disappointment Lighthouse, and the Lewis and Clark Interpretive Center, is overlapped by Zone 3. Potential project-related impacts on historic elements of the park are discussed in section 4.9.

Fort Stevens State Park

Fort Stevens is an Oregon State Park and an element in the LCNHP. It covers about 3,700 acres at the mouth of the Columbia River, west of Hammond, Oregon, between the Pacific Ocean and Trestle Bay. It is named for the former federal military installation, originally commissioned in 1863, located within its boundaries, and the park includes the remains of gun batteries and the commander's station, and a military museum. Also part of the Fort Stevens State Park, are the remains of the ship wreck of the Peter Iredale, Coffenbury Lake and Swash Lake, wildlife viewing platforms, 9 miles of bike paths, and 5 miles of hiking trails, including the northern trailhead for the Oregon Coast Trail. With 530 campsites, Fort Stevens State Park is the largest public campground of any state park in Oregon. The northern portion of Fort Stevens State Park, including the military museum and Fort Stevens gun batteries, are overlapped by Zone 2.

Lewis and Clark National Wildlife Refuge

The LCNWR is a unit within the system of 547 wildlife refuges nationwide, first established in response to the federal conservation movement by President Theodore Roosevelt in 1903, and operated by the FWS. These refuges offer a network of protected habitats to benefit fish and wildlife, and offer outdoor experiences for the American public. The LCNWR, created in 1971, is meant to preserve wetland habitats along the lower Columbia River estuary and serve as a wintering area for migratory waterfowl and shorebirds. The refuge boundary encompasses 35,000 acres of tidelands and open water, including 8,313 acres of islands and sandbars between CRMs 18.5 and 35 in the Columbia River. It provides nesting areas for about 35 bald eagles, 1,000 tundra swans, 5,000 geese, and 30,000 ducks. The estuary within the LCNWR also offers habitat for fish, seals, otter, beaver, raccoon, weasel, mink, and muskrat. The LCNWR is administered out of the office for the JBHNRW in Cathlamet, has no developed recreational facilities, and the inlands within its boundaries can only be accessed by boat, with launches available at Skamokawa in Washington and John Day Point and Aldrich Point in Oregon. Portions of the LCNWR are overlapped by the Zones 1, 2, and 3.

Julia Butler Hansen National Wildlife Refuge

The JBHNRW was established in 1972 specifically to protect and manage the federally listed endangered Columbian white-tailed deer. The JBHNRW extends from approximate CRM 33.5 to CRM

39 along the Columbia River, and includes the Hunting Islands and Price Island in Washington, and Tenasillahe Island, Crims Island, Wallace Island, and several small parcels in the vicinity of Westport in Oregon. It contains approximately 6,100 acres of pastures, forested tidal swamps, marshes, sloughs, and open water. The JBHNR provides habitat for fish, wintering birds, including bald eagles and osprey, a small herd of Roosevelt elk, and various other mammals, reptiles and amphibians (FWS, 2007b). The islands within the refuge can only be reached by boat. Public recreational facilities within the JBHNR include its headquarters off of Steamboat Slough Road, and the mainland dike road, which is used for vehicle access, public fishing, and wildlife viewing opportunities. Portions of the JBHNR are overlapped by Zones 1, 2, and 3.

Clatsop State Forest

The Clatsop State Forest, comprising some 518,000 acres, is the only public forest in Northwestern Oregon and is administered by the Astoria District of the Oregon Department of Forestry (ODF). According to the ODF (2001), the Clatsop State Forest is 98 percent Board of Forestry Lands. These lands were privately owned and logged between 1910 and 1940, and when Clatsop and Columbia Counties foreclosed due to landowners not paying their taxes, the counties deeded these cutover and unmanaged forest lands to the Board of Forestry to manage as a state forest. The remaining 2 percent of the Clatsop State Forest are Common School Fund Lands. The *Clatsop State Forest Astoria District Recreation Management Plan* outlines the implementation of recreation management in the state forest through objectives and actions, activity zoning, and the type of facilities the ODF will develop and manage. Recreational uses in the Clatsop State Forest occur along roads, rivers, and streams. Recreational activities include hunting, fishing, dispersed or campground camping, off-highway vehicle use, horseback riding, mountain biking, hiking, and scenic viewing (at viewpoints), and some interpretation. Portion of Clatsop State Forest are overlapped by Zone 3 just south and east of the City of Astoria, and to the west of Clifton.

Warrenton/Astoria Parks and Museums

The Warrenton Waterfront Trail and Carruthers Park are overlapped by Zone 2. Within Zone 3 at Warrenton is the Fishermen's Memorial and Lighthouse Park.

Parks in Astoria located within 1,600 meters south of the navigation channel (partly or wholly overlapped by the extent of Zone 2) include Astoria Column, Shively Park, Maritime Park, 4-H fair grounds, Tapiola Park, Warren Field, Fort Astoria, and Fred Lindstrom Memorial Park. The Yacht Club Park is overlapped by Zone 3. The 125-foot-high Astoria Column, dedicated in 1926, is located within a 780-acre wooded park located on Astoria's highest hill. Tapiola Park, established in 1941 by members of the Finnish Brotherhood, includes a skate park in a former swimming pool and an "educational superplayground." Shively Park was developed for Astoria's Centennial celebration in 1911 and designed by Arthur Peck. A small park at 15th and Exchange Streets contains a partial replica of Fort Astoria. Warren Field covers 8 acres. The City of Astoria also operates an Aquatic Center along Marine Drive within Zone 2.

Along the Columbia River waterfront in Astoria, besides the docks, are the Maritime Memorial Park, 6th Street Viewing Dock, 14th Street Riverpark, and the pedestrian/bike Columbia Riverwalk Trail. A restored 1914 trolley runs for 3 miles between Basin and 36th Streets. Portions of these facilities are overlapped by Zone 1. Near the waterfront, within Zone 2, is the 1926 Astoria Victory Monument and Doughboy Statue.

Also situated along Astoria's waterfront is the Columbia River Maritime Museum. Other museums in Astoria, within Zone 2, include the Flavel House in an 1885 Queen Anne Victorian at 8th and

Duane Streets, the Heritage Museum in the old 1904 City Hall building at 16th and Exchange Streets, and the Uppertown Firefighters and Children's Museum in the 1896 North Pacific Brewery building at 30th Street and Marine Drive. The Liberty Theater is in a 1925 Italian Renaissance style building at Commercial and 12th Streets (Astoria and Warrenton Chamber of Commerce, 2007; Astoria's Historic Resources and Heritage, 2006). Astoria's historic resources are addressed in section 4.9.

Skamokawa Vista Park

The 70-acre Skamokawa Vista Park, operated by Wahkiakum Port District No. 2, is located on the north shore of the Columbia River, at about CRM 32, near the mouth of the Skamokawa Creek. The park includes a campground with 34 sites for hookups, playground, game field, and basketball and tennis courts. Additional amenities include picnic tables, toilets, shower, beach, and facilities for small boat launch. It provides access to the Lower Columbia River Water Trail. Skamokawa Vista Park is within Zone 2.

Cathlamet Parks

Within the City of Cathlamet, which is partly overlapped by Zone 3, are two parks and a swimming pool operated by the Department of Parks and Recreation. Erickson Park consists of 10 acres on Columbia Street, acquired in 1947, that includes a covered shelter, and tennis and basketball courts, playground equipment, and nature paths. Strong Park covers about 2 acres on the Cathlamet waterfront and includes the Wahkiakum County Museum (Town of Cathlamet, 2007).

Schools, Libraries, and Hospitals

The Warrenton community library is located within Zone 2. However, all of the public schools in Warrenton appear to be outside of the Zones of Concern.

In Astoria, Captain Robert Gray Elementary School, John Jacob Astor Elementary School, Clatsop Community College, Clatsop Care Center, Columbia Memorial Hospital, Clatsop County Health and Human Services, and the public library are overlapped by Zone 2. Within Zone 3 are Astoria Middle School and Astoria High School. Local infrastructure and public services, including schools and hospitals, for the communities along the waterway used by LNG marine traffic are further discussed in section 4.8.1.6.

Military Installations

The Tongue Point Naval Air Station was established in 1940 on the east side of Astoria, Oregon. In 1964 the Coast Guard Astoria Air Station was located at the Tongue Point Naval Air Station. It was relocated to the Astoria Regional Airport southeast of Warrenton in 1966. However, the Coast Guard maintains an Aid to Navigation Team at Tongue Point and has docking facilities for cutters along the Astoria waterfront. The Coast Guard facility at Tongue Point is overlapped by Zone 2, while the Coast Guard Air Station is within Zone 3. The Coast Guard also operates a life boat station at Cape Disappointment in Ilwaco, Washington, and the mooring for that station is overlapped by Zone 3.

Impacts on Recreation and Public Interest Areas

The main impact on recreation and public interest areas as a result of LNG marine traffic in the waterway would be visual. Visual impacts associated with LNG marine traffic are discussed in section 4.7.1.5.

In the unlikely event of an LNG spill from a tanker in route along the waterway to the terminal, and an associated pool fire, there may be effects upon recreational facilities, parks, and other public interest areas. Those facilities within Zone 1 could sustain damages to structures, features, or vegetation. Facilities within Zone 3 would be less affected. However, with the implementation of the safety and security measures outlined in the Coast Guard's WSR, the chance of a spill would be extremely remote and the potential impacts on recreational facilities, parks, and other public interest areas would be less than significant.

General Recreation and Other River Users

The lower Columbia River is used for both commercial and recreational purposes. Portions of the discussion below are based upon the findings of the *River User Impact Analysis* relative to LNG marine traffic produced for NorthernStar (Kraley, 2006), and NorthernStar's preliminary WSA by ABSG Consulting, Inc.¹⁵ The potential impact of LNG marine traffic in the waterway on commercial and recreational users of the lower Columbia River is further discussed in section 4.8.1.7, and recreation and tourism is also addressed in section 4.8.1.8.

Commercial Uses

Commercial activities along the lower Columbia River include: shipping, commercial fishing, charter boat services, cruises, ship piloting (both along the river and at the bar), tugboat operations and long-shoring, and miscellaneous shore-based activities in the Astoria area. These commercial activities and potential impacts of the Bradwood Landing Project on these activities are further discussed in section 4.8.1.7.

Recreational Uses

Recreational activities for the lower Columbia River and shoreline include: fishing, water-skiing, boating, sailing, kayaking, windsurfing, personal watercraft, sunbathing, sightseeing, wildlife viewing, hiking, camping, picnicking, and beach combing. The potential impact of LNG marine traffic in the waterway on recreation and tourism is further discussed in section 4.8.1.8.

Fishing

Recreational fishing occurs most frequently during the summer months (averaging about 300 private fishing boats in the waters of the Columbia River estuary per day between June and August). The largest fishery on the river, at Buoy 10 near the mouth of the Columbia, is fished during August and accounts for the highest level of recreational boat traffic during that time. According to the ODFW, in 2005 Washington and Oregon anglers combined took over 400,000 fishing trips along the almost 150-mile-long stretch of the lower Columbia River between Bonneville Dam and Buoy 10 (Watts and Takata, 2006).

Boating and Sailing

Recreational boaters, including sport fishers and sailors, can reach the lower Columbia River from upstream boat ramps and marinas, including locations in Kalama and Longview, Washington, and Rainier and Clatskanie, Oregon. Along the waterway to be used by LNG marine traffic in Washington,

¹⁵ The *River User Impact Analysis* was attached as Appendix A to Resource Report 5 in NorthernStar's June 5, 2006 application. It is available for viewing on the FERC Internet website (<http://www.ferc.gov>). Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number excluding the last three digits in the "Docket Number" field (i.e., CP06-365). Be sure to select an appropriate date range. ABSG Consulting Inc.'s, May 18, 2006, "Waterway Suitability Assessment, Bradwood Landing LNG Project, Columbia River," was submitted to the Coast Guard under its SSI regulations and is not available to the public.

there are boat launches at Cape Disappointment State Park, Chinook, Knappton, and Skamokawa, and moorings at marinas at Ilwaco and Cathlamet. In Clatsop County, Oregon, there are recreational boat ramps at John Day Park, Knappa, Aldrich Point, and Westport, and marinas in Hammond, Warrenton, and Astoria. Both power boats and sailboats can access the lower Columbia River from the boat launches and marinas mentioned above.

Accurate information on the boat traffic into or out of various launches along the lower Columbia River is unavailable, as most rely on the honor system with payment drop boxes based on donations. Therefore, it is not possible to estimate the current level of recreational boat traffic. However, a sense of recreational boating activity can be gauged from the operation of local marinas (see table 4.7.1-1).

TABLE 4.7.1-1			
Marinas and Boat Launches in the Lower Columbia River			
Marina or Boat Launch	County	State	Gross Revenue
Astoria East Mooring Basin	Clatsop	OR	\$90,000
Hammond Marina	Clatsop	OR	\$205,000
Warrenton Marina	Clatsop	OR	\$315,000
Astoria West Mooring Basin	Clatsop	OR	\$310,000
Rainier City Marina	Columbia	OR	\$32,000
Kalama Marina	Cowlitz	WA	\$328,000
Willow Grove Boat Launch	Cowlitz	WA	NA
Cape Disappointment State Park	Pacific	WA	\$170,000
Port of Chinook	Pacific	WA	\$400,000
Port of Ilwaco	Pacific	WA	\$700,000
Elochoman Slough Marina	Wahkiakum	WA	\$433,000
NA	Not available.		

The Hammond Marina, at about CRM 11, includes a four-boat launch ramp, 140 slips, and offers overnight moorage for both commercial and recreational vessels. Facilities include a fuel dock, restroom and showers, picnic area, camping area, and parking lot for 400 vehicles. Two Columbia River Pilot cutters operate out of this marina. The entrance to the Hammond Boat Basin is 1,410 feet from the navigation channel, within Zone 2.

The Warrenton Marina is located up the Skipanon River from the Columbia River navigation channel, but is still overlapped by Zone 3. The marina contains 370 slips, and its facilities include restrooms, showers, and a fish cleaning station (Astoria-Warrenton Chamber of Commerce, 2007). There are an additional 92 slips at the Skipanon Marina.

The Port of Astoria operates two marinas for recreational boaters, overlapped by Zone 1, with moorings for craft up to 100 feet long. The West Basin, located at about CRM 14, contains 335 slips. The East Basin, at about CRM 15.6, has 82 slips, and a public pier, and is home to some of Astoria's fishing fleet (Port of Astoria, 2007). There is also a transient dock at 17th Street.

Water-skiing, Jet-skiing, Windsurfing, and Kayaking

Other recreational uses of the lower Columbia River include water-skiing, personal watercraft such as jet-skis, windsurfing, kite surfing, kayaking and canoeing. Wake-boarding, tubing, and other, similar boat-pulled activities are included in our discussion of water-skiing. Water-skiing and the

mentioned related activities typically occur upriver of CRM 38, where the water is calmer and other boat traffic is relatively sparse.

Windsurfing and kite surfing are relatively recent activities along the lower Columbia River. Most of this activity occurs upriver of CRM 38, with a favorite location being near Clatskanie, Oregon. The Columbia River off of Jones Beach (CRM 47) is known to be used by windsurfers and kite surfers. Windsurfers also use the Columbia River off of Chinook County Park in Pacific County, Washington (CRM 6). However, both Jones Beach and Chinook County Park are located outside of the Zones of Concerns for LNG marine traffic to the proposed Bradwood Landing LNG terminal. Little, if any, windsurfing occurs in the waterway that would be used by LNG marine traffic. Where these activities do take place is typically in shallow areas of the river, near shore, away from the navigation channel. Therefore, we do not expect the project to have any direct impacts on windsurfing or kite surfing activities.

Personal watercraft, such as jet-skis, can be rented in Warrenton, Oregon, and Longview, Washington. This activity can take place in shallower waters, outside of the navigation channel along the lower Columbia River.

Kayaking and canoeing typically occur near the shore and outside of the shipping channel. Kayak rentals are available at several points along the lower Columbia River, including in Warrenton, Oregon and Skamokawa, Cathlamet, and Longview, Washington.

Sunbathing, Beachcombing, Sightseeing, Wildlife Viewing, Hiking, Swimming, Camping, and Picnicking

Increased commercial ship traffic in the lower Columbia River resulting from this project should not have significant negative impacts on sunbathing, beachcombing, sightseeing, wildlife viewing, hiking, swimming, camping, and picnicking. The only developed recreational beach immediately adjacent to the waterway to be used by LNG marine traffic is at Skamokawa Vista Park, at CRM 32, in Wahkiakum County, Washington. Parks and other recreational and public interest areas are discussed above and in section 4.8.1.8. Potential visual impacts from LNG carrier traffic along the river on park and beach users are discussed in section 4.7.1.5. Elsewhere in this EIS are discussions of ship wakes and the potential for shoreline erosion.

Potential Impacts of LNG Marine Traffic in the Waterway on Other River Users

Recreational boaters, including power boat and sailboat users, have always needed to account for commercial ship traffic on the Lower Columbia River. Fishermen frequenting the area indicate that other ship traffic does not represent either a detriment to their fishing experience or to the location they decide to fish (Kraley, 2006). While currently almost 2,000 commercial ships use the lower Columbia River, the project would add about 125 LNG carriers per year to the existing marine traffic. One of the conditions of the Coast Guard's WSR is to impose a moving 500-yard safety and security zone around LNG carriers heading up river. Recreational boat operators may have to move out of that zone while an LNG carrier passes by. We believe this minor inconvenience would only last for a few minutes, as the LNG carriers would travel up river at speeds between 8 and 12 knots. The Coast Guard's WSR further addressed communication networks that would need to be implemented to make other river users aware of future LNG carrier deliveries.

Operators of personal watercraft, such as jet-skis, and kayakers, canoers, and windsurfers typically stay in shallow waters outside of the navigation channel. They may be affected by wakes from LNG carriers. However, large commercial ships that currently travel through the lower Columbia River

already create wakes of similar size to those that would be generated by LNG carriers, and jet-skiers, kayakers, and canoers should be familiar with how to deal with wakes from large ships.

In the unlikely event of an LNG spill and associated pool fire, recreational river users could potentially be affected, depending on the location and duration of the incident. However, with the safety and security measures outlined in the Coast Guard's WSR, the likelihood of such impacts would be extremely remote and the potential impact on recreation river users would be less than significant.

4.7.1.5 Visual Resources

People in Oregon and Washington along the waterway for LNG marine traffic would view LNG carriers on the Columbia River from the point the ships enter the river to the LNG terminal at CRM 38. The proposed LNG terminal is expected to receive approximately 125 LNG carriers per year, averaging 10 to 11 ships per month or one every 3 days. In addition, the Clatsop State Forest has designated Land Management Classifications along the Columbia River just west of the proposed LNG terminal that include the visual focused stewardship subclass. We believe that the visual impacts of LNG marine traffic would be short term, for it would typically take a vessel only a few minutes to pass through the viewshed, traveling at the average speed between 8 and 12 knots. LNG carriers would be generally consistent with large tankers that currently use the navigation channel heading to and from upriver ports. There are as many as 2,000 commercial vessels per year that travel up and down the Columbia River. Therefore, the addition of 125 LNG carriers per year would not be a significant increase in terms of visual impacts for observers along the waterway.

4.7.2 LNG Terminal

4.7.2.1 Land Use

The proposed LNG terminal would be on the southern shore of the Columbia River and southeastern end of the Clifton Channel in Clatsop County, Oregon. NorthernStar controls a 411-acre upland tract, with an option to purchase from the current landowner. Historically, this property was the site of several lumber mills that operated from about 1843 to 1852, 1910 to 1920, and 1930 to 1962, and the location of the town of Bradwood from about 1930 to 1985 (see section 4.9.1.2). Between about 1966 and 2003 the COE placed almost 900,000 cubic yards of material dredged during maintenance of the Columbia River navigation channel at Bradwood.

Construction of the LNG terminal would affect about 61 acres within the 411-acre upland tract controlled by NorthernStar, and about 40 acres would be needed for the permanent operation of the onshore facility structures (see table 4.7.2-1). The remainder of the upland tract to be acquired by NorthernStar would be left alone as a buffer area around the terminal; kept in its current land use as forest, shrub, or wetlands. NorthernStar intends to conserve and improve wetland habitat at the mouth of the Hunt Creek as part of its wetland and habitat mitigation plan. A 58-acre area of the Columbia River would be used for a turning basin and ship berth at the terminal. Within the 58-acre maneuvering area, 46 acres would be dredged from the river bottom that is owned by the state of Oregon (section 1.3 discusses the permits that NorthernStar would need to obtain before being allowed to dredge in the Columbia River). Additionally, a power line would be constructed to bring electricity to the LNG terminal, affecting 16.9 acres. The right-of-way for the power line would be on private land that would have to be acquired by PacificCorp.

TABLE 4.7.2-1												
Land Uses Affected by the Construction and Operation of the Proposed LNG Terminal ^a												
Facility Component	Marine Industrial (acres)		Forest/Aquatic Natural (acres)		Aquatic Development (acres)		Forest (acres)		Aquatic Development/ Aquatic Conservation (acres)		Total (acres)	
	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.
Ship Berth and Unloading Facilities	5.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	1.0
LNG Storage	20.5	14.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.5	14.5
Regasification	16.0	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	10.5
Bridge/Road/Railroad Easements	0.0	0.0	11.9	8.1	0.0	0.0	0.0	0.0	0.0	0.0	11.9	8.1
Water Storage and Treatment	6.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	4.5
Buildings	0.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0	0.0	0.0	1.0	0.5
Buffer	0.0	0.0	6.0	1.0	0.0	0.0	0.9	0.9	0.0	0.0	6.9	1.9
Power Line Right-of-Way	0.0	0.0	0.0	0.0	0.0	0.0	16.9	16.9	0.0	0.0	16.9	16.9
Ship Berth and Maneuvering Area (includes 46-acre dredge area footprint)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	58.0	58.0	58.0	58.0
Total	48.5	30.5	17.9	9.1	1.0	0.5	17.8	17.8	58.0	58.0	143.2	115.9
^a	These were the land use zoning designations at the time NorthernStar filed its applications with the FERC in June 2006. However, in March 2008 Clatsop County changed the zoning for the proposed LNG terminal.											
Con.	Construction											
Oper.	Operation											

The proposed 58-acre ship maneuvering area for the terminal in the Columbia River is currently open water. About 21 acres onshore that would be impacted by construction of the LNG terminal is currently dredged material piles. The onshore area impacted by construction of the LNG terminal is currently forested and scrub-shrub vegetation. Within the onshore area, wetlands characterized as emergent, scrub-shrub, and forested are also present (see table 4.4.1-2). Construction of the 1.5-mile-long powerline would affect forested land. Commercial/industrial lands affected by construction of the proposed LNG terminal would include Bradwood Road and the PWRR. Section 2.1.3 describes the various components of the LNG terminal.

Based on the *Clatsop County Comprehensive Plan*, at the time when NorthernStar filed its applications with the FERC, the land that may be affected by construction and operation of the LNG terminal was zoned as Marine Industrial, Forest, Aquatic Development, Aquatic Natural, and Aquatic Conservation. A DMD Overlay zone applies to a portion of the site. The DMD Overlay Zone is intended to designate sites for disposal of dredged materials. Additionally, an inactive licensed basalt quarry is presently located on the LNG terminal site. The quarry may be activated during construction but would be decommissioned before the LNG terminal is operational.

In response to NorthernStar's land use application to Clatsop County, the zoning for portions of the terminal have been changed. Additional information regarding land use zones at the proposed LNG terminal is provided below in section 4.7.2.2.

4.7.2.2 Consistency with Existing Land Use Plans, Policies, Designations, and Guidelines

State and local government entities in Oregon have established plans, policies, designations, and guidelines for land use development in the project area. At the time NorthernStar filed its applications with the FERC it appeared that the proposed project would not be wholly consistent with some of those plans. However, in March 2008, Clatsop County made a final decision to change the land use zoning at the proposed Bradwood Landing LNG terminal. Consistency of the Bradwood Landing Project with local and state zoning and land use planning goals ordinances, and regulations is discussed below and in section 4.7.3.2. Consistency with coastal zone management programs is discussed in section 4.7.2.4.

Land use in Oregon is required to be consistent with the Statewide Land Use Planning Goals. The goals are implemented in Clatsop County through its state-acknowledged Comprehensive Plan as established by Clatsop County Ordinance 80-14, the Land and Water Development and Use Ordinance (LWDUO). The land uses described in section 4.7.2.1 also equate to the zoning codes used by Clatsop County. These include Marine Industrial, Forest, Aquatic Development, Aquatic Natural, and Aquatic Conservation Two. According to the Comprehensive Plan, the following summarizes the purposes of each of the land use zoning codes affected by the project:

- Marine Industrial – to manage Columbia River Estuary shorelands in urban and urbanizable areas and shorelands in rural areas especially suited for water-dependent development and to reserve these shorelands for water-dependent industrial, commercial, and high-intensity recreational use. The provisions of the Marine Industrial zone are set forth in section 3.620 - 3.636 of the LWDUO.
- Forest 80 – to conserve forest lands by maintaining the county's forest land base; to protect the county's forest economy by making possible economically efficient forest practices that assure the continuous growth and harvest of forest tree species as the leading use of forest land consistent with sound management of soil, air, water, fish and wildlife resources, and scenic resources; and to provide for public and private recreational opportunities and agriculture. The provisions of the Forest 80 zone are set forth in section 3.550 - 3.558 of the LWDUO.
- Aquatic Natural – to assure the preservation and protection of significant fish and wildlife habitats, continued biological productivity of the Columbia River estuarine resources, and scientific research and educational opportunities. These areas are managed to preserve natural resources in recognition of dynamic, natural, geological, and evolutionary processes. This zoning code includes all tidal marshes, tidal flats, and seagrass, algae beds, and ecologically important subtidal areas, and is intended to preserve those natural aquatic resource systems existing relatively free of human influence. Provisions of the Aquatic Natural zone are set forth in section 3.802 - 3.812 of the LWDUO.
- Aquatic Development – to provide for navigation, and other identified needs for public, commercial, and industrial water-dependent uses, consistent with the level of development or alteration allowed by this zone and the need to minimize damage to the Columbia River estuarine ecosystem. Provisions of the Aquatic Development zone are found in section 3.740 - 3.756 of the LWDUO.
- Aquatic Conservation Two – to conserve designated areas of the Columbia River Estuary for long-term uses of renewable resources that do not require major alterations of the estuary, except for the purpose of restoration. These areas are managed for the protection and conservation of their natural resources and benefits, and include areas needed for

maintenance and enhancement of biological productivity, recreational resources, aesthetic values, aquaculture and open water portions of the estuary. Areas that are partially altered and adjacent to existing developments of low to moderate intensity that do not possess the resource characteristics of other aquatic areas are also included in this zone. The provisions of the Aquatic Conservation Two zone are set forth in section 3.780 - 3.792 of the LWDUO.

During project scoping, we received a letter from the Clatsop County Board of Commissioners that further outlined the county's land use regulations and ordinances that apply to the construction and operation of an LNG terminal at Bradwood (Clatsop County Board of Commissioners, 2005). While the letter was not intended to express any position or establish any findings by Clatsop County regarding NorthernStar's proposal, it did identify several apparent conflicts between the existing land use zoning and the action at the time NorthernStar filed its applications with the FERC. Some of the concerns expressed by Clatsop County during scoping are summarized below.

The main policies of Clatsop County's Comprehensive Plan that relate to the LNG terminal are found in the plan's "Goal 16 and 17 Element: Columbia River Estuary." The Goal 16 and 17 Element contains six major policy sections, labeled P15, P20, P21, P30, P40, and P50. Each of these sections contains a detailed set of related policies. For example, P20, "Columbia River Estuary Shoreland and Aquatic Regional Policies," consists of 20 policies dealing with topics such as diking, log storage, and fish and wildlife habitat in the Columbia River estuary. All of Bradwood's shoreline lies within the Columbia River estuary and hence is subject to Goal 16. Therefore, much of the Goal 16 and 17 Element of Clatsop County's plan is relevant to the Bradwood Landing Project. For example, the "use tables" for aquatic and shoreland areas specify categories of development that may be allowed on lands along the Columbia River, including the proposed LNG terminal site. The policies most directly applicable to the proposed development are:

- P20.3, "Deep-Water Navigation, Port and Industrial Development;"
- P20.5, "Dredging and Dredged Material Disposal;"
- P20.6, "Estuarine Construction;" and
- P30.21, "Bradwood."

P30.21 is a three-page subarea plan for the Bradwood area. Some of the key provisions most relevant to the Bradwood Landing Project are as follows:

The Bradwood Industrial site offers limited potential for small to medium water-dependent industrial development. There is deep water close to shore, some available vacant land and the proximity of the wildlife refuge...Future development which would require extensive filling (impacting aquatic areas in excess of 20 acres) along the Columbia River shoreline for the purpose of creating additional industrial land is not appropriate. In order to fully utilize the marine industrial shorelands, it would be appropriate to fill the old Bradwood mill pond. This pond covers an area of less than 10 acres. This fill activity would be subject to the state and federal permit process and the development of proper mitigation areas. An upland area along the entrance road into Bradwood has been identified as a potential mitigation site.

On December 12, 2006, NorthernStar filed an application with Clatsop County to amend the combined Clatsop County Comprehensive Plan Map and Zoning Map to change areas that were zoned as Aquatic Development to Marine Industrial, and from Aquatic Conservation Two to Aquatic Development. In addition, the application sought an amendment to the Clatsop County Comprehensive Plan to allow dredging for the creation of the terminal turning basin and berth, and to delete language in the plan relating to small and medium scaled development. The Clatsop County Planning Commission

held hearings on NorthernStar's land use application in July 2007, and recommended approval of the applications subject to conditions following public deliberations in August 2007, with an adoption of findings on September 28, 2007. The Board of Commissioners held public hearings in October and November 2007, with a tentative decision to approve the application in December 2007. A final decision to adopt the zoning changes was made on March 20, 2008.

The Marine Industrial zone covers that portion of the Bradwood property formerly occupied by the Bradley-Woodard lumber mill. Much of this land has been raised above the elevation of the adjoining marsh and wetlands by deposition of dredged materials and by fill used to create berms for the railroad and haul road that cross the property. As discussed above, the zone is intended for intensive water-dependent industrial uses, subject to various standards and requirements regarding matters such as buffers, building height, and setback. Therefore, NorthernStar's activities proposed within the Marine Industrial zone are permitted or conditionally permitted uses within this zone.

In the middle of the portion of the Bradwood tract zoned as Marine Industrial is the former mill pond; now partly filled with silt. The county's land use maps show the above-water silted parts of the mill pond to be zoned Marine Industrial and the remaining underwater portion to be zoned Aquatic Development. All the mill pond and Aquatic Development-zoned waters are owned by the state and are not part of the privately owned Bradwood property. In its March 2008 decision, the Clatsop County Board of Commissioners changed the zoning of the 2.51-acre mill pond area from Aquatic Development to Marine Industrial.

Related to the Marine Industrial zone is the DMD Overlay Zone, which applies to the same part of the proposed LNG terminal site that is zoned Marine Industrial. The zone is intended to designate sites for disposal of dredged materials, for which the Bradwood property has already been used. Resulting dredged materials are evident as large sand dunes along the shore of the Columbia River on the eastern part of the site. The provisions of the DMD Overlay Zone are set forth in Clatsop County's LWDUO in section 4.160-4.172. The DMD Overlay Zone is intended to "protect important dredged material disposal sites from incompatible and preemptive uses that may limit their ultimate use for the deposition of dredged material." It thus prohibits many uses that would otherwise be allowed under the Marine Industrial zone as outlined in section 4.168 of the LWDUO and, therefore, the activities proposed by NorthernStar would not be permitted in this zone. The DMD Overlay Zone, however, does contain provisions for withdrawing the DMD designation under certain conditions.

A portion of the land required for the proposed LNG terminal was zoned Aquatic Natural. Generally, the Aquatic Natural designation was intended as a conservation zone for the protection of fish and wildlife habitats, and estuarine and aquatic resources. At the proposed LNG terminal, the Aquatic Natural zone covered a low-lying brushy area of disturbed wetlands bounded on the northwest by Hunt Creek, on the east by the railroad track that runs through Bradwood, and on the southwest by Clifton Road. Two smaller strips of Aquatic Natural-zoned land were also identified between the railroad and tidal marsh and between the berms that support the parallel road and railroad. Typically, intensive industrial activities would not be allowed in Aquatic Natural zoned lands. However, in its March 2008 decision, the Clatsop County Board of Commissioners re-zoned these areas, covering a total of 5.35 acres, to Marine Industrial.

A portion of the land for the proposed berth at the LNG terminal is zoned as Aquatic Development. The Aquatic Development zone applies to an aquatic strip or band of the estuary along the northeastern shore of Bradwood. These Aquatic Development-zoned areas are not part of the privately owned 411-acre Bradwood tract; they are owned by the state. Generally, the zone allows many of the intensive water-dependent industrial uses proposed by NorthernStar, such as "cargo loading and unloading facilities."

The portion of the Columbia River where NorthernStar proposes to create its turning basin/maneuvering area was formerly zoned as Aquatic Conservation Two. This area is owned by the State of Oregon, and NorthernStar would have to acquire permits from the COE, ODSL, and ODEQ, as discussed in sections 1.3 and 4.3.2.3, for the dredging of the turning basin. Generally, as mentioned above, the Aquatic Conservation Two zone is a conservation zone intended to protect estuarine resources. Typically, industrial activities would not be allowed within the Aquatic Conservation Two zone. However, in its March 2008 decision, the Clatsop County Board of Commissioners changed the zoning of the 46.4 acres where NorthernStar would dredge its turning basin to Aquatic Development, and changed the plan designation for this area from Conservation – Other Resources to Development.

The Forest 80 zone applies to lands that would be crossed by the nonjurisdictional power line, and portions of the access roads serving the LNG terminal. However, the access roads are currently cleared and are not actually forested. Generally, as discussed above, this zone is intended to conserve forest lands for growing and harvesting trees. However, roads, transmission lines, and gas pipelines would be allowed within the Forest 80 zone, subject to certain conditions and limitations. Therefore, NorthernStar's activities proposed within this zone appear to be permitted or conditionally permitted uses.

Part of the LNG terminal site contains a quarry, which is subject to a Quarry Mining Overlay. Uses permitted or conditionally permitted in the underlying zone, including "Sensitive Uses," are allowed in the quarry impact area subject to the underlying zone criteria and as otherwise authorized by the energy, social, economic and environmental analysis (section 4.4.20 of the LWDUO). The new use may not interfere with or cause an adverse impact on permitted mineral activity or prevent adjacent mineral activity from meeting applicable standards. The quarry site is under the control of NorthernStar. NorthernStar plans to possibly use material from the quarry during construction of the proposed project and then cease quarry operations during the life of the facility.

The March 20, 2008 final decision by the Clatsop County Board of Commissions to approve the land use applications for the proposed Bradwood Landing Project was based upon NorthernStar accepting a series of conditions, including:

- submittal of copies of state and federal permits required for project development;
- certain stipulations for bridge replacement;
- a specific time window for removing the two concrete batch plants;
- developing and submitting a shoreline monitoring plan prior to dredging;
- maintaining access to Clifton Channel;
- developing and submitting a dredge material disposal plan prior to dredging;
- preventing runoff from the dredge disposal site to adjacent wetlands and intertidal areas;
- revegetation of the dredge disposal area if there is a delay in constructing the facility;
- re-establishment of stream banks and associated vegetation following construction of the electric power lines;
- submitting a site plan demonstrating compliance with county site development standards;

- certain widening and vegetative clearing along Rulryville Road;
- certain signage along Taylorville Road;
- submitting construction drawings for the purposes of flood hazard review;
- not opposing re-zoning of a parcel near the facility as Aquatic Natural;
- only two tanks would be permitted as part of the land-use review process;
- submitting a suitable Mitigation Plan that meets the applicable county performance standards, and is consistent with approvals from other agencies;
- making Clifton and Bradwood Road improvements consistent with county requirements;
- developing a decommissioning plan that includes financial assurance for site restoration;
- implementing safety recommendations outlined in Clatsop County's Public Safety Assessment for the facility;
- securing permits related to constructing and operating the helicopter pad prior to constructing the LNG facility; and
- developing and submitting an erosion control plan consistent with county standards.

In a letter dated November 14, 2007, as part of the application review process noted above, NorthernStar committed to meeting the conditions specified by Clatsop County.

4.7.2.3 Existing Residences and Planned Developments

Existing Residences

Based on review of aerial photographs and site visits, no residences are present within 0.5 mile of the LNG terminal. Two abandoned, unoccupied structures are located within the parcel controlled by NorthernStar. These consist of an open-sided pole barn erected in about 1985 that is partly covered by dredged material and the concrete remains of what was formerly an office building for the Bradley-Woodard lumber mill. The closest residence to the proposed LNG terminal is about 0.6 mile to the northeast across the Columbia River on Puget Island. No hospitals, fire departments, law enforcement offices, churches, or schools are located within 1 mile of the LNG terminal.

There are 21 residences within a 0.6- to 1.0-mile radius around the LNG terminal; all are located on the western tip of Puget Island. NorthernStar identified 45 other residences between 1 and 2 miles away from the terminal, including 3 houses in Clifton. Additionally, about 15 commercial structures were identified between 1 and 2 miles from the proposed LNG terminal.

The closest communities to the proposed LNG terminal are Clifton and Knappa, in Clatsop County, Oregon, and Puget Island and Cathlamet in Wahkiakum County, Washington. Clifton is located about 1 mile west of Bradwood on the south shore of the Columbia River along the Clifton Channel. It was the site of a fish packing factory in the 1870s, but by the 1960s Clifton had lost its post office, and an observer in 2000 counted only about five dwellings there (Helwig, 2000). Knappa is a rural unincorporated community, with a school district and fire department, located more than 3 miles

southwest of Bradwood along Highway 30. Puget Island, situated in the middle of the Columbia River and extending west to east from CRM 38 to CRM 45, has a disbursed rural population of just under 800 people. The town of Cathlamet is the Wahkiakum County seat, first founded by fur traders in the 1840s, and incorporated in 1907. It has a population of about 560 people and is located more than 3 miles northeast of Bradwood, on the other side of the Columbia River. Section 4.8 discusses regional population, local community social services, and infrastructure for the area.

During construction and operation of the LNG terminal there could be impacts on nearby residential and commercial areas from increased traffic on local roads, dust, odors, and noise. There would also be visual impacts for people residing or passing through the viewshed that includes the terminal. In general, as the distance from the terminal increases, the severity of the impacts decreases. We believe that most of the impacts on nearby residential communities related to traffic, dust, and odors would be temporary and short term, and not significant.

The majority of project workers would commute on Highway 30, which could have traffic implications for the communities of Clatskanie to the east and Knappa to the west. In order to allow construction traffic to move to and from the site safely, and lessen the impact on nearby communities, NorthernStar would follow a traffic management plan.

It is possible that construction of the proposed LNG terminal could have temporary adverse impacts on air quality due to fugitive dust emissions. The amount of fugitive dust would depend on the composition and moisture content of soils disturbed during construction activities. Given the regional climate and the distance to nearby residential communities, it is unlikely that fugitive dust from project construction would have an adverse effect. However, NorthernStar would implement BMPs to ensure that dust does not cause a nuisance (see section 4.10.1.2).

Dredging activities can sometimes result in odors, primarily due to hydrogen sulfides released from decaying organic material (e.g., plants) that occur in the dredged sediments. Generally, the greatest potential for odors is shortly after the dredged materials are brought to the surface and when the material is still wet (particularly when temperatures are warm). The sediments to be dredged from the turning basin site do not contain a high percentage of organic material. Additionally, the issue of odors associated with dredged material has not been particularly problematic for other dredging operations on the Columbia River. Therefore, neither dredging nor sediment disposal associated with the Bradwood Landing Project is expected to cause, or contribute to, objectionable odors on nearby residential and commercial areas.

To minimize noise impact on nearby noise-sensitive areas (NSA), NorthernStar would consider incorporating such noise attenuation measures as:

- use of bubble curtains and wooden blocks during pile driving;
- noise barriers or enclosures to block sound transmission from operating equipment;
- use of noise attenuation devices (i.e., exhaust mufflers) on construction equipment to manufacturers' recommended specifications;
- restricting activities with the potential to cause an exceedance of regulatory limits to daylight hours (i.e., dusk to dawn), except dredging;
- working with the dredging contractor to ensure that the project complies with any noise regulations applicable to nighttime construction activities;

- valves with "low-noise" trims;
- acoustical insulation for aboveground piping; and
- selection of equipment types with the least noise emissions.

Additional information on measures NorthernStar would implement to reduce impacts associated with increased traffic, dust, and noise is presented in sections 4.8.2.7, 4.10.1.2, and 4.10.2.2, respectively. Visual impacts are discussed in more detail in section 4.7.2.7.

Planned Developments

We did not identify any future planned residential or commercial developments in close proximity to the proposed LNG terminal. Based on NorthernStar's conversations with Clatsop County, no permits for new developments near the site have been filed (Stoel Rives, 2005). Wahkiakum County's Public Works Department indicated that its current construction projects include countywide guardrails, Altoona Pillar Rock slide repair, Puget Island ferry ramp replacement, West Little Island paving, and Beaver Creek emergency repair. Planned developments identified in the area that may cumulatively or additively impact resources that would be affected by construction and operation of the Bradwood Landing Project are discussed in section 4.12.

4.7.2.4 Coastal Zone Management

In 1972, Congress passed the CZMA to "preserve, protect, develop, and where possible, to restore or enhance, the resources of the nation's coastal zone for this and succeeding generations" and to "encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone" (16 USC 1452, section 303 (1) and (2)).

Section 307 (c)(3)(A) of the CZMA states that "any applicant for a required federal license or permit to conduct an activity, in or outside the coastal zone, affecting any land or water use or natural resource of the coastal zone of that state shall provide a certification that the proposed activity complies with the enforceable policies of the state's approved program and that such activity would be conducted in a manner consistent with the program." In order to participate in the coastal zone management program, a state is required to prepare a program management plan for approval by the OCRM. Once the OCRM has approved a plan and its enforceable program policies, a state program gains "federal consistency" jurisdiction. This means that any federal action (e.g., a project requiring federally issued licenses or permits) that takes place within a state's coastal zone must be found to be consistent with state coastal policies before the federal action can take place.

The Bradwood Landing Project is subject to a federal Coastal Zone Consistency Review because it would: 1) involve activities within the coastal zone of Oregon; and 2) require several federal permits and approvals (see table 1.3-1). Oregon has an approved coastal zone management program administered by the ODLCD, per section 306(d)(5) of the CZMA and ORS196.435. A description of the state's program, the applicable project activities, and information provided by NorthernStar in its FERC section 7(c) application regarding consistency of the project with state policies is provided below.

According to the OCMP, the coastal zone of Oregon encompasses the:

area lying between the Washington and California borders on the north and south, bound on the west by the extent of the state's territorial sea jurisdiction (3 nautical miles offshore), and

extending east to the crest of the Coast Range except at: [a] the Columbia River where the coastal zone extends to the downstream end of Puget Island, [b] the Umpqua River where the coastal zone extends to Scottsburg, and [c] the Rogue River where the coastal zone extends to Agness.

The mission of the OCMP is “to provide the public with sustainable coastal natural resources” (OCMP, 2005). To accomplish this mission, the OCMP has combined various state statutes for managing the state’s coastal lands and waters into a single, coordinated package. The package, administered by the ODLCD, has three basic parts:

1. *The 19 Statewide Planning Goals.* The 19 goals are Oregon’s standards for comprehensive land use planning. The goals set requirements on how land use decisions are to be made by local governments and state agencies. The ODLCD is responsible for adopting and interpreting most of the 19 goals, sets overall rules for planning decisions, and oversees the statewide program.
2. *City and County Comprehensive Land Use Plans.* In Oregon, local governments share the job of land use planning with the state by preparing and adopting plans. Ordinances are then implemented to meet the statewide planning goals and are coordinated with relevant programs of Oregon state agencies. In effect, day-to-day land use decisions can be made by local governments in conformance with their state-approved plans.
3. *State Agencies and Natural Resource Laws.* Since the late 1960s, the Oregon Legislature has adopted numerous statutes in response to threats on coastal and statewide resources from uncontrolled development. These statutes include the Oregon Beach Bill, administered by the Oregon Parks and Recreation Department, and the Removal/Fill Law, administered by the ODSL. All state agencies must also follow certain requirements of the Statewide Planning Goals and must coordinate their land use actions with local government comprehensive land use plans. This helps ensure that all land use decisions by local governments and by state agencies are done more or less under the umbrella of the Statewide Planning Goals.

NorthernStar is coordinating with the COE and ODLCD regarding coastal zone management review as part of the COE section 404 permit application. Federal regulations require the federal consistency determination request to contain at least: 1) a detailed description of the proposed activity; 2) a discussion of anticipated coastal zone effects; and 3) an evaluation of the activity and effects in light of the enforceable policies of the approved OCMP.

NorthernStar submitted a draft consistency certification to the ODLCD on May 31, 2006. A formal certification with a request for a formal federal consistency review was submitted on December 8, 2006. In a January 5, 2007 letter to NorthernStar, the ODLCD stated that the certification did not include the necessary data and information required by 15 CFR 930.58(a) and that the agency’s 6-month review period had not yet begun. Among the information requested and subsequently provided by NorthernStar was: copies of complete applications for federal, state, and local licenses, permits, and approvals; findings that clearly identify data and information from referenced documents together with a clear explanation of why this information leads to a conclusion that a standard is met; additional details on the rail line realignment; the effects and compliance with state and local requirements for the proposed soil disposal area, temporary parking area, power line, concrete plant, aggregate site use, barge operations, road improvements, bridge replacement, mitigation, and in-water dredge material disposal site use; and copies of referenced supporting documents.

NorthernStar submitted a revised consistency certification on October 23, 2007. On November 21, 2007, ODLCD determined that although NorthernStar's application did not include all necessary data, pursuant to 15 CFR 930.60(a)(2) its 6-month review period began with the submission of the revised consistency certification. However, on April 10, 2008, the ODLCD and NorthernStar executed a Stay Agreement that allowed for a 150-day continuation period, when NorthernStar could provide additional information to supplement its application with the ODLCD. According to the Stay Agreement, the ODLCD would make its consistency determination for this project on or before September 21, 2008. On May 9, 2008, ODLCD sent NorthernStar a data request to clarify information about the project.

If the Bradwood Landing Project is authorized by the Commission, NorthernStar would need to document that its project is consistent with the CZMA before the FERC would allow any construction activities to begin. Therefore, **we recommend that:**

- **Prior to construction, of the LNG terminal and pipeline, NorthernStar should file with the Secretary documentation of concurrence from the ODLCD that the project is consistent with the CZMA.**

4.7.2.5 Hazardous Waste Sites

Based on an August 2005 Phase I Environmental Site Assessment, there are no contaminated sites within 0.25 mile of the proposed LNG terminal site (AMEC, 2005). However, the Environmental Site Assessment did identify several RECs on the property. RECs are defined by the presence or likely presence of hazardous substances and petroleum products on a property under conditions that could indicate an existing release, a past release, or a material threat of a release into the ground, groundwater, or surface water. The following RECs were identified at the site:

- REC 1 – two gasoline USTs, of which one was located at a former town store and the other was located at the main mill office. Documentation of their removal or decommissioning was not found;
- REC 2 – an area of the former train/maintenance shop building located at the mill where trains and other equipment were maintained;
- REC 3 – suspect asbestos-containing cement board scattered along the south side of the PWRR tracks;
- REC 4 – solid waste disposal and burn areas located along Bradwood Road, between the northwestern end of town and the Hunt Creek Bridge; and
- REC 5 – the potential presence of PCBs and dioxins in dredged Columbia River sand deposited at the proposed site.

RECs 1 and 2 are buried under dredged material. Because excavations would not be a component of LNG terminal construction, NorthernStar does not anticipate the need to manage potentially contaminated materials associated with RECs 1 and 2.

Before construction, NorthernStar would inspect the area occupied by REC 3. Any suspected asbestos-containing material would be collected and disposed of appropriately and in accordance with applicable state and federal regulations.

Similar to RECs 1 and 2, REC 4 has no surface manifestation and is buried. The realigned railroad and the LNG terminal administrative building would overlap the footprint of REC 4. However, because excavation is not a component of railroad construction and the administrative building would be constructed on fill, it is not anticipated that management of potentially contaminated materials associated with REC 4 would be required.

REC 5 is described as the potential presence of PCBs and dioxins in dredged Columbia River sand deposited at the site. However, in a February 1, 2006 letter from the COE to NorthernStar, the COE stated “USACE dredged material placed at this site is not a potential source of contaminants based on historical information” (COE, 2006).

In summary, management of potentially contaminated materials during LNG terminal construction is not anticipated. However, we have recommended that NorthernStar prepare a *Plan for the Discovery and Management of Contaminated Soils and Groundwater* that would specify the procedures to be followed to identify, characterize, and properly manage potentially contaminated materials in the event they are encountered during construction of the project (see section 4.2.2.1).

4.7.2.6 Recreation, Public Interest, and Special Use Areas

The Bradwood Landing LNG terminal would not affect any national or state parks, Indian reservations, or wild and scenic rivers. The project would be located on private property that does not provide public access to the Columbia River.

There are several recreation and public interest areas located in the vicinity of the proposed LNG terminal. The Clatsop State Forest boundary is about 0.3 mile west of the terminal. Tenasillahe Island, which is part of the JBHNWR, is located about 0.7 mile northwest across Clifton Channel from the terminal. The Bradley State Scenic Viewpoint is located about 1.8 miles southeast of the terminal. The Elochoman Slough Marina at Cathlamet is more than 3 miles northeast of Bradwood. The closest developed public recreational beach is at Skamokawa Vista Park, about 4 miles northwest of the terminal, across the Columbia River in Wahkiakum County, Washington. We do not believe that the project would have any significant adverse effects on these recreational use areas, which are further discussed below.

Designated Recreation and Public Interest Areas

The nearest recreational and public interest areas to the proposed Bradwood Landing LNG terminal include:

- a portion of the LCNHT, which is congruent with the Columbia River and within the area to be affected by terminal construction and operation;
- a portion for the Lower Columbia River Water Trail that is adjacent to the terminal and its LNG carrier berth and within the area that would be dredged for the proposed turning basin/maneuvering area;
- Bradwood Cliffs and old growth forest, which is about 0.2 mile south;
- the Clatsop State Forest, which is about 0.3 mile west;
- the JBHNWR, which is about 0.7 mile north on Tenasillahe Island;
- county land, which is about 1 mile southwest; and
- the Bradley State Scenic Viewpoint, which is about 1.8 miles southeast.

Lewis and Clark National Historic Trail

The LCNHT follows the lower Columbia River adjacent to the proposed LNG terminal at Bradwood, where NorthernStar would dredge its turning basin. Project impacts on the LCNHT are addressed in section 4.9.

Lower Columbia River Water Trail

The Lower Columbia River Water Trail also follows the river past the proposed LNG terminal. The water trail is intended for use by non-motorized water craft mostly during daily excursions. The proposed LNG carrier turning basin/maneuvering area and terminal berth would overlap a portion of the water trail. The dredging for these facilities may temporarily impact users of the water trail during construction. The Zones of Concern along the waterway for LNG marine traffic would also overlap the water trail, and potential project-related impacts associated with LNG carrier transit to and from the terminal are discussed in section 4.7.1.4.

Bradwood Cliffs/Old Growth Forest

Within about 0.25-mile of the proposed LNG terminal are the “Bradwood Cliffs,” which have been identified as a “Scenic and Natural Area” in the Clatsop County Northeast Community Plan. The plan describes the cliffs as follows: “The area consists of 40 acres of old growth Douglas fir forest standing on basalt ledge overlooking the Columbia River. This stand is highly natural and the old growth trees will continue to constitute a viable natural ecosystem if left alone. The steep rocky slopes could not tolerate logging.” Additional details on existing upland forested communities are presented in section 4.4.2.2.

Construction and operation of the LNG terminal would not affect old growth forest or the Bradwood Cliffs, NorthernStar revised the power line route so as to avoid impacts on the old growth forest associated with the Bradwood Cliffs (see section 3.1.7).

Clatsop State Forest

Located about 0.3 mile west of the LNG terminal site in Oregon is the Clatsop State Forest. The *Clatsop State Forest Astoria District Recreation Management Plan* outlines the implementation of recreation management in the state forest through objectives and actions, activity zoning, and the type of facilities the ODF will develop and manage. Dispersed recreational activities occur on forest lands, including hunting, fishing, camping, off-highway vehicle use, horseback riding, mountain biking, hiking, and scenic viewing. The ODF’s Forest Management Plan for Northwest Oregon has Land Management Classification designations that include areas of visual concern. There is a visual designation along the Columbia River on the Clatsop State Forest directly west of the proposed Bradwood Landing LNG terminal.

The only effect the proposed LNG terminal may have on visitors to the Clatsop State Forest would be visual impacts for viewers using the forest. Visual impacts are addressed in section 4.7.2.7.

Julia Butler Hansen National Wildlife Refuge

Located about 0.7 mile north of the LNG terminal site on Tenasillahe Island is the JBHNR. The eastern end of Tenasillahe Island has been used to store materials dredged from the Columbia River during maintenance of the federal navigation channel. The JBHNR was established to protect the endangered Columbian white-tailed deer. It contains several public use facilities. Of these, the closest to

the LNG terminal is the Tenasillahe Island dike, which is open to the public and provides visitors access to the periphery of the island for wildlife viewing opportunities. Tenasillahe Island can only be reached by boat.

During construction and operation of the proposed LNG terminal there could be potential impacts on the JBHNWR, including noise and light. These impacts are discussed elsewhere in this EIS. Visual impacts are addressed in section 4.7.2.7.

County Land

Located about 1.0 mile south-southwest of the LNG terminal site is land owned by Clatsop County. Due to the distance, construction and operation of the Bradwood Landing Project is not expected to have any direct or indirect impacts on this land.

Bradley State Scenic Viewpoint

The Bradley State Scenic Viewpoint, located about 1.8 miles southeast of the proposed LNG terminal, was donated as park land to the Oregon Highway Commission in 1922. It currently serves as a rest stop along Highway 30, accommodates picnicking, and provides a view of the Columbia River and Puget Island. The LNG terminal would not be visible from this spot. However, the proposed power line to the terminal may be visible. Section 4.7.2.7 discusses the visual impacts associated with the LNG terminal.

General Recreation and Special Uses

It is possible that dredging of the turning basin during construction of the proposed LNG terminal may interfere with recreational use of the Columbia River. Because the temporary mooring of the dredge barges would occupy a relatively large portion of the channel throughout dredging operations, this equipment might present an obstruction to navigation; however, dredging would only occur between November and January when river use is lowest. Therefore, impacts on recreational uses of the river during construction would be minor and short term. Operation of the LNG terminal would not significantly affect recreational uses of the river because none of the structures to be constructed as part of the ship berth would be located within the navigation channel. Potential effects on river users resulting from LNG marine traffic in the waterway to the terminal are addressed in section 4.7.1.4.

The primary impact of the proposed LNG terminal on recreational river users in the immediate vicinity would be visual. Visual impacts are discussed in section 4.7.2.7.

4.7.2.7 Visual Resources

The degree of visual impact that may result from a proposed project is typically determined by considering the general character of the existing landscape and the visually prominent features of the proposed facility. The site is bordered on the north and east by the Columbia River, and on the south and west by forest land. Southwest of the proposed site, cliffs between 225 and 235 feet high occur along the southern side of the Columbia River. Hunt Creek enters the site from the south, dropping down from the surrounding hills with a waterfall, and runs along the western side of the site before entering the Columbia River. Views from the site include the confluence of the Clifton Channel and Columbia River, and Tenasillahe and Puget Islands. The terrain in the area of the site is relatively flat along the river and slopes upward west and south of the river. The proposed Bradwood Landing LNG terminal site is not a unique or scenic resource designated by Clatsop County or the State of Oregon. The overall visual

character of the site area is of a previously used industrial site. The dominant visible landforms currently on the site are the piles of dredged materials.

Topography would screen the LNG terminal from view by potential onlookers from the south and west and those traveling along Highway 30. The proposed LNG terminal would be visible from the Columbia River, the western shore of Puget Island, and the JBHNWR (see figure 4.7.2-1). NorthernStar conducted a visual assessment for the proposed project.¹⁶ The results of the visual assessment for the Bradwood Landing Project are summarized below.

Commercial and recreational users of the Columbia River would have an unobstructed view of the LNG terminal from the river, resulting in a high to moderate overall visual impact, depending on the viewer's location and the time of year. Similarly, residents along the western shore of Puget Island and visitors to the portion of the JBHNWR on Tenasillahe Island would also experience unobstructed views of the LNG terminal, resulting in a high to moderate overall visual impact (see figures 4.7.2-2 and 4.7.2-3). Due to distance, intervening islands, and vegetation, views of the LNG terminal site from the portion of the JBHNWR on the Washington side of the Columbia River and Cathlamet would be partially obstructed, resulting in a moderate to low overall visual impact (see figures 4.7.2-4 and 4.7.2-5). Recreational users of Skamokawa Vista Park would have an unobstructed to partially obstructed view of the LNG terminal, depending on their location (see figure 4.7.2-6). However, because the park is located about 4.3 miles north of the proposed site, the resulting potential visual impacts would be low.

The completed LNG terminal would include a variety of structures as described in section 2.1.3. A component of assessing the potential visual contrast of the LNG facilities is to compare the relative scale of the structures to surrounding landscape elements. In that regard, the LNG storage tanks would be the most significant contribution to visual effects simply because of their size. The tanks would be about 254 feet in diameter and about 135 feet high, and would be constructed at a base elevation of about 20 feet above NAVD. As a result, the anticipated elevation at the top of the tanks would be about 155 feet above NAVD. About 500 feet south of the LNG storage tanks are cliffs which rise about 225 to 235 feet in height, and forested hills behind them would be a backdrop reducing visual impacts from viewpoints along the Columbia River. Furthermore, NorthernStar proposes to paint the LNG storage tanks so that they would blend in with the forested hillside in the background. Additionally, a berm would be built around the site approximately 25 feet above the water level and trees would be planted at the shoreline to provide a natural barrier between the river and the LNG terminal.

The exteriors of the LNG terminal structures would be painted to reduce visual impacts. Local planners would be consulted for color tones and hues selection. Colors of building materials suitable for the facility purpose would be chosen to blend into the existing visual environment.

¹⁶ The Visual Assessment for the Bradwood Landing LNG terminal was filed on June 5, 2006 as Appendix 8A of Resource Report 8, and is available to the public through the FERC's Internet website (<http://www.ferc.gov>). Using the "eLibrary" link, select "General Search" from the eLibrary menu and enter the docket number excluding the last three digits in the "Docket Number" field (i.e., CP06-365). Be sure to select an appropriate date range.

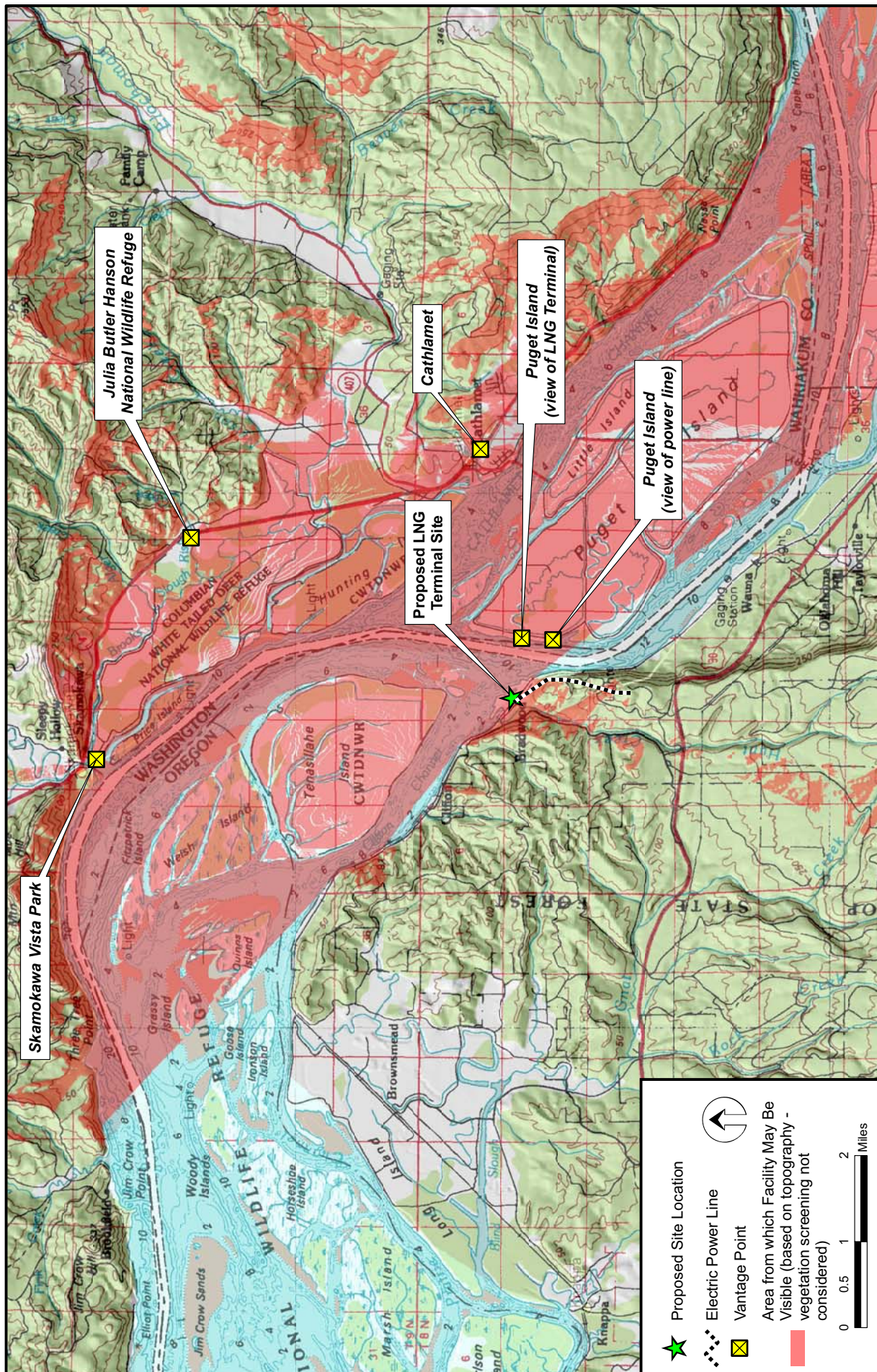


Figure 4.7.2-1
Bradwood Landing Project
 Key Observation Points



Existing



Proposed

Figure 4.7.7-2
Bradwood Landing Project
 View of the LNG Terminal Site without LNG Carrier from Puget Island



Existing



Proposed

Figure 4.7.2-3
Bradwood Landing Project
 View of the LNG Terminal Site with LNG Carrier from Puget Island



Existing

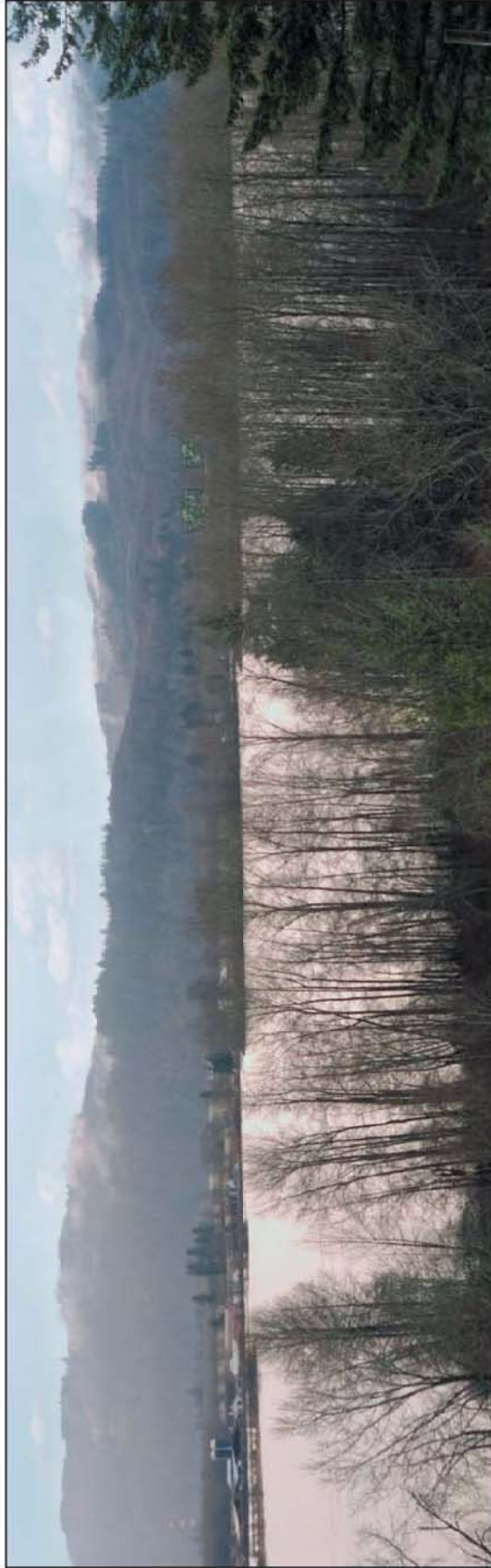


Proposed

Figure 4.7.2-4
Bradwood Landing Project
 View from the Northwestern Boundary of the JBHNR in Washington



Existing



Proposed

Figure 4.7.2-5
Bradwood Landing Project
 View of the LNG Terminal Site from Cathlamet



Existing



Proposed

Figure 4.7.2-6
Bradwood Landing Project
 View of the LNG Terminal Site from Skamokawa Vista Park

The facility would require lighting at night for operational and personal safety and security reasons. For example, lighting would be needed for vessel navigation and for illuminating work areas after sunset. In addition, lights may be needed at the ship berth, construction staging areas, and parking lots. Exterior lighting at the LNG terminal site would be installed as necessary for general plant operations, worker and visitor safety, and security.¹⁷ Lighting at the LNG terminal site is expected to be in accordance with OSHA requirements, with the recommendations of ANSI/IESNA Recommended Practice for Industrial Facilities, other applicable codes, and proper security practices.

NorthernStar filed its Lighting Plan in July 2007, which would minimize the number and/or intensity of facility lighting whenever possible through use of specific lighting intensities, light placement, and height. Down-shielding lights would also be used whenever possible to reduce off-site light scatter and illuminating of facility structures. At the current time there are no nighttime light sources at or in the immediate vicinity of the site. NorthernStar would minimize the impacts of nighttime lighting on surrounding areas through installation of appropriately focused lighting fixtures. Most of the lighting would be located in internal areas of the facility and would, therefore, not have a significant impact on surrounding areas. Overall, lighting impacts would be less than those from other developed areas along the river. Sections 4.5.2.1 and 4.5.2.3 include additional discussion of potential lighting impacts on wildlife.

Because the LNG terminal site is not served by public utilities, NorthernStar would need to supply electrical power to the facility via a 1.5-mile-long power line extension with a 100-foot right-of-way. The power line would interconnect with the existing BPA system and be constructed, owned, operated, and maintained by PacifiCorp. Five new standard pole H-frame towers, measuring 60- to 105-feet tall, would be set about 11 feet into the ground, leaving approximately 50 to 95 feet of power line pole exposed aboveground. Construction and operation of the power line would impact about 16.9 and 5.0 acres, respectively, of forest land, resulting in a permanent impact on visual resources. However, the power line would generally be located adjacent to the Columbia River in a relatively remote, rural area. The power line poles and exposed operational right-of-way would be noticeable primarily from users of the Columbia River and from a few distant vantage points, including the Bradley State Scenic Viewpoint. Figure 4.7.2-7 depicts a visual simulation of the power line from Puget Island. Two of the towers would be visible against the sky. Section 3.1.7 contains a discussion of the power line route alternatives analysis, in which visual impacts were considered.

4.7.3 Pipeline Facilities

4.7.3.1 Land Use

The Bradwood Landing Project would involve construction of one 36.3-mile-long, 30- to 36-inch-diameter pipeline that would connect the LNG terminal with the existing Williams Northwest pipeline north of Kelso, Washington. Additionally, other entities may construct three nonjurisdictional lateral pipelines. These include the 0.2-mile-long, 4-inch-diameter lateral pipeline to the Wauna Mill; the 1.4-mile-long, 24-inch-diameter lateral pipeline to the Northwest Natural pipeline servicing the Mist natural gas storage facility; and the 0.6-mile-long, 12-inch-diameter lateral pipeline to the PGE Beaver Power Plant. Table 4.7.3-1 summarizes the land uses crossed by the proposed pipeline and lateral routes.

¹⁷ The Office of Pipeline Safety (OPS) within the DOT has statutory authority to regulate the safety and security of LNG plants under the Natural Gas Pipeline Safety Act of 1968 (P.L. 90-481). The OPS security regulations for LNG facilities are found in Title 49 CFR 193, Liquefied Natural Gas Facilities: Federal Safety Standards (Subpart J-Security). These regulations govern security procedures, protective enclosures, communications, monitoring, lighting, power sources, and warning signs. Title 49 CFR 193.2911 deals specifically with security lighting requirements.



Figure 4.7.2-7
Bradwood Landing Project
View of Proposed Power Line from Puget Island

TABLE 4.7.3-1																	
Land Uses Affected by the Construction and Operation Rights-of-way for the Proposed Pipeline and Laterals ^a																	
County, State/ Facility	Agricultural ^b (acres)		Forest ^c (acres)		Rangeland ^d (acres)		Open ^e (acres)		Commercial ^f (acres)		Residential (acres)		Water ^g (acres)		Total (acres)		
	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	
Clatsop County, Oregon																	
Pipeline	0.0	0.0	51.5	25.1	10.2	5.8	5.3	2.5	7.3	3.8	0.0	0.0	1.8	0.9	76.1	38.1	
Georgia-Pacific Lateral	0.0	0.0	0.1	<0.1	0.0	0.0	0.0	0.0	2.4	1.2	0.0	0.0	0.0	0.0	2.5	1.2	
Columbia County, Oregon																	
Pipeline	51.6	23.2	59.7	29.8	25.5	12.0	16.3	7.7	6.4	2.9	0.0	0.0	8.7	4.4	168.2	80.0	
Northwest Natural Lateral	0.2	0.2	14.0	6.9	0.9	0.5	0.0	0.0	0.7	0.3	0.0	0.0	0.0	0.0	15.8	7.9	
PGE Lateral	0.0	0.0	1.6	0.8	0.4	0.2	0.0	0.0	4.2	2.1	0.0	0.0	0.0	0.0	6.2	3.1	
Cowlitz County, Washington																	
Pipeline	22.8	10.0	161.6	81.2	14.5	7.4	0.2	0.1	2.4	1.1	1.0	0.4	4.5	2.3	207.0	102.5	
Total	74.6	33.4	288.5	143.8	51.5	25.9	21.8	10.3	23.4	11.4	1.0	0.4	15.0	7.6	475.8	232.8	
Note: The totals shown in this table may not equal the sum of addends due to rounding.																	
^a	Assumes an 85-, 100-, to 120-foot-wide construction right of way for the main pipeline, and a 100-foot-wide construction right-of-way for the lateral pipelines (see Appendix F). Assumes a 50-foot-wide operational right-of-way for the main pipeline and lateral pipelines.																
^b	Agricultural land includes cropland, pastureland, orchards, groves, vineyards, nurseries, and other agricultural land.																
^c	Forest land includes deciduous, evergreen, and mixed forests, and forested wetlands.																
^d	Rangeland includes herbaceous, mixed, and shrub and brush rangeland.																
^e	Open land includes transitional areas and non-forested wetlands.																
^f	Commercial land includes industrial, mixed urban or built up land; strip mines, quarries, and gravel pits; and transportation and communications corridors.																
^g	Water includes streams and canals.																
Con.	Construction																
Oper.	Operation																

Of the 36.3 miles of the NorthernStar pipeline route, about 8.0 miles (22 percent) would be constructed adjacent to the existing KB pipeline. The remaining 78 percent of the pipeline route would be constructed on newly created right-of-way.

The predominant land use that would be crossed is forest, comprising about 50 percent of the pipeline route. Agricultural and rangeland are the next two most predominant land uses affected.

About 8.2 miles of the pipeline would cross forest land, 8.3 miles would cross wetlands, 6.7 miles would cross agricultural land, 4.8 miles would cross rangeland, 2.9 miles would cross commercial land, 0.2 mile would cross residential land, 3.0 miles would cross open land, and 2.2 miles would cross open water. Wetland and upland communities crossed by the proposed route are described in detail in section 4.4.1.3 and 4.4.2.3, respectively.

Land use impacts associated with the pipelines would include the disturbance of existing land uses within the construction right-of-way during construction and retention of a new permanent right-of-way for operation of the pipeline. NorthernStar proposes to use a 100-foot-wide construction right-of-way for the majority of the pipeline route. NorthernStar has also indicated that an additional 20 feet of construction right-of-way width may be needed for stockpiling topsoil wherever topsoil must be segregated from subsoil (e.g., in agricultural and residential lands). The 20 feet of additional width is based on the segregation of up to a 12-inch-thick layer of topsoil excavated only from directly over the pipe ditch and under the spoil pile (ditch plus spoil side).

In addition, in wetlands where the crossing length is 100 feet or less, NorthernStar would reduce the construction right-of-way to a width of 85 feet. The 85-foot limitation on the construction right-of-way width would not apply to wetlands in actively cultivated or rotated cropland. Appendix F provides a list by milepost of the locations where NorthernStar would use an 85-, 100-, or 120-foot-wide construction right-of-way.

Where the Bradwood Landing pipeline would be adjacent to the existing KB pipeline, the proposed temporary construction right-of-way would overlap onto the existing pipeline's permanent right-of-way. The overlap would be up to 10 feet on the spoil side of the pipe ditch, but no closer than 15 feet from the existing pipeline to keep construction equipment off the operating pipeline to prevent damage to the existing line.

Following construction, a 50-foot-wide permanent right-of-way would be maintained for operation and maintenance of the pipeline. The typical right-of-way cross sections that NorthernStar would use for the pipeline route are provided in Appendix D.

In addition to the construction right-of-way, NorthernStar would require temporary extra workspace outside the standard construction right-of-way at locations where additional excavation, soil placement requirements, or equipment management and staging would make it impracticable to carry out all construction operations within a 100-foot-wide corridor. These would include road and railroad crossings; wetland and waterbody crossings, areas with steep side slopes or severe terrain, areas requiring topsoil segregation, truck turnarounds, hydrostatic test water withdrawal pump locations, hydrostatic test water discharge locations, pipeline and utility crossovers, tie-ins to existing pipelines and laterals, HDD entry and exit points, staging and fabrication areas for HDD pull sections, and foreign pipeline crossings. Extra workspace may also be required where special construction techniques would be used. The size and configuration of each extra workspace is unique and dependent upon the existing conditions (e.g., available or accessible space, the presence of buildings and other structures, crossing angle, crossing depth, length of crossing, terrain, the presence of trees or sensitive habitat) at each work location. Table 4.7.3-2 lists by milepost the locations of and land uses affected by additional temporary workspaces required for pipeline construction. NorthernStar would access the construction right-of-way via existing public and private roads that intersect the right-of-way. Modifications or improvements to support the expected loads would not be required. Table 4.7.3-3 lists by milepost the roads identified by NorthernStar that would be used to access construction.

To support construction of the pipeline, NorthernStar proposes to use two pipe storage and contractor yards, one in Oregon (Yard A) and one in Washington (Yard B). Both pipe storage and contractor yards would be located on previously disturbed land. Yard A would be located within a fill site for dredged material located on the Wauna Mill property (at about MP 4.4) and would affect approximately 9.1 acres (see figure 2.3.3-1). Yard B would be located in a commercially zoned area off of Washington Way in Longview, Washington and would affect approximately 9.3 acres (see figure 2.3.3-2).

NorthernStar proposes to construct the following: 1) one pig launcher within the LNG terminal at MP 0.0, one launcher/receiver at MP 18.8, and one pig receiver at the pipeline terminus at MP 36.3; 2) a meter station at each of the following five locations: the LNG terminal (MP 0.0), the delivery point to the Wauna Mill (MP 3.7), the interconnection with the Northwest Natural intrastate pipeline to the Mist storage facility (MP 11.4), the delivery point to the PGE Beaver Power Plant at Port Westward (MP 18.9), and the terminus of the pipeline at the interconnection with Williams Northwest (MP 36.3); and 3) four MLVs at MPs 3.7, 18.8, 26.3, and 31.7. Table 4.7.3-4 summarizes by milepost the land use impacts at the proposed aboveground facilities.

TABLE 4.7.3-2

Additional Temporary Workspaces Required for Construction of the Bradwood Landing Pipeline			
County, State/ MP	Type of Additional Temporary Workspace ^a	Area Affected (acres)	Land Use Type
Clatsop County, Oregon			
0.0	HDD entry	1.0	Rangeland
		0.7	Forest
1.3	HDD exit	1.4	Forest
1.4	Pipe laydown	<0.1	Forest
		1.3	Forest
1.4	Pipe laydown	1.4	Forest
3.3	HDD entry	0.1	Rangeland
		1.1	Forest
3.7	HDD exit	1.0	Commercial
		0.3	Rangeland
3.7	Pipe laydown	0.3	Rangeland
		0.8	Rangeland
		0.1	Commercial
4.0	HDD entry	1.2	Rangeland
4.3	HDD exit	1.1	Commercial
		<0.1	Forest
4.4	Pipe laydown	2.4	Commercial
4.8	HDD entry	1.1	Commercial
5.4	HDD exit	1.2	Forest
5.4	Pipe laydown	1.2	Forest
Columbia County, Oregon			
8.4	HDD entry	1.2	Agricultural
8.6	HDD exit	1.1	Agricultural
		0.1	Water
8.7	Pipe laydown	0.6	Agricultural
		<0.1	Water
		0.6	Open
9.9	HDD entry	0.8	Agricultural
		0.4	Open
10.1	HDD exit	1.2	Agricultural
10.2	Pipe laydown	1.3	Agricultural
		<0.1	Water
13.2	HDD entry	0.9	Rangeland
		0.1	Open
13.4	HDD exit	1.1	Rangeland
		0.1	Forest
13.5	Pipe laydown	1.1	Forest
18.1	Pipe laydown	1.0	Agricultural
		0.1	Water
		0.5	Commercial
		0.1	Rangeland
		3.8	Open
18.8	HDD for slick bore	0.1	Rangeland
18.8	HDD for slick bore	0.1	Commercial
19.0	HDD exit	1.2	Commercial

TABLE 4.7.3-2 (cont'd)

Additional Temporary Workspaces Required for Construction of the Bradwood Landing Pipeline

County, State/ MP	Type of Additional Temporary Workspace ^a	Area Affected (acres)	Land Use Type
Cowlitz County, Washington			
19.8 ^b	HDD entry	1.2	Forest
		0.2	Residential
20.1	Pipe laydown	0.8	Forest
		<0.1	Water
20.2	Pipe laydown	0.8	Forest
		<0.1	Water
20.3	HDD exit	1.2	Forest
20.8	HDD double entry	1.2	Forest
21.2	HDD exit	1.2	Forest
21.2	Pipe laydown	1.4	Forest
22.2	HDD entry	1.2	Forest
22.4	HDD exit	1.2	Agricultural
22.5	Pipe laydown	0.3	Agricultural
		0.9	Forest
28.0	For bluff area	0.1	Forest
		0.3	Residential
34.2 ^b	HDD entry	1.2	Agricultural
34.6	Pipe laydown	1.3	Agricultural
34.6	HDD exit	1.2	Agricultural
34.7	Pipe laydown	1.3	Agricultural
34.8	HDD exit	0.9	Agricultural
35.3	HDD entry	0.3	Residential
		0.8	Rangeland

^a HDD entry and exit workspaces were included in the land use types affected by the pipeline right-of-way.

^b The acreages of State of Washington, Department of State Lands are estimates. As part of the process of obtaining an easement from the WDNR, NorthernStar would be required to complete a survey, conducted by a Washington state licensed surveyor, of each waterbody that would be affected by the pipeline to determine the amount of state-owned aquatic land that would be affected.

TABLE 4.7.3-3

Access Roads Required for Construction of the Bradwood Landing Project

Access Road No.	Approximate MP ^a	Approx. Length (feet)	Approx. Width (feet)	Surface Type	Current Land Use
0	2.1 and 2.4	3,256	18	Dirt	Private Road
1	2.1 and 2.4	2,591	18	Dirt	Private Road
2	3.0	355	35	Paved	Private Road
3	3.6, 3.9, and 4.1	3,342	25	Dirt	Private Road
30	4.7	1,566	25	Dirt	Private Road
4	4.8	810	35	Dirt	Private Road
5	6.7	493	26	Dirt	Private Road
6	7.5	706	27	Dirt	Private Road
7	7.8	665	26	Dirt	Private Road
8	8.1	634	27	Dirt	Private Road
9	8.4	528	21	Dirt	Private Road
10	8.6	702	25	Paved	Private Road
33	8.9	1,185	23	Dirt	Private Road
11	10.3	495	22	Dirt	Private Road
13	12.6	780	20	Dirt	Private Road
14	13.4	552	14	Dirt	Private Road
35	19.0	272	28	Dirt	Private Road
16	19.8	2211	27	Dirt	Private Road
17	20.4	1,490	57	Dirt	Private Road
31	20.9	2,777	33	Dirt	Private Road
18	22.1	2,439	41	Paved	Private Road
19	22.5	853	25	Dirt	Private Road
20	22.9	2,565	39	Paved	Private Road
21	23.5	1,663	50	Dirt	Private Road
22	24.6 and 24.7	3,929	48	Dirt	Private Road
23	25.4	3,118	58	Dirt	Private Road
24	30.3	491	45	Dirt	Private Road
25	33.2	3,321	27	Dirt	Private Road
26	34.9	1,540	40	Dirt	Private Road
27	35.5	1,471	32	Dirt	Private Road
28	35.9	1,387	26	Dirt	Private Road
29	36.3	784	39	Dirt	Private Road

^a Indicates where road intersects the construction right-of-way, which may occur at more than one location.

TABLE 4.7.3-4				
Land Uses Affected by Construction and Operation of Aboveground Facilities				
State, County/ Facility	MP	Construction Impacts (acres)	Operation Impacts (acres)	Land Use Type(s)
Clatsop County, Oregon				
Launcher and Meter Station – Bradwood Terminal	0.0 (In Terminal)	0.2 ^a	0.2 ^a	Commercial
MLV	3.7	0.5	0.1	Commercial
Meter Station – Georgia-Pacific Wauna Mill Interconnect	3.7	0.2	<0.1	Commercial
Columbia County, Oregon				
Meter Station – Northwest Natural Interconnect	11.4	0.9	0.1	Agricultural
MLV at Receiver/Launcher Facility	18.8	1.2	0.4	Commercial
Meter Station – PGE Beaver Power Plant Interconnect	18.9	0.4	<0.1	Commercial
Cowlitz County, Washington				
MLV	26.3	0.5	<0.1	Forest
MLV	31.7	0.5	<0.1	Agricultural, Forest
Receiver and Meter Station – Williams Northwest Pipeline Interconnect	36.3	0.6	0.4	Rangeland
Total Land Use for Aboveground Facilities		4.8	1.2	
^a Land use impacts associated with the launcher and receiver are included with the LNG terminal acreage totals included table 4.7.2-1 and, therefore, are not included as part of the total land use affected by the aboveground facilities associated with the pipeline.				

Construction of the pipeline facilities would disturb a total of about 553.0 acres of land, including the pipeline construction rights-of-way, temporary extra workspace, two pipe storage and contractor yards, and aboveground facilities. Of this total, 475.8 acres would be disturbed by the pipeline construction rights-of-way, 54.0 acres would be disturbed by temporary extra workspace, 18.4 acres would be disturbed by the pipe storage and contractor yards, and 4.8 acres would be disturbed by aboveground facilities. Table 4.7.3-5 summarizes the acres of each land use that would be affected by construction and operation of the proposed pipeline facilities.

Forest land would be the primary land use affected by construction of the pipeline facilities, totaling about 308.8 acres (56 percent). The remaining land uses that would be disturbed consist of 90.2 acres (16 percent) of agricultural land, 58.8 acres (11 percent) of rangeland, 51.6 acres (9 percent) of commercial land, 26.7 acres (5 percent) of open land, 15.1 acres (3 percent) of water, and 1.8 acres (less than 1 percent) of residential land.

Of the 553.0 acres of land affected by construction of the pipeline facilities, about 232.8 acres would be retained as permanent right-of-way for the pipelines and 1.2 acres would be retained for aboveground facilities. The land retained for the meter stations and MLVs would be fenced and off limits to any future development. The land that is retained as permanent right-of-way for the pipeline would be allowed to revert to former use with certain restrictions. Activities such as the construction of aboveground structures, including houses, house additions, garages, patios, pools, or any other object not easily removable, or the planting and cultivating of trees or orchards, would be prohibited within the permanent right-of-way. The permanent right-of-way would result in long-term impacts on about 143.9 acres of forest land and about 1.7 acres of orchards, groves, vineyards, or nurseries included with agricultural land. The remaining areas that are used for construction (e.g., rangeland, additional temporary workspace) would be allowed to revert to prior uses following construction with no restrictions.

TABLE 4.7.3-5																
Acres of Land Affected by Construction and Operation of the Pipeline Facilities for the Bradwood Landing Project																
Facility	Agricultural		Forest		Rangeland		Open		Commercial		Residential		Water		Total	
	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.	Con.	Oper.
Pipeline Rights-of-Way ^a	74.5	33.3	288.6	143.9	51.5	25.9	21.8	10.3	23.4	11.4	1.0	0.4	15.0	7.6	475.8	232.8
Additional temporary workspace	14.6	0.0	19.4	0.0	6.7	0.0	4.9	0.0	7.5	0.0	0.8	0.0	0.1	0.0	54.0	0.0
Pipe Storage/ Contractor Yards	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.4	0.0	0.0	0.0	0.0	0.0	18.4	0.0
Aboveground Facilities	1.1	0.1	0.8	0.1	0.6	0.4	0.0	0.0	2.3	0.6	0.0	0.0	0.0	0.0	4.8	1.2
Total	90.2	33.4	308.8	144.0	58.8	26.3	26.7	10.3	51.6	12.0	1.8	0.4	15.1	7.6	553.0	234.0
Note:	The totals shown in this table may not equal the sum of addends due to rounding.															
^a	Includes main pipeline and three lateral pipelines.															
Con.	Construction															
Oper.	Operation															

One specialty crop would be affected by construction of the proposed pipeline, a Christmas tree farm. The Christmas tree farm is located in Cowlitz County, Washington and would be crossed between MPs 31.7 and 32.0. NorthernStar has stated that it would initiate discussions with the landowner(s) before construction to coordinate activities to occur at a time that would minimize impacts on the productivity of the tree farm, such as constructing after harvest periods. After construction activities are completed, NorthernStar would repair and/or restore all contours and grade to as near original conditions as possible.

Nearly 93 percent of the pipeline facilities would be located on privately owned lands with the exception of those portions of the pipeline within public road rights-of-way and state and local lands discussed in section 4.7.3.6. NorthernStar would need to acquire new easements or property to construct and operate the proposed facilities. The easement would convey both temporary (for construction) and permanent rights-of-way to NorthernStar and would give NorthernStar the right to construct, operate, and maintain the pipeline facilities. Typically, NorthernStar would negotiate a one-time payment for each easement. Some land management agencies (e.g., the WDNR) may request alternate easement payment schedules. An easement agreement between a company and a landowner typically specifies compensation for losses resulting from construction, including losses of non-renewable and other resources, damages to property during construction, and restrictions on existing uses that would not be permitted on the permanent right-of-way after construction.

If an easement cannot be negotiated with a landowner and the project has been certificated by the FERC, the company may use the right of eminent domain granted to it under section 7(h) of the NGA and the procedures set forth under the Federal Rules of Civil Procedure (Rule 71A) to obtain the right-of-way and extra workspace areas. The company would still be required to compensate the landowner for the right-of-way and damages incurred during construction. However, the level of compensation would be determined by a court according to state or federal law.

4.7.3.2 Consistency with Existing Land Use Plans, Policies, Designations, and Guidelines

Clatsop County, Oregon

The first 6.2 miles of the proposed Bradwood Landing sendout pipeline would be in Clatsop County, Oregon. As discussed in section 4.7.2.2, land use in Oregon must be consistent with the Statewide Land Use Planning Goals, which have been established in Clatsop County by its Comprehensive Plan. The proposed pipeline facilities in Clatsop County, Oregon would cross lands zoned as Marine Industrial, Forest 80, Heavy Industrial, Lake and Wetlands, Aquatic Development, Open Space, Parks, and Recreation, and Exclusive Farm Use. According to the Clatsop County's LWDUO, the pipeline facilities appear to be consistent with the base zoning as listed in table 4.7.3-6.

TABLE 4.7.3-6	
Clatsop County Comprehensive Plan Land Use Zones Related to the Bradwood Landing Pipeline	
Comprehensive Plan Zone	Use Description (LWDUO Section Reference)
Marine Industrial	Water-dependent industrial and port uses, including fuel dispensing facilities (section 3.624(10)). Utilities, maximum utilization of existing easements and rights-of-way shall be made (section 3.624(13)). ^a Public utility structures (section 3.626(1)). ^a
Forest 80	Physical alterations to the land auxiliary to forest practices including, but not limited to, those made for purposes of exploration, mining, commercial gravel extraction and processing, landfills, dams, reservoirs, road construction, and recreational facilities (section 3.553(2)). Utility facilities for the purpose of generating power subject to the standards in section 3.509. A power generation facility shall not preclude more than 10 acres from use as a commercial forest operation unless an exception is taken (section 3.555(11)). ^a New gas distribution lines with rights-of-way 50 feet or less in width subject to standards in section 3.509 (section 3.554(5)).
Heavy Industrial	Utilities with maximum utilization of existing easements and rights-of-way (section 3.404(5)). ^a Distribution services (section 3.405(2)).
Lake and Wetlands	Submerged pipeline (section 3.613 (4)).
Aquatic Development	Water-dependent use and pipelines (section 3.746(1)).
Open Space, Parks, and Recreation	Amended to include cable, sewerline, waterline, or other pipeline (section 3.584).
Exclusive Farm Zone	Utility facilities necessary for public service (section 3.564(4)).
^a Utilities are defined in LWDUO section 1.030 as local sewer, water, gas, telephone, and power distribution lines necessary for local utility service. Included in this definition are uses needed to operate transmission and distribution lines such as pumping stations, repeater stations, and water storage tanks. Clatsop County ruled that the proposed Bradwood Landing pipeline does not qualify as a utility as defined in the LWDUO because it would not provide local service.	

In March 2006, NorthernStar met with the Clatsop County Planning Director to obtain land use ordinance information and to discuss local land use regulations. NorthernStar reviewed the Geologic Hazards Overlay District (GHO), Flood Hazard Overlay District (FHO), and Shoreland Overlay District (SO) ordinances determined by the county as relevant to the proposed project. Clatsop County's GHO does not identify permitted uses but rather requires the applicant to obtain a geologic hazard permit and identifies requisite geotechnical report and construction requirements. Similarly, the FHO identifies standards applicable to construction in flood plains.

The SO is described in section 4.084 of the LWDUO as "areas described on official Clatsop County Zoning Maps. It does not include shoreland areas of the Columbia River Estuary designated Marine Industrial Shoreland, Conservation Shoreland, or Natural Shoreland." The SO also classifies

certain coastal shorelands as Category 1 or Category 2. Category 1 lands are described in the Estuarine and Coastal Shoreland Element of the Clatsop County Comprehensive Plan as:

- 8.1.1 significant, non-estuarine marshes;
- 8.1.2 riparian resources;
- 8.1.3 significant fish and wildlife habitat;
- 8.1.4 exceptional aesthetic resource; and
- 8.1.5 historical and archaeological sites.

Category 2 lands are shorelands that are not Category 1 lands and are not zoned Marine Industrial Conservation Shorelands or Natural Shorelands (section 4.086 of the LWDUO).

NorthernStar, in coordination with the county, reviewed the CREST's resource maps showing the SO boundary. One map depicted the project as within the SO boundary, while another did not. While it was unclear through NorthernStar's conversations with the county whether the project would be located within the SO zone, the Clatsop County segment of the pipeline does not appear to be subject to the SO restrictions because it would be located within areas zoned Marine Industrial, which are expressly exempted from the SO regulations.

Based on NorthernStar's review, the remainder of the pipeline in Clatsop County would not affect land described in the Estuarine and Coastal Shoreland Element of the Comprehensive Plan as Category 1 (i.e., significant non-estuarine marshes, riparian resources, significant fish and wildlife habitat, exceptional aesthetic resource, or historical and archaeological sites). However, the proposed route would affect wetlands and habitat areas. If any of the Clatsop County lands affected by the project are determined to be Category 1 lands, the pipeline use would not be allowed on those lands under the zoning ordinances (section 4.088 of the LWDUO). If no Category 1 lands are to be affected, the area would default to Category 2 lands but only if regulated by the SO overlay, which, as described above, does not apply because the area is zoned Marine Industrial.

In addition to the ordinances described above, part of the Bradwood Landing LNG terminal site in which a portion of the pipeline would be located is designated as a DMD Overlay Zone (see section 4.7.2.2). The DMD Overlay Zone ordinance does not allow uses that would preclude use of the site for disposal of dredged material. The installation of the pipeline would not preclude the use of the LNG terminal site for dredged material placement. In addition, installation and operation of the pipeline would not interfere with ongoing quarry operations or permitted quarry activity.

As previously mentioned in section 4.7.2.2, NorthernStar filed a land use application with Clatsop County in December 2006. On February 9, 2007, NorthernStar filed an application with Clatsop County to amend the Clatsop County Land Development and Water Use Ordinance to add "cable, sewerline, waterline, or other pipeline" as permitted uses in Open Space, Parks, and Recreation zones. The proposed amendments were accepted by the Clatsop County Board of Commissions in their March 20, 2008 decision regarding the Bradwood Landing Project, subject to some specific conditions, as discussed below.

Clatsop County found that the pipeline would be consistent with applicable provisions of its Flood Hazard Overlay Zone. The way in which the pipeline would be installed underground should not displace floodwater. However, one of the conditions of the Clatsop County's approval of NorthernStar's land use application was that the pipeline should be properly backfilled, and the right-of-way graded and restored, so as not to impede drainage or increase the risk of flooding.

Clatsop County indicated that no specialized standards exist in the LWDOU intended to address natural gas pipelines. However, it believes that there are standards for riparian protection outlined in section 4.237 of the County's Standards Document that would apply to this project, because the pipeline would be a development "affecting vegetation adjacent to and bordering Columbia River estuarine aquatic areas." Therefore, as part its conditional approval of NorthernStar's land use application, Clatsop County indicated that a riparian vegetation restoration plan should be prepared. Potential impacts on wetlands would be mitigated by HDDs at some locations along the pipeline route in Clatsop County, and implementation of the measures outlined in NorthernStar's *Waterbody and Wetland Construction and Mitigation Procedures Plan*.

Clatsop County found the pipeline crossing of Marine Industrial-zoned land, where it begins in the tract containing the LNG import terminal, to be allowed as a water-dependent activity. The pipeline crossing of about 2.6 miles of Forest 80-zoned land would be allowed by Clatsop County as a "new distribution line," conditioned on the restoration of the temporary construction right-of-way outside of the 50-foot-wide permanent operational pipeline easement. Clatsop County found the pipeline crossing of about 2.6 miles of Heavy Industrial-zoned land in the vicinity of the Wauna pulp mill to be a conditionally allowed use, provided that state and federal wildlife agencies are consulted regarding potential impacts and mitigation for the Columbian white-tailed deer. The pipeline would cross a short segment of land zoned as Lakes and Wetlands at Driscoll Slough. Because NorthernStar would use an HDD to avoid impacts on Driscoll Slough, Clatsop County considers this to be a permitted use within this zone as a submerged pipeline. The pipeline would also cross Westport Slough with an HDD, in an area zoned as Aquatic Development, and Clatsop County found this to be an allowed use. Near River Ranch, in the vicinity of MP 5.3, the pipeline would cross about 0.7 mile of land zoned as Open Space, Parks, and Recreation. As a result of its review of NorthernStar's request for amendment, Clatsop County revised its plan for Open Space, Parks and Recreation-zoned lands to allow for pipeline crossings. Lastly, Clatsop County found that the pipeline crossing of about 0.2 mile of land zoned for Exclusive Farm Use, designed as Rural Agricultural Land in the Comprehensive Plan, at about MP 6.0, would be an allowed use.

Columbia County, Oregon

The proposed Bradwood Landing sendout pipeline would cross lands within Columbia County, Oregon between MPs 6.2 and 18.9. In March 2006, NorthernStar met with Columbia County's Chief Planner to obtain land use ordinance information and to discuss local land use regulations. Similar to Clatsop County, the Statewide Land Use Planning Goals are implemented in Columbia County through its state-acknowledged Comprehensive Plan. The Comprehensive Plan is implemented through the Columbia County Zoning Ordinance and related land use implementing ordinances.

The proposed pipeline in Columbia County, Oregon would cross lands zoned as Primary Agriculture (PA-38) between MPs 6.2 to 12.5 and MPs 13.2 to 17.4; lands zoned as Resource Industrial - Planned Development (RIPD) between MPs 17.4 to 19.0; and lands zoned as Rural Residential - 5 Acre Minimum (RR-5) between MPs 12.5 to 13.2. The proposed pipeline crossing of PA-38 zoned lands is allowed as a conditional use because it is a facility necessary for public utility service (Zoning Ordinance Section 303.8). Conditional uses may be approved in the PA-38 zone when an applicant satisfies all the requirements for obtaining a conditional use permit.

The proposed pipeline crossing RIPD-zoned lands would be allowed as a conditional use because it constitutes the "distribution of services" under Columbia County Zoning Ordinance Section 683.1. A permit with conditions is typically approved by the County Planning Commission when an applicant demonstrates that its proposal would conform to the goals and policies of the Comprehensive Plan.

The proposed pipeline is not allowed as an outright or conditional use in the RR-5 zone. The county would usually have to rezone this segment of the pipeline route or amend its zoning ordinance to allow this use. However, in a letter to the FERC dated July 12, 2006, the Planning Director for Columbia County indicated that land use approvals are not required for the Bradwood Landing Project in Columbia County, because the county believes its local permitting process is preempted by the FERC's authority to site pipelines under the NGA. The county indicated that it would raise with the FERC any significant issues it may identify in the future regarding inconsistencies the project may have with its Comprehensive Plan and local land use implementing ordinances.

Cowlitz County, Washington

The proposed Bradwood Landing pipeline would cross lands within Cowlitz County, Washington between MPs 19.4 and 36.3. In March 2006, NorthernStar met with Cowlitz County's land use and environmental planning staff to discuss its proposed pipeline facilities, and applicable county plans, policies, designations, regulations, and guidelines.

The proposed pipeline segment in Cowlitz County would be located entirely within an "unclassified" (also referred to as "unzoned") area. The CCC section 18.10.270, states that the unclassified areas "are generally those expansive areas of Cowlitz County which have not had extensive urban development and probably would not have any degree of such development in the foreseeable future." CCC section 18.10.275 also states that "all uses which have not been declared a nuisance by statute, resolution, ordinance, or court of competent jurisdiction are permitted." Therefore, construction and operation of the proposed pipeline facilities appear to be a permitted use not subject to conditional use approval criteria. Unzoned or unclassified areas remain subject to county and state environmental regulations, including the Shoreline Management Act (RCW 90.58) and the county's Critical Areas Ordinance (CCC Chapter 19.15), which are discussed below.

Cowlitz County would consider issuing a general permit for the pipeline under its Gas and Oil Pipelines Ordinance and review of the project for compliance with the Cowlitz County Comprehensive Plan. The Cowlitz County Comprehensive Plan includes all of the county's formally adopted land use planning goals and policies. The plan generally references "utilities," including natural gas pipelines, within the economic development element and the land use element. Generally speaking, the Cowlitz County Comprehensive Plan policies encourage minimization of negative environmental impacts, including impacts on shorelines and adjacent land uses. The plan also encourages utilization of corridor areas for agricultural and small tree production; imposes guidelines to "establish common or jointly used corridors" and placement of utility lines "closer together;" encourages utility companies to "make arrangements, where practical, to use existing rights of way;" and requires control of noxious weeds. Based on NorthernStar's discussions with county staff, compliance with the Shoreline Management Act, would be considered concurrently with the project's SEPA review. County staff also indicated that through the general permit, the county typically seeks assurance that the pipeline is a safe facility. Permits under Cowlitz County's Floodplain Management and Forest Lands Conversion Ordinances could also be considered.

Cowlitz County's SMMP was adopted to implement state planning and regulatory requirements under the Shoreline Management Act. A shoreline substantial development permit and potentially a shoreline conditional use permit for portions of the pipeline proposed within 200 feet of the ordinary high water line of "shorelines of the state" may be reviewed under the SMMP. The Columbia River and six other streams along the proposed corridor are considered shorelines of the state. Further, NorthernStar's facilities would be located in the Conservancy, Urban, and Rural Districts of the shoreline. In these districts, utilities including gas pipelines are a permitted use, subject to requirements to minimize impacts on vegetation and the environment, and subject further to sufficient restoration measures (see section

4.3.2.4). In the event that all surface impacts on jurisdictional shorelines are avoided through HDD or conventional bore construction methods (with bore hole pads set back from the ordinary high water mark and associated wetlands by at least 200 feet), it appears that the proposed pipeline segment through Cowlitz County would be consistent with the substantial development and conditional use provisions of the SMMP.

Cowlitz County's Critical Areas Ordinance requires critical areas permits for disturbance of wetlands, critical aquifer recharge areas, fish and wildlife habitat conservation areas, frequently flooded areas, and geologically hazardous areas. Critical areas permits are administrative permits and generally control the development standards to minimize impacts on critical areas. NorthernStar would design its project to be consistent with the local Critical Areas Ordinance. The county staff appeared most concerned about the pipeline's potential impacts on streams and the crossing of geologically sensitive areas. Detailed information on geological hazards and streams crossed by the pipeline is presented in sections 4.1.4.3 and 4.3.2.4 of this EIS.

Cowlitz County is the SEPA lead agency and is responsible for coordinating the SEPA and the NEPA reviews. This EIS may be used to satisfy the SEPA if the requirements of WAC 197-11-610 and 197-11-630 are met. After the final EIS for the Bradwood Landing Project is issued by the FERC, Cowlitz County would adopt it if an independent review of the document confirms that it meets the county's environmental standards. As indicated in section 1.4, we met with Cowlitz County staff in December 2006 to discuss this EIS and compliance responsibilities under the SEPA.

4.7.3.3 Existing Residences and Planned Developments

Existing Residences

Table 4.7.3-7 lists by MP residences that NorthernStar identified to be within 50 feet of construction work areas for its proposed pipeline. No residences are located within 50 feet of the aboveground facilities associated with the proposed Bradwood Landing sendout pipeline. NorthernStar did not identify any residences immediately adjacent to the proposed pipeline in Clatsop County, Oregon, between MPs 0.0 and 6.2.

TABLE 4.7.3-7			
Structures Located Within 50 Feet of the Pipeline Construction Work Areas ^{a, b}			
County, State/ MP	Type of Structure	Distance from Pipeline Centerline (feet)	Distance from Construction Work Space (feet)
Columbia County, Oregon			
13.1	Residence	50	30
13.4	Barn and workshops	63	32
15.0	Residence	9	Within
17.7	Residence	50	25
Cowlitz County, Washington			
34.1	Barn	40	5
34.7	Shed	93	38
^a Structures, buildings, or residences that would be avoided by the HDD method are not included in this table as impacts on these structures would be avoided.			
^b Based on review of aerial imagery.			

Within Columbia County, Oregon, between MPs 6.2 and 18.9, NorthernStar identified three residences and one barn within 50 feet of its proposed pipeline construction right-of-way. NorthernStar

would avoid impacts on two residences located at about MP 17.5 by moving the pipeline to the opposite side of Hermo Road.

NorthernStar did not identify any residences within 50 feet of the proposed pipeline in Cowlitz County, Washington, between MPs 19.4 and 36.3. However, the pipeline construction right-of-way would be within 50 feet of a barn at about MP 34.1, and close to a maintenance shed for a nearby rock quarry at about MP 34.6. In addition, impacts on two residences at about MP 21.1 would be avoided by the use of an HDD under Germany Creek, while impacts on a residence at about MP 28.1 would be avoided by the use of an HDD under Coal Creek.

In residential areas, impacts associated with installation of an underground natural gas pipeline include disturbance during construction and encumbrance for future uses (e.g., the limitation on future permanent structures within the permanent right-of-way). In general, as the distance from the construction work area increases, the impacts on residences decrease.

Temporary construction impacts on residential areas could include inconvenience caused by construction related traffic; blocking of roads and driveways; noise and dust generated by construction equipment; ground disturbance of lawns; removal of trees, landscaped shrubs, or other vegetative screening between residences and/or adjacent rights-of-way; potential damage to existing septic systems or wells; and removal of aboveground structures, such as sheds or trailers, from within the right-of-way.

Potential impacts on wells and proposed mitigation measures are discussed in Section 4.3.1.4. On December 21, 2007, NorthernStar filed with the FERC a *Residential Construction Conceptual Mitigation Plan*.¹⁸ This conceptual plan outlined the following general measures that NorthernStar would implement to minimize construction related impacts on residences and other structures located within 50 feet of the proposed pipeline construction right-of-way:

- install fencing on the edge of the construction right-of-way for 100 feet on each side of the residence;
- implement dust control plans;
- cleanup construction work areas daily;
- preserve landscaping and mature trees to the extent possible;
- restore lawns and landscaping immediately after backfilling the trench;
- weld, inspect, and coat pipe before excavation of the trench;
- excavate the trench only at the time when the pipe is ready to be lowered in;
- backfill immediately after the pipe is lowered into the trench;
- construct during daylight hours, according to the landowner's needs;
- discuss spoil management with the landowner;
- discuss removal of trees with the landowner;
- reach agreement with the landowner during easement negotiations about plantings in pasture; and
- discuss temporary relocation of the residents during construction.

¹⁸ NorthernStar's Residential Construction Conceptual Mitigation Plan was filed on December 21, 2007, in response to recommend Environmental Condition 31 in our draft EIS. This document can be viewed by the public through the eLibrary link on the FERC internet webpage at www.ferc.gov. Put in Docket No. CP06-365, the date of the filing, and look up accession number 20071226-0098.

Our review of this conceptual plan found that it did not address the full range of potential impacts on residences close to the construction right-of-way. For example, some commentors on our draft EIS questioned how potential impacts on septic systems from pipeline construction activities would be mitigated.

NorthernStar recognized that it did not yet have access to some properties along the pipeline route, and so it could not develop detailed site-specific residential construction mitigation plans for all houses within 50 feet of the construction right-of-way. NorthernStar committed to filing a final formal site-specific residential construction mitigation plan, after the FERC issues an Order authorizing the project, but before construction of the pipeline would begin. Therefore, **we recommend that:**

- **Before pipeline construction begins, NorthernStar should file with the Secretary, for the review and written approval of the Director of OEP, a plan outlining measures that should be implemented to mitigate pipeline construction impacts on domestic water supply systems and septic systems. For all residences located within 50 feet of the pipeline construction work area, during construction of the pipeline, NorthernStar should:**
 - a. **not remove mature trees and landscaping within the edge of the construction work area, unless necessary for safe operation of construction equipment;**
 - b. **immediately after backfilling the trench, restore all lawn areas and landscaping within the construction work area consistent with the requirements of the FERC staff's Plan;**
 - c. **fence the edge of the construction work area adjacent to the residence for a distance of 100 feet on either side of the residence to ensure that construction equipment and materials, including the spoil pile, remain within the construction work area;**
 - d. **try to maintain a minimum distance of 25 feet between the residence and the edge of the construction work area; and**
 - e. **for any residence closer than 25 feet to the construction work area, file a site-specific plan with the Secretary for the review and written approval of the Director of OEP before pipeline construction. The plan should include:**
 - (1) **a description of construction techniques to be used (such as reduced pipeline separation, centerline adjustment, use of stove-pipe or drag-section techniques, working over existing pipelines, pipeline crossover, bore, etc.), and include a dimensioned site plan that shows:**
 - i. **the location of the residence in relation to the new pipeline and, where appropriate, the existing pipelines;**
 - ii. **the edge of the construction work area;**
 - iii. **the edge of the new permanent right-of-way; and**
 - iv. **other nearby residences, structures, roads, or waterbodies.**

- (2) a description of how NorthernStar would ensure the trench is not excavated until the pipe is ready for installation and the trench is backfilled immediately after pipe installation; and
- (3) evidence of landowner concurrence if the construction work area and fencing would be located within 10 feet of a residence.

To minimize additional impacts on traffic, NorthernStar would minimize trips to and from Bradwood, and would develop a traffic management plan (see section 4.8.2.7).

Planned Developments

We did not identify any future planned residential or commercial developments in close proximity to the proposed pipeline route in Clatsop County Oregon. In comments on our draft EIS, Cowlitz County, Washington, indicated that William and Marjorie Castle submitted a building permit application to the county for a proposed single family dwelling located adjacent to the Bradwood Landing pipeline route. Therefore, **we recommend that:**

- **Prior to construction of the pipeline, NorthernStar should study Cowlitz County records to determine all plans for future residential and commercial developments along the proposed pipeline route in Washington, and file the results of that study with the Secretary, for the review and written approval of the Director of OEP. The study should specifically include the Castle family house plans, and provide details about how NorthernStar would avoid or mitigate impacts on that future residence, including the distance (in feet) from the proposed house to the pipeline construction right-of-way.**

Columbia County has identified several development projects at the Port Westward Industrial Area, including a recently completed 400 MW gas-fired electric generation plant operated by PGE, an ethanol plant currently being installed by Cascade Grain Products, LLC, and a 536 MW power plant to be built in the near future by Summit Westward Energy, LLC. The county has invested about \$16.5 million to make road and access improvements at the Port Westward Industrial Area, to be completed by the end of 2009, and it is concerned about potential impacts of the Bradwood Landing Project on those improvements.

Maps received from the Port of St. Helens and PGE also show that the proposed Bradwood Landing pipeline would cross a potential future outfall connection and a proposed Port of St. Helens industrial discharge line at approximate MPs 18.8 and 18.9, respectively, and be within 100 feet of an unidentified potential future facility between MPs 18.5 and 18.7. Further, the Oregon Economic and Community Development Department and Columbia County Regional Coordinator have identified road and water improvement projects in Port Westward and the proposed project vicinity that are either currently ongoing or proposed.

During planning of the proposed pipeline, landowners expressed concerns about impacts of the proposed route on agricultural land in the Port Westward area. Port of St. Helens staff expressed additional concerns (e.g., conflicts with existing infrastructure, existing industrial development, and planned development) regarding the original proposed pipeline route. In response, NorthernStar developed an alternative route variation between approximate MPs 13.5 and 18.2 that follows property boundaries and road alignments and would minimize impacts on active agricultural areas without significant additional construction impacts on natural resources (see section 3.1.8.2). This new pipeline

alignment, which increased the length of the pipeline by 1.6 miles, also would minimize potential conflicts with future development projects.

The currently proposed route for the Bradwood Landing pipeline, as illustrated in the maps attached in Appendix B to the draft EIS, shows it on the north side of Collins Road between about MPs 16 and 17, then being adjacent to the east side of Hermo Road from about MPs 17 to 18. In comments filed December 19, 2007 on our draft EIS, Columbia County indicated that it intends to expand Hermo Road on its east side, so there would be a potential conflict with the installation of the Bradwood Landing pipeline. Therefore, **we recommend that:**

- **Prior to pipeline construction, NorthernStar should document that it has consulted with the Port of St. Helens, the Columbia County Development Agency, and other appropriate agencies and representatives of Columbia County, to determine if its pipeline may have impacts on county improvements in the vicinity of the Port Westward Industrial Area, and file with the Secretary a plan to avoid or mitigate those impacts, for the review and written approval of the Director of OEP.**

4.7.3.4 Coastal Zone Management

Section 4.7.2.4 addresses coastal zone management review for the entire Bradwood Landing Project, including the pipeline facilities.

4.7.3.5 Hazardous Waste Sites

In February and April 2006, NorthernStar conducted a search of environmental records to identify locations of known or potential contamination within the project vicinity. The records reviewed included over 50 federal and state databases including the EPA's National Priorities List (NPL), CERCLIS, and Resource Conservation and Recovery Information System (RCRIS); the ODEQ's Environmental Cleanup Site Information System (ECSI), Oregon Solid Waste Facilities list, Underground Storage Tank database, and Spills Data; and the WDE's Confirmed & Suspected Contaminated Sites List (CSCSL), Hazardous Sites list, Underground Storage Tank database, and Aboveground Storage Tank list. Based on these records, 10 potentially contaminated sites were identified within 1,500 feet of the construction work areas. These sites are summarized in table 4.2.3-3. Based on the distance of these sites from the proposed project area and the fact that soil and groundwater contamination either has not been reported or has been cleaned up for each facility, NorthernStar does not expect to encounter contamination from these sites during pipeline construction.

While the majority of the sites identified are at such a distance that they would not affect construction, there is potential to encounter unknown aspects of the identified sites or new areas of contamination. Therefore, we have recommended that NorthernStar prepare a *Plan for the Discovery and Management of Contaminated Soils and Groundwater* that specifies the procedures to be followed to identify, characterize, and properly manage potentially contaminated materials (see section 4.2.2.1).

4.7.3.6 Recreation, Public Interest, and Special Use Areas

The Bradwood Landing pipeline would not affect any Indian reservations, or federally designated wild and scenic rivers. Several recreation and public interest areas are located near the proposed pipeline facilities.

Designated Recreation and Public Interest Areas

Special interest areas administered by federal, state, or local agencies that would be in the vicinity of or crossed by the proposed pipeline are listed in table 4.7.3-8.

Description	MP	Length of Crossing (miles)	Distance from Pipeline Centerline (feet)	Distance from Construction Workspace (feet)	Construction Impacts (acres)	Operational Impacts (acres)
Bradley State Scenic Viewpoint	1.7	NA	1,000	935	NA	NA
Ducks Unlimited Waterfowl Management Area	6.0	2.1	NA	NA	27.9	12.8
Jones Beach	9.0	NA	1,111	1,056	NA	NA
Port of Portland	9.3	0.2	NA	NA	2.4	1.0
Port of St. Helens	16.9	2.1	NA	NA	26.0	13.0
LCNHT and Lower Columbia River Water Trail	19.0	NA	0	0	NA	NA
JBHNR	19.0	NA	2,000	1,935	NA	NA
State of Washington, Department of State Lands ^a	19.6	<0.1	NA	NA	0.3	0.1
	21.1	<0.1	NA	NA	0.4	0.2
	34.2	<0.1	NA	NA	0.2	0.1
City of Longview	28.5	NA	130	95	NA	NA
^a The acreages of State of Washington, Department of State Lands are estimates. As part of the process of obtaining an easement from the WDNR, NorthernStar would be required to complete a survey, conducted by a Washington state licensed surveyor, of each waterbody that would be affected by the pipeline to determine the amount of state-owned aquatic land that would be affected.						
NA Not applicable.						

Bradley State Scenic Viewpoint

The Bradley State Scenic Viewpoint, a roadside park administered by the Oregon Parks and Recreation Department, is approximately 1,000 feet west of MP 1.7 of the proposed pipeline. No direct impacts on the Bradley State Scenic Viewpoint are anticipated as the pipeline route is not within the park's boundary. Indirect visual impacts are discussed in section 4.7.3.7.

Ducks Unlimited Waterfowl Management Area

Between approximate MPs 6.0 and 8.1, the proposed pipeline route would cross private property managed by Ducks Unlimited as a waterfowl management area. NorthernStar has consulted with the landowner and the Ducks Unlimited land manager regarding the proposed Bradwood Landing pipeline (Karamanos, 2005; Lobdel, 2005). According to the landowner, Ducks Unlimited is funding the establishment of more wetland habitat with ponds over a 35-year period. The Ducks Unlimited land manager indicated that there is a recorded agreement for the 275 acres on the western portion of the property with federal monies being spent over a period of 25 to 30 years. Ducks Unlimited is in the process of negotiating a conservation easement on an additional portion of the land with the owner for the same purposes. NorthernStar has stated it is consulting with the owner regarding the use of portions of the remaining property as the Peterson Point Mitigation Site (see section 4.5.2.2).

NorthernStar has stated that construction activities would be planned to occur from March to September at a time when waterfowl would least likely inhabit the property. Further, NorthernStar would continue to coordinate with the landowner and Ducks Unlimited before construction activities to identify and address their concerns.

Jones Beach

Jones Beach is on land owned by the ODSL on the southern shore of the Columbia River, between Wauna and Clatskanie, at about CRM 47. The beach has been created out of dredged sand piles, deposited by the COE during its maintenance of the navigation channel. It has no developed facilities, except for a parking lot. The beach is used for recreation by ORV drivers. The Lower Columbia River Water Trail can be accessed from Jones Beach. The river at this location is also used by windsurfers and kite surfers. The proposed pipeline would be about 0.2 mile from Jones Beach, and should have no impacts on the beach, its visitors, and river users in this area.

Julia Butler Hanson National Wildlife Refuge

The pipeline at MP 19 would be within about 2,000 feet east of the JBHNR at Crims Island. NorthernStar would cross under the Columbia River using the HDD method in this area, thus avoiding any direct impacts on the refuge. Additional information on the JBHNR is provided in sections 4.5.2.3 and 4.6.

Lewis and Clark National Historic Trail

The LCNHT follows the lower Columbia River. The Lewis and Clark expedition of 1805-1806 camped in the vicinity of the proposed pipeline, near Cape Horn on the Washington side of the river, near the mouth of the Clatskanie River in Oregon, and on either Walker or Dibblee Island. However, none of the Lewis and Clark campsites in the project area have been definitely relocated, or recorded as archaeological sites. The Bradwood Landing pipeline would cross the LCNHT along the Columbia River near MP 19. The pipeline would cross under the river at this location using an HDD. Potential project impacts on the LCNHT are discussed in section 4.9.

Lower Columbia River Water Trail

The proposed pipeline would cross the Columbia River using an HDD starting from the Oregon side at about MP 19. Therefore, the pipeline would have no impacts on the Lower Columbia River Water Trail.

Other Lands

The pipeline route would also cross state and local lands. These include the Port of Portland (MP 9.3), the Port of St. Helens (MP 16.9), and State of Washington lands (MPs 19.6, 21.1, and 34.2). Also, the City of Longview is located within 130 feet of the pipeline MP 28.5. Furthermore, the states own submerged lands crossed by the pipeline. For Washington, the amount of state-owned aquatic land that the pipeline would affect at the Columbia and Cowlitz Rivers would be determined at the time a survey of each waterbody is completed by a Washington state licensed surveyor. NorthernStar would be required to complete this survey as part of the process of obtaining an easement from the WDNR, which is generally one of the last steps in the permitting and licensing process. At this time, only estimates of acreage impacts can be provided, subject to change once the aforementioned surveys of both crossings are completed (Ellis, 2008). NorthernStar would obtain the appropriate authorizations to use or cross these

areas in accordance with applicable regulations. Impacts associated with the pipeline would be temporary and there would be no long-term or adverse impacts on these areas.

General Recreation and Special Uses

Much of the general recreation and special use of the area that would be affected by the proposed pipeline facilities is similar to that described for the LNG terminal. These uses include sightseeing, wildlife viewing, hiking, swimming, camping, and picnicking activities. The primary impact associated with construction of the project would be visual. Construction would alter visual aesthetics by removing existing vegetation and disturbing soils. Construction would also generate dust and noise, which could be a nuisance to recreational users. Construction could also interfere with or diminish the quality of the recreational experience by affecting wildlife movements or disturbing trails. In general, impacts on recreation and special interest areas would be temporary and would be limited to the period of active construction, which typically would last only several days to several weeks in any one area. NorthernStar would minimize construction-related impacts on these areas by installing its pipeline adjacent to existing rights-of-way to the extent possible, ensuring effective post-construction reclamation of the right-of-way to preconstruction conditions, and coordinating construction activities with land management agencies so that they occur outside of the primary recreation and special use periods (e.g., after harvest, during months when waterfowl are least likely to occupy an area).

The Clatskanie City Park is located about 2.5 miles south of the proposed pipeline (MP 13.4) and is the site of an annual bluegrass festival, which is held in August. In addition, the park has a swimming pool, sport playing field, an indoor skate park, playgrounds for younger children, horse arena, picnic tables, barbecue facility, restrooms, recreational vehicle (RV) hook-ups and facilities for camping, canoeing, paddle boating, and a boat ramp.

The Cities of Longview and Kelso, Washington are located about 4 miles south of the proposed pipeline. Recreational and tourist attractions within Longview include an 18-hole golf course, tennis courts, baseball fields, sturgeon fishing, year-round boating, Columbia Theatre for the Performing Arts, registered historical buildings, art exhibits, lecture series, summer community concerts, as well as an annual County Fair hosting the Thunder Mountain Pro Rodeo (Cowlitz County Washington State Tourism Department, 2007). Within Kelso, recreational and tourist attractions include the Mount St. Helens Volcano and Information Center; Cowlitz County Historical Museum, and the Three Rivers Golf Course, which is the only 18-hole golf course constructed on volcanic ash from Mount St. Helens. In September, Kelso celebrates its Scottish heritage with the annual Highlander Festival. Cowlitz County owns and operates a 60-acre beach park on the north side of the Columbia River at Willow Grove.

We believe that the proposed Bradwood Landing sendout pipeline would not have any significant direct impacts on general recreational use of the project area. Regional tourism should not be significantly affected because the pipeline would be installed underground and, therefore, after the right-of-way is properly restored following construction, the pipeline should not be visible to most distant visitors. The aboveground facilities associated with the proposed pipeline would be minor.

We received comments on the draft EIS regarding the potential for the permanent pipeline right-of-way to increase accessibility for ORV use, trespassing, and vandalism. Measures that NorthernStar could utilize to protect the right-of-way from unauthorized use may include placement of berms across the right-of-way; rock redistribution and strategic placement, without making it into a challenging obstacle course; or placement of woody material removed during construction across the right-of-way to both disguise the right-of-way and serve as “vertical mulch.” Any such measures could be included in a landowners’ easement negotiation process with NorthernStar.

4.7.3.7 Visual Resources

Visual resources along the pipeline route are a function of geology, climate, and historical processes and include topographic relief, vegetation, water, wildlife, land use, and human uses and development. The vegetation along the pipeline route consists mainly of medium-to large-diameter trees on mostly rolling terrain.

NorthernStar proposes to use up to a 120-foot-wide construction right-of-way. Some areas along the pipeline route would be widened for temporary extra workspaces. Visual impacts associated with the construction right-of-way and temporary extra workspaces would include the removal of existing vegetation and the exposure of bare soils, as well as earthwork and grading scars associated with heavy equipment tracks, trenching, and machinery and tool storage. Other visual effects could result from the removal of large individual trees that have intrinsic aesthetic value; the removal or alteration of vegetation that may currently provide a visual barrier from undesirable views; or landform changes that introduce contrasts in visual scale, spatial characteristics, form, line, color, or texture.

Visual impacts would be greatest where the pipeline route parallels or crosses roads and the pipeline right-of-way may be seen by passing motorists, on residents where vegetation used for visual screening of existing utility rights-of-way would be removed, and in forested areas. The duration of visual impacts would depend on the type of vegetation that is cleared or altered. The impact of vegetation clearing would be shortest in agricultural, range, and open lands, where the reestablishment of vegetation following construction would be relatively fast (generally less than 5 years).

The visual impacts would be greater in forest land, which would take many years to regenerate mature trees. The greatest potential visual impact would result from the removal of large specimen trees, which would take longer than other vegetation types to regenerate and would be prevented from reestablishing on the permanent right-of-way. The establishment of a new pipeline right-of-way through these forested areas would create a permanent visual impact. Although the temporary portion of the construction right-of-way would be allowed to revert to preconstruction conditions, the new permanent right-of-way would be maintained in an herbaceous state. NorthernStar's restoration plan calls for the planting of in-kind trees outside of a 30-foot-wide corridor centered on the pipeline within the cleared construction right-of-way that is presently forest. Also, in forested wetlands, the right-of-way would be replanted with in-kind wetland tree specimens, with the exception of the portion of the right-of-way within 5 feet of the pipeline (10 feet total), thereby minimizing the extent of disturbance. Nearly complete canopy coverage over the pipeline would be expected to develop in most forested upland and forested wetland areas within approximately 20 years. In general, visual contrasts in forested areas would be noticeable primarily from road crossings and the scattered rural residences. Several major roads would be crossed by the pipeline. Therefore, many motorists would be visually aware of pipeline construction and would notice permanent tree removal to accommodate the permanent right-of-way.

About 22 percent of the Bradwood Landing pipeline would be located adjacent to the existing KB pipeline right-of-way. Construction within or adjacent to existing rights-of-way typically reduces impacts on visual resources because it minimizes vegetation clearing. However, a degree of permanent clearing still must occur to properly maintain and operate a pipeline right-of-way. Vegetation would be cleared during construction of the Bradwood Landing pipeline and would result in both short-term and long-term impacts on visual resources depending on the type of vegetation that is removed. NorthernStar would maintain its permanent right-of-way in an herbaceous state.

Revegetation of the right-of-way is an important mitigation measure that would be used to reduce visual impacts of pipeline construction and operation. NorthernStar would monitor and measure

revegetation success in accordance with the FERC's guidelines for proper establishment of the desired species and weed control.

Construction of the pipeline would result in indirect visual impacts on the Bradley State Scenic Viewpoint, located approximately 1,000 feet west of MP 1.7. Between MPs 0.0 and 1.3, the pipeline would be installed using the HDD method to reduce impacts on the Bradwood Cliffs and associated forest. Since the proposed Bradwood Landing pipeline would be located at the base of the hill east of the Bradley State Wayside viewpoint, and would only occupy a 50-foot-wide permanent right-of-way once it is permanently restored, NorthernStar does not anticipate a major impact on the view. The proposed pipeline right-of-way through most of the forested area would not be seen from the Bradley State Scenic Viewpoint because the ridge blocks the view. Where the right-of-way is closer to the Wauna Mill, the right-of-way follows existing roads or cleared areas. A stretch of the right-of-way south of the paper mill is forested near the Wauna Mill's landfills. At the end of construction, the right-of-way would look similar to many of the access roads on the Wauna Mill property.

All affected permanent and temporary workspace visible from the Bradley State Scenic Viewpoint is zoned Forest 80. By definition, all Forest 80-zoned property is subject to harvest under the guidelines established by the Oregon Department of Forestry, including its jurisdiction over the harvesting of the trees involved with NorthernStar's pipeline right-of-way. Therefore, removal of forest land to accommodate the permanent right-of-way would not be inconsistent with tree removal allowed by state zoning.

Construction and operation of the new aboveground facilities associated with the Bradwood Landing pipeline would have a permanent impact on visual resources. However, none of these sites are located in areas identified as having any special or unique scenic characteristics or in areas with any designated protection for scenic values. The facilities would be located in industrial areas, or in rural areas with generally moderate to low scenic values that are not sensitive to visual resource changes due to a low number of potential viewers. However, construction and ground disturbances would be noticeable to viewers in the vicinity of these activities. Permanent structures would be relatively small and, as such, would remain subordinate to the visual landscape in which they would be located. Further, NorthernStar would paint the meter stations a non-reflective color that would blend with the surrounding landscape, the use of which would reduce the visual impacts associated with operation of the aboveground facilities.

4.8 SOCIOECONOMICS

The Bradwood Landing Project includes the construction and operation of an LNG import terminal in Clatsop County, Oregon and a 36.3-mile-long natural gas sendout pipeline that would cross through portions of Clatsop and Columbia Counties, Oregon and Cowlitz County, Washington. Therefore, most of the project-related socioeconomic impacts would occur within these counties. However, socioeconomic effects relating to construction of the project would also extend into the Portland-Vancouver-Beaverton, Oregon-Washington, Metropolitan Statistical Area (Portland MSA), where approximately 75 percent of the construction workforce for the LNG terminal and 86 percent of the construction workforce for the pipeline are expected to reside. Columbia County is one of seven counties included in the Portland MSA; therefore, overlap will occur when discussing potential socioeconomic impacts on these areas. Socioeconomic effects relating to LNG marine traffic during operation of the LNG terminal could also extend into Wahkiakum and Pacific Counties, Washington.

Several potential socioeconomic effects may result from construction and operation of the proposed Bradwood Landing Project. Many of these potential effects would occur during the construction phase and would result from the number of local and non-local construction workers who would work on the project; their income and local expenditures; and their impact on traffic flow, population, housing, and public services. Other potential impacts are related to operation of the project, such as LNG marine traffic along the lower Columbia River and its effects on other river users. Operation of the project would have impacts on the local economy, including increased property tax revenue, increased job opportunities and income, and ongoing local expenditures by NorthernStar.

The potential impacts of the project on land use and residences in the vicinity of the project are discussed in section 4.7. A discussion of the cumulative impacts of the Bradwood Landing Project when considered with other proposed or reasonably foreseeable future projects is included in section 4.12.

4.8.1 Waterway for LNG Marine Traffic

As described above, socioeconomic effects related to LNG marine traffic along the waterway would potentially impact Wahkiakum, Pacific, and Cowlitz Counties in Washington and Clatsop County in Oregon. Within these counties, the communities of Warrenton and Astoria, Oregon and Ilwaco, Cathlamet, and Puget Island, Washington have over 500 people residing there.

4.8.1.1 Population

Table 4.8.1-1 provides a summary of population statistics for the three counties and communities with populations over 500 along the waterway. With the exception of Ilwaco, at least a portion of each of the communities in this table would be within the Zones of Concern during LNG carrier transit up the Columbia River. The counties affected by the Bradwood Landing Project vary in their population totals and densities. Clatsop County, Oregon has a population density higher than the average for the State of Oregon. The highest population density occurring along the waterway is within the City of Astoria, with 1,597.6 persons per square mile. The lowest population density occurring along the waterway is within Wahkiakum County, with an average of 14.5 persons per square mile. However, during the tourist season, population in some communities can more than double (ODE, 2006).

TABLE 4.8.1-1					
Existing Population in the Counties and Communities Along the Waterway for LNG Marine Traffic					
State/County/Community	Population			Population Density ^a	
	1990	2006	Percent Change	1990	2006 ^b
Oregon	2,842,321	3,700,758	30.2	29.6	38.6
Clatsop County	33,301	37,315	12.1	40.3	45.1
Astoria (CRM 14) ^{b c}	10,069	9,813	-2.6	1,766.5	1,597.6
Warrenton (CRM 10) ^c	2,681	4,096	52.8	160.5	332.2
Washington	4,866,692	6,395,798	31.4	73.1	96.1
Pacific County	18,882	21,735	15.1	19.4	22.3
Ilwaco (CRM 3) ^c	815	950	16.6	388.1	452.4
Wahkiakum County	3,327	4,026	21.0	12.6	15.2
Cathlamet (CRM 39) ^c	508	565	11.2	1,270.0	1,426.2
Puget Island (CRM 38) ^c	734	798	8.7	97.9	106.4
^a Persons per square mile based on population and land area size: Oregon (95,997 square miles), Clatsop County (827 square miles), Astoria (5.7 square miles), Warrenton (16.7 square miles), Washington (66,544 square miles), Pacific County (975 square miles), Ilwaco (2.1 square miles), Wahkiakum County (264 square miles), Cathlamet (0.4 square mile), and Puget Island (7.5 square miles).					
^b Information from the U.S. Census Bureau includes the community of Navy Heights (population of 627 persons) as part of the City of Astoria.					
^c Census Bureau 2006 data not available. Data from U.S. Census Bureau, 2000 Census data.					
Sources: U.S. Census Bureau, American Population, Housing Units, Area, and Density, 1990. U.S. Census Bureau, State and County Quickfacts, 2006.					

No changes to the local population distribution or number are expected to occur as a result of the proposed LNG marine traffic. However, the population within the Zones of Concern along the waterway could be affected due to an accidental or intentional breach of an LNG carrier resulting in a release of LNG during transit to the LNG terminal. The severity of impacts on populations in Zones 1-3 would depend on the location of the incident relative to the population, the scope of the incident, and whether the released LNG ignited or evaporated. Impacts from a pool fire would be most severe in Zone 1 and decreasing outward through Zones 2 and 3. However, with the implementation of the safety and security measures and conditions outlined in the Coast Guard's WSR (see Appendix G), an LNG release along the waterway would be highly unlikely and the potential impact on the area population would be less than significant.

4.8.1.2 Housing

Housing statistics for the counties and communities larger than 500 persons along the waterway, are presented in table 4.8.1-2. A total of 10,116 vacant housing units occur in the counties along the waterway. Within the communities considered, vacancy rates ranged from a low of 32 available units in Cathlamet, Washington to a high of 623 units in Astoria, Oregon.

At Astoria, there are five hotels or motels (Cannery Pier Hotel, Astoria Rivershore Motel, Lamplighter Motel, Holiday Inn Express, and the Dunes Motel), with a total of 253 rooms combined, overlapped by Zone 1. Within Zone 2 in Astoria are seven hotels or motels (Hotel Elliott, Hideaway Inn and Hostel, Best Western, Red Lion Inn, Comfort Suites, Fisherman Suites, and Paradise Home Stay), with a combined total of 333 rooms.

TABLE 4.8.1-2				
Housing Characteristics in the Counties and Communities Along the Waterway for LNG Marine Traffic				
State/County/MSA	Total Housing Units	Total Vacant Housing Units	Vacancy Rate (percent)	Median Gross Monthly Rent
Oregon	1,452,709	118,986	8.2	\$620
Clatsop County	19,685	4,982	25.3	\$543
Astoria ^a	4,858	623	12.8	\$519
Warrenton	1,799	178	9.9	\$561
Washington	2,451,075	179,677	7.3	\$663
Pacific County	13,991	4,895	35.0	\$483
Ilwaco	524	108	20.6	\$565
Wahkiakum County	1,792	239	13.3	\$519
Cathlamet	278	32	11.5	\$395
Puget Island	404	72	17.8	\$783

^a Information from the U.S. Census Bureau includes the community of Navy Heights (population of 627 persons) as part of the City of Astoria.

Source: U.S. Census Bureau, 2000.

LNG marine traffic should not result in significant changes in demand for housing in the communities along the waterway. The lower Columbia River is already used by almost 2,000 commercial ships per year. Residential structures and hotels within the Zones of Concern along the waterway could be affected in the event of an accidental or intentional breach of an LNG carrier resulting in a release of LNG and an associated fire. As discussed further in section 4.11.5, if a pool fire occurred where the transit route is close to shore, structures within 2,200 feet of the center of a spill could be subject to a long-term loss of use. However, with the implementation of the safety and security measures and conditions outlined in the Coast Guard's WSR, an LNG release along the waterway would be highly unlikely and the potential impact on housing would be less than significant.

4.8.1.3 Property Values

In 2005, the total assessed value of real property in Pacific County, Washington was \$1,633,127,590, while the total assessed value of real property in Wahkiakum County, Washington was \$277,859,240 (Workforce Explorer, 2007). The total real market value of assessed property in Clatsop County, Oregon in the fiscal year 2005 to 2006 was \$5,438,799 (Oregon Department of Revenue, 2007). In 2005, the estimated median value of a house in Warrenton was \$147,200, in Astoria it was \$153,500, and in Cathlamet it was \$122,900 (City Data, 2007).

Currently, almost 2,000 commercial ships per year using the Columbia River navigation channel pass by the communities along the river shore in Pacific and Wahkiakum Counties, Washington, and Clatsop County, Oregon. If the proposed LNG terminal goes into operation, commercial river traffic would increase by about 7 percent (Parsons Brinckerhoff, 2005). We do not believe that this slight increase in commercial river traffic would have any negative impacts on property values in communities along the waterway. We are unaware of any studies that have been done relative to the effects on property values due to the potential hazards of LNG marine traffic, and none have been filed with the FERC. With implementation of the safety and security measures and conditions outlined in the Coast Guard's WSR, it is highly unlikely that there would be an incident involving an LNG carrier using the waterway that would affect adjacent property values.

4.8.1.4 Economy and Employment

Table 4.8.1-3 provides a summary of existing economic conditions in counties and communities along the waterway. According to the U.S. Census Bureau (2000), the top industries in the areas along the waterway include education, health, and social services. Reflecting the level of tourism in these communities, arts, entertainment, recreation, accommodation and food services, and retail trade comprise a large percentage of employment in Astoria and Warrenton, respectively. The top employer in two of the three affected counties is a forestry or wood products company, reflecting the continued importance of forestry in the region. According to the Clatsop County Community Profile, the county's top employers include the Georgia-Pacific pulp and paper mill, state and local governments, and the Coast Guard (Clatsop County, 2005). Pacific County's top private employer is Coast Seafoods (Pacific County Economic Development Council, 2007). In Wahkiakum County, Jerry DeBriar Logging Company, Wahkiakum County, and Wahkiakum County School District are the top employers (Lower Columbia Economic Development Council, 2005).

TABLE 4.8.1-3				
Existing Economic Conditions in the Counties and Communities Along the Waterway for LNG Marine Traffic				
State/County/ Community	Per Capita Income (2000)	Civilian Labor Force (2000)	Unemployment Rate (percent) (2006)	Top Industries by Employment (2000)
Oregon	\$20,940	1,740,298	5.4	Education, Health and Social Services (19.3%) Manufacturing (14.4%)
Clatsop County	\$19,515	17,656	5.0	Education, Health and Social Services (19.2%) Arts, Entertainment, Recreation, Accommodation, and Food Services (15.7%)
Astoria ^a	\$18,759	4,796	6.9	Education, Health and Social Services (22.0%) Arts, Entertainment, Recreation, Accommodation, and Food Services (14.1%)
Warrenton	\$16,874	1,933	3.7	Education, Health and Social Services (19.3%) Retail Trade (18.6%)
Washington	\$22,973	2,979,824	5.0	Education, Health and Social Services (19.4%) Manufacturing (12.5%)
Pacific County	\$17,322	8,663	6.6	Education, Health and Social Services (21.3%) Arts, Entertainment, Recreation, Accommodation, and Food Services (12.6%)
Ilwaco	\$16,138	435	6.4	Education, Health and Social Services (23.3%) Arts, Entertainment, Recreation, Accommodation, and Food Services (12.3%)
Wahkiakum County	\$19,063	1,691	6.5	Education, Health and Social Services (24.6%) Agriculture, Forestry, Fishing and Hunting, and Mining (14.6%)
Cathlamet	\$18,588	216	9.7	Education, Health and Social Services (29.7%) Agriculture; Forestry; Fishing and Hunting; and Mining (11.3%) Public Administration (11.3%)
Puget Island	\$22,444	374	8.0	Education, Health and Social Services (29.1%) Manufacturing (12.2%)
^a Information from the U.S. Census Bureau includes the community of Navy Heights (population of 627 persons) as part of the City of Astoria. Sources: U.S. Census Bureau, Profile of Selected Economic Characteristics, 2000. U.S. Department of Labor, Bureau of Labor Statistics. Local Area Unemployment Statistics, 2006.				

Within the counties and communities along the waterway, average per capita income was slightly lower than the averages for Oregon and Washington. In 2006, Warrenton and Clatsop County, Oregon had unemployment rates lower than the state average of 5.4 percent. The remaining counties and communities along the waterway had unemployment rates higher than state averages, ranging from 6.4 percent within Ilwaco, Washington to 9.7 percent within Cathlamet, Washington.

LNG marine traffic could have beneficial impacts on the economy of the counties along the waterway. NorthernStar would have to rent at least three tugboats, and pay their crews, to escort each LNG carrier. This is discussed in section 4.8.1.7. The economy in the area could be affected in the unlikely event of an accidental or intentional breach of an LNG carrier resulting in a release of LNG. If a pool fire occurred where the transit route is close to shore, businesses within 2,200 feet of the center of a spill could be subject to a long-term loss of use. However, because the hazard area surrounding an LNG cargo vessel is transient (moving with the vessel along its route), it is not possible to accurately quantify the economic impact of an incident. Also, given the precipitation in the region, any project-related fire would likely be of short duration and limited extent. Nevertheless, with the implementation of the safety and security measures and conditions outlined in the Coast Guard's WSR, an LNG release along the waterway would be highly unlikely and the potential impact on the economy and employment would be less than significant.

4.8.1.5 Tax Revenues

The tax revenues generated by the Bradwood Landing Project would be associated with construction and operation of the LNG terminal and pipeline facilities themselves, and not with the LNG carriers. Therefore, LNG marine traffic along the waterway would not affect tax revenues in the area.

4.8.1.6 Local Infrastructure and Public Services

Information on existing public services in the area of the waterway for LNG marine traffic is provided in table 4.8.1-4. Warrenton, Astoria, and Cathlamet are incorporated cities within the Zones of Concern along the waterway for LNG marine traffic. The other communities listed on table 4.8.1-4 are within approximately 30 miles of the waterway and provide public services to the region.

Warrenton, Oregon was incorporated in 1899. The city government includes an administrative office run by a City Manager, a finance department, planning department, fire and police departments, municipal court, and department of public works. The City of Astoria is the county seat for Clatsop County, Oregon. The Astoria city government is administered by a City Manager, and includes departments of finance, public works, fire, police, community developments, and parks and recreation. Astoria has a port authority that operates an airport and several marinas. Northwest Natural provides natural gas and Pacific Power provides electricity to Warrenton and Astoria.

The town of Cathlamet, Washington, which is the county seat for Wahkiakum County, was incorporated in 1907. The town government is directed by a Mayor and Council. Town employees include a treasurer, clerk, public works supervisor, attorney, and librarian. There is a Fire Department, Public Works Department, Planning Commission, and Library Board, and the town operates parks and recreational facilities. The town manages a water treatment plant and sewer system, but its main source of water comes from the Wahkiakum County Public Utilities District No. 1, which also provides electricity. Natural gas is not currently available in Cathlamet (Town of Cathlamet, 2007; Lower Columbia Economic Development Council, 2007).

TABLE 4.8.1-4

Existing Public Services in the Vicinity of the Bradwood Landing Project

Facility	Location	Details
Hospitals	Astoria	Columbia Memorial Hospital Level III Trauma Center with 49 beds
	Cathlamet	Wahkiakum Family Practice Clinic Outpatient Treatment
	Ilwaco	Ocean Beach Hospital 15 beds
	Longview	St. Johns Medical Center Level III Trauma Center with 193 beds
	Seaside	Providence Seaside 22 extended care beds, 34 acute care beds
	St. Helens	St. Helens Lab Outpatient Treatment
Ambulance Services	Astoria	Medix Ambulance
	Clatskanie	Clatskanie Ambulance
Fire Departments	Columbia	Columbia River Fire and Rescue 7 stations in Columbia County
	Cowlitz County	Cowlitz County Fire Protection District #2 Serving the Kelso/Longview area
	Cowlitz County	Cowlitz County Fire Protection District #6 Serving the Castle Rock area
	Astoria	Astoria Fire Department
	Astoria	Lewis and Clark Rural Fire Protection District (RFPD)
	Astoria	Olney Walluski Fire and Rescue
	Astoria	John Day-Fernhill RFPD
	Clatskanie	Clatskanie RFPD
	Gearhart	Gearhart RFPD
	Knappa	Knappa-Svensen Burnside RFPD
	Longview	Longview Fire Department
	Seaside	Seaside Fire and Rescue
	Warrenton	Warrenton Fire Department
	Westport	Westport Wauna Fire District
Law Enforcement	Clatsop County	Clatsop County Sheriff's Office 60 officers
	Columbia County	Columbia County Sheriff's Department 6 police officers
	Cowlitz County	Cowlitz County Sheriff's Office 48 commissioned deputies
	Wahkiakum County	Wahkiakum County Sheriff's Office 8 officers
	Astoria	City of Astoria Police Department
	Clatskanie	Clatskanie Police Department 5 police officers
	Columbia	Columbia City Police Department 7 police officers
	Castle Rock	Castle Rock Police Department
	Kelso	Kelso Police Department
	Longview	Longview Police Department
	Svensen	Svensen Sheriff Station
	St. Helens	St. Helens Police Department 18 police officers

Sources: Columbia Memorial Hospital, 2006; Providence Seaside Hospital, 2006; Legacy Health System, 2006; Peace Health, 2006; Orr, 2004; NorthernStar's communications, 2005.

There are structural elements of the local infrastructure within the communities along the waterway for LNG marine traffic that are overlapped by the Zones of Concern. At about CRM 5, Zone 3 overlaps with the Coast Guard Cape Disappointment Station mooring on the north shore of the Columbia River in Pacific County, Washington.

The former town of Hammond has been merged into the City of Warrenton, in Clatsop County, Oregon. The City of Warrenton covers 17 square miles, and is responsible for the southern shoreline of the Columbia River from Clatsop Spit (Buoy 14) east to Smith Point. At about CRM 11, the Hammond Boat Basin and the Youngs Bay Bridge along Highway 101 are within Zone 2. Within Zone 3 is the Warrenton police and fire departments, the Warrenton-Astoria Regional Airport, including the Coast Guard Air Station (about 3,700 meters south of the navigation channel), and the Warrenton Marina.

The City of Astoria, in Clatsop County, Oregon, is located between about CRMs 13 and 14. Within Zone 1 at Astoria is Pier 1, where cruise ships berth; Pier 2, serving the bulk of the local commercial fishing fleet, and recreational boating facilities at the West Basin and East Basin marinas and the 17th Street dock, operated by the Port of Astoria; the Astoria-Megler Bridge over the Columbia River along Highway 101; the Astoria police and fire departments and emergency information center; the Columbia River Maritime Museum; the riverfront trolley; and boat anchorages. Within Zone 2 at Astoria is Captain Robert Gray Elementary School, with 780 students (1,100 meters south of the navigation channel); John Jacob Astor Elementary School, with 298 students (1,200 meters south of the navigation channel); Clatsop Care Center; Columbia Memorial Hospital (1,200 meters south of the navigation channel); Clatsop County Health and Human Services; and the Coast Guard base at Tongue Point. Within Zone 3 at Astoria is Astoria Middle School, with 550 students (1,900 meters south of navigation channel) and Astoria High School, with 760 students (1,700 meters south of the navigation channel).

At about CRM 33, the Wahkiakum County Fire Protection District No. 2 in Skamokawa, Washington is overlapped by Zone 1. There is also a town center in Skamokawa.

In Cathlamet, Washington, at about CRM 39, the Wahkiakum County Fire Protection District No. 1, the town of Cathlamet fire department, and town hall are overlapped by Zone 3.

In review of NorthernStar's WSA, the Coast Guard identified resource gaps that exist in the ability of local emergency services, including police and fire departments, to respond to a potential incident involving an LNG carrier in the waterway. The Coast Guard has outlined conditions in its WSR that must be met in order to have the waterway found suitable for LNG marine traffic (see Appendix G). In addition, the ODE requested that the FERC require NorthernStar to fill emergency response gaps in Clatsop County. On March 24, 2008, NorthernStar filed its first draft ERP. In accordance with the EAct, the ERP must offer a cost-sharing plan, and outline how NorthernStar would fill resource gaps and supplement the first-responder capabilities of the local jurisdictions. As discussed further in section 4.11.6, we will require NorthernStar to file a final ERP for review and approval by the Director of OEP prior to the beginning of project construction activities.

4.8.1.7 Transportation and River Traffic

The main road systems along the waterway include Washington State Route 4 running east-west parallel to the lower Columbia River on the north side in Washington, and Oregon State Route 30 running east-west on the south side of the river in Oregon. U.S. Highway 101 runs south-north between Warrenton, Oregon and Ilwaco, Washington, crossing the Columbia River from Astoria, Oregon to Point Ellice, Washington. The Zones of Concern overlap Highway 101, including the Youngs Bay Bridge at Warrenton, and the Astoria-Megler Bridge over the Columbia River at about CRM 13, and a portion of Washington State Route 4 near Cathlamet, and Oregon State Route 30 south of Bradwood and at Astoria.

In the unlikely event of an LNG carrier accident that results in a spill and associated pool fire, these roads may be affected. However, we believe that with the implementation of the conditions outlined in the Coast Guard's WSR, the likelihood for such impacts is extremely remote.

About 2,000 commercial ships per year use the Columbia River navigation channel to reach upriver ports. In 2007, 18 cruise ships docked at Astoria and 19 cruise ships are scheduled to call in 2008. Table 4.8.1-5 includes the totals of the various commercial vessel types that used the river in 2004, 2005, and 2006. In addition, several smaller river cruise vessels travel between Portland and Astoria that could be affected by passage of the LNG carriers associated with the proposed project. However, we expect that impacts on these smaller vessels would be similar to the impacts on other recreational river users as discussed in section 4.8.1.8.

TABLE 4.8.1-5					
Density and Type of the Shipping Marine Traffic on the Columbia River					
Vessel Type	2004	2005	2006	Total	Daily 3-Year Average
Container vessels	198	94	140	432	0.39
Tankers	163	137	188	488	0.45
Car carriers	247	267	344	858	0.78
Bulkers	780	795	733	2,308	2.11
General Cargo (includes log ships)	244	218	252	714	0.65
Others (includes barges, naval, etc.)	76	76	57	209	0.16
Ocean-going cruise Ships	20	24	26	70	0.06
Total	1,728	1,611	1,740	5,079	

In accordance with the Coast Guard's guidance in the NVIC-05-05, NorthernStar prepared a WSA to address potential impacts of its proposal on other waterway users. The Coast Guard validated the WSA, and issued a WSR in February 2007 (see Appendix G). The conditions outlined in the WSR are discussed in section 4.11.5.5. After the completion of the final EIS, the Coast Guard will complete its review and issue an LOR to address the suitability of the waterway for LNG marine traffic. A discussion of safety issues related to LNG marine traffic is included in section 4.11.5. Impacts on recreational activities on the Columbia River are discussed in section 4.7.1.4.

NorthernStar indicated that about 125 LNG carriers per year would travel along the navigation channel in the Columbia River to the LNG terminal at Bradwood. As discussed in section 2.1.1, the LNG carriers could range in capacity from 100,000 to 200,000 m³, although the Coast Guard would limit the size of the LNG carriers to a maximum capacity of 148,000 m³ until additional risk analyses addressing larger vessels have been completed (see section 4.11.5). Typically, LNG carriers would be up to 1,000 feet long, have drafts of about 40 feet deep, and travel at a speed of up to 12 knots in the waterway.

We do not believe that LNG carriers transiting in the waterway to and from the proposed Bradwood Landing terminal would be significant impediments to other river traffic. They would represent only a minor increase in current totals for commercial ship traffic. This is more fully discussed below. In addition to the potential impacts discussed below, an incident that results in an LNG spill from a carrier in the waterway would affect other commercial traffic in the lower Columbia River. However, with the implementation of the safety and security measures and conditions outlined by the Coast Guard in its WSR, we believe that an LNG release along the waterway would be highly unlikely and the potential impact on transportation and river traffic would be less than significant.

Shipping

Other ship traffic using the navigation channel of the Columbia River at the same time that an LNG carrier is transiting the waterway to the terminal may be affected by the conditions outlined in the Coast Guard's WSR. These conditions include:

- establishment of a 500-yard moving safety and security zone around the LNG carrier while it is underway or at anchor on the Columbia River and a 200-yard fixed security zone while the LNG carrier is moored at the LNG terminal; and
- one-way traffic when meeting an LNG carrier along certain portions of the waterway, such as at turns along the Columbia River.

The 200-yard fixed security zone while the LNG carrier is moored at the LNG terminal was designed to minimize impacts on other vessels while ensuring adequate protection of the LNG carrier (see figure 4.8.1-1). It should be noted that the Coast Guard's moving safety/security and moored vessel security zones would not be treated as absolute exclusion zones that would preclude all other vessel movements. Rather, other vessels may be allowed to transit through the moving safety/security and moored vessel security zones with the permission of the COTP. The expectation is that the COTP's Representative would work with the pilots and patrol assets to control traffic, and would routinely allow vessels to transit the safety/security zone based on a case-by-case assessment conducted on scene.

Although one-way traffic would be imposed along certain portions of the waterway during the LNG carrier transit, four passing zones along the transit route would allow two-way traffic. The passing zones are based on informal best practices currently used by deep-draft traffic. The meeting and overtaking of vessels is coordinated by river pilots using their VTIS system and bridge-to-bridge communication. Through careful traffic management, prearrangement of meeting locations, and an expanded vessel traffic information system, traffic delays are expected to be negligible, as the traffic patterns are designed to resemble those already in use by deep-draft traffic today. Overtaking an LNG carrier would be prohibited; however, due to the relative speed of an LNG carrier, and with vessel traffic planning, it is extremely unlikely this prohibition would result in any measurable delays.

A marginal increase in ship traffic could occasionally increase the wait time for ships in Astoria. If a large number of ships arrive at the mouth of the Columbia River in a short time period, some may need to wait for a pilot. A similar scenario plays out just upriver of Astoria when bar and river pilots replace one another.

NorthernStar filed an analysis of vessel arrival patterns at the mouth of the Columbia River, to determine the potential for navigational conflicts LNG carrier traffic may have with other commercial ships traversing the Columbia River bar. LNG carriers are expected to cross the bar within a 3-hour window prior to high tide. The study found that about half the time, arriving LNG carriers would encounter no other commercial vessels while crossing the bar during the 3-hour tidal window. The maximum number of other commercial vessels that may be encountered by an arriving LNG carrier at the mouth of the Columbia River would be four. Almost 80 percent of the time, there would be no delays for LNG carriers crossing the bar due to other traffic. However, 20 percent of the time the average delay at the bar for an LNG carrier due to other traffic would be about 26 minutes. In one case, an arriving LNG carrier would have to wait 2.23 hours to cross the bar because of a cruise ship departure.¹⁹

¹⁹ Parsons Brinckerhoff, 30 May 2007, Columbia River Navigation Channel Analysis of Vessel Arrival Patterns, filed on March 24, 2008. This document is available for viewing by the public via the FERC's Internet webpage at www.ferc.gov through the eLibrary link. Go to Docket No. CP06-365, select an appropriate date range, and look up accession number 20080325-5012.



This information is for environmental review purposes only.

Figure 4.8.1-1
Bradwood Landing Project
 Fixed Security Zone Around Unloading LNG Carrier

Proposed LNG Terminal Site LNG Carrier Security Zone

0 750 1,500 2,250 Feet

↑

The worst case delay scenario is that another ship would be required to wait an entire tide cycle (12 hours or more). However, proactive scheduling and active communication between LNG carriers and other commercial ships could help to mitigate potential impacts. Further, because the river currently supports a high level of cargo shipping, it is anticipated that other vessels have extensive experience with ship traffic and would be adept at minimizing wait time. NorthernStar has filed a proposal for navigation protocols and priorities that would minimize delays to other commercial vessels on the lower Columbia River due to LNG carrier traffic.²⁰

In the unlikely event of an LNG spill, the physical properties of LNG would limit any potential impacts. If spilled into water, the cryogenic liquid would vaporize rapidly upon contact with the warm air and water over a period of approximately 1 to 2.5 hours. If an LNG spill occurred along the transit route, ship traffic may be temporarily interrupted in the navigation channel; however, traffic in the navigation channel would quickly resume normal operations and any economic impact on the maritime industry would be minimal.

Commercial Fishing and Indian Treaty Fishing Rights

In recent years, commercial fishing for salmon and sturgeon (the primary commercial fish) along the Columbia River has been limited to a season lasting just a few days, occasionally even hours. These seasons are regulated according to forecasted fish populations with the goal of sustaining the fishery. There is a commercial fishing fleet based out of Astoria, Oregon and Ilwaco, Washington, in addition to others located along the lower Columbia River all the way up to Bonneville Dam. In part due to their proximity to Astoria and net-pen fisheries, commercial fishing activities on the lower river are concentrated on Young's Bay and the mouth of the Columbia. At certain times, there may be a peak of up to 200 commercial fishing boats on the lower Columbia River (Kraley, 2006). There are five Select Area Fisheries Evaluation net-pen rearing and fishing sites situated between CRM 10 and 35. In 2003, returning select area fishing generated \$3,290,642.

Gill-netters on the lower Columbia River recognize, among themselves, certain "drift rights." These drift rights are held by members of associations that pool their efforts to clear particular fisheries or "drifts" of snags and debris. This membership gives the members of the drift exclusive rights to fish this area on the ebb tide. Although the drift rights are considered to be only a gentleman's agreement, a membership may be bought or sold, with the permission of the other members of the association. The drift rights allow each group of fisherman to fish in its respective area. The fish are not considered to be common property among the entire fleet; rather, they belong to the specific drift until they are either caught or move on. By contrast, in more mobile adaptations such as trolling, fish are considered common property until actually caught (Martin, 1994). However, as a matter of law, in neither Oregon nor Washington may individuals or associations obtain exclusive fishing rights in any portion of a navigable waterway, such as the Columbia River. In 1990, the Washington Supreme Court specifically rejected the claims of a gill-netter association to exclusive drift rights on the lower Columbia River, finding that "local custom and usage do not support legal recognition of drift rights." Although exclusive, location-specific drift rights are not authorized by commercial gill net licenses and do not have any legal recognition in Oregon or Washington, NorthernStar is negotiating with the claimants of such rights in areas immediately adjacent to the project site regarding potential mitigation.

LNG marine traffic in the waterway should not have significant adverse effects on commercial and gill net fishing. Commercial fishermen already take into consideration current large tanker traffic on the lower Columbia River. Project-related LNG carrier transit would increase commercial ship traffic in

²⁰ Parsons Brinckerhoff, 31 January 2007, Columbia River Navigation Channel Analysis of Navigation Protocols and Priorities, filed March 24, 2008. This document is available for viewing by the public via the FERC's Internet webpage at www.ferc.gov through the eLibrary link. Go to Docket No. CP06-365, select an appropriate date range, and look up accession number 20080325-5012.

the waterway by about 7 percent. It is expected that fishermen could encounter an LNG carrier on the river about once every 1.5 days. Fishing vessels may have to temporarily move out of the way to avoid the safety and security zones surrounding the LNG carriers during their transit upriver to the terminal. However, it is anticipated that such inconveniences would be short term, lasting only a few minutes while an LNG carrier passes at speeds between 8 to 12 knots.

Comments were received on the draft EIS regarding potential impacts of the project on Indian treaty fishing rights. Four Indian tribes exercise their treaty fishing rights for ceremonial, subsistence, and commercial purposes in the Columbia River above Bonneville Dam. No Indian treaty fishing sites have been identified along the waterway for LNG marine traffic. However, salmon migrating to and from sites above Bonneville Dam could be affected by the passage of LNG carriers during operation of the proposed project. As discussed in section 4.5.1.1, NorthernStar would avoid, minimize, reduce, rectify, and compensate for impacts on fishery resources during construction and operation of the project. Therefore, no significant adverse impacts on Indian treaty fishing rights are anticipated as a result of the proposed project.

Charter Boat Services

A charter fleet operates out of Ilwaco, Washington. Charter boat traffic in 2004 occurred primarily during the summer months and peaked during June with a daily average of 15 boats per day. Although the average daily traffic is sparse, this traffic is likely more concentrated during weekend periods. Because charter services extend beyond the mouth of the Columbia River into the open ocean, charters have extensive experience with ship traffic and are adept at minimizing its impact. For these reasons, and due to the relatively minor increase in overall ship traffic due to the project, LNG carriers would have minimal impact on charter services.

Ferry

A ferry runs between Westport, Oregon and Puget Island, Washington. The ferry is operated by Wahkiakum County and links Washington State Route 409 to Oregon Highway 30 (Wahkiakum County Commission, 2005). This ferry is located 5 miles upriver of Bradwood and would not be impacted by the Bradwood Landing Project.

Ship Piloting

The piloting grounds of the Columbia River are divided into the Columbia River Bar and the river proper. From entry into United States waters to a location in the channel off Tongue Point east of Astoria, LNG carriers would transit under the navigational control of a Columbia River Bar Pilot. LNG carriers would transit under Columbia River Pilot supervision from Tongue Point to the proposed LNG terminal. Arrival and docking operations would proceed under the supervision of the Columbia River Pilots with assistance tugs. Although NorthernStar would be responsible for payment of pilot fees, the true impact on pilotage from this project would take the form of lower tariffs for other shippers. NorthernStar would contribute approximately \$1.6 million of the fixed costs associated with pilot service. Currently, this cost is being borne by all of the other ships that use the pilots. Therefore, because of the fees paid by NorthernStar, the resulting per ship pilotage fee paid by other users would be lowered significantly, which has the potential to increase the competitiveness of the region as a shipping destination.

Currently, both piloting grounds have unused capacity. Therefore, the 7 percent increase in ship traffic associated with the proposed project could be serviced with the existing number of pilots. Although pilots would experience increased deck-time and ships serviced per pilot, additional pilots

would not be needed (Kraley, 2006). The increased deck-time per pilot may result in increased wait time for ships in Astoria occasionally. This is due to the fact that there are different pilots for the Columbia River Bar and for the Columbia River, and the pilots change just upstream of Astoria.

In a letter to the FERC dated October 10, 2005, Captain Steve Brown, President of the Columbia River Pilots, expressed the opinion that the pilots could move the LNG carriers without incident. He noted that there is nothing uniquely difficult about LNG carriers from the standpoint of safe navigation, and the pilots routinely move vessels of similar size. The pilots suggested that the LNG transits occur mostly during daylight hours during the first months of operation of the terminal, and that two pilots be assigned to each LNG carrier, as is currently the practice for large tankers carrying petroleum products.

Tugboat Operations and Long-Shoring Activities

The Coast Guard's WSR requires that each LNG carrier be escorted by a minimum of two tugs; at least one of which must be a tractor tug. A third tug would be necessary for turning and mooring to the terminal berth. NorthernStar estimated it would pay about \$1.4 million per year in tugboat rental fees, and the increased tugboat activities related to the Bradwood Landing Project would result in the hiring of approximately 40 additional employees to work on the LNG carrier escort tugboats.

4.8.1.8 Recreation and Tourism

The Zones of Concern along the waterway would overlap with state parks, local parks, national wildlife refuges, and marinas located along the shore of the Columbia River. Therefore, LNG marine traffic has the potential to affect recreational and tourist related activities. Some commentors on our draft EIS expressed concerns that the project could have negative impacts on tourism in the region. However, we could find no evidence to support that contention, and our analysis, provided in sections 4.8.1.4, 4.8.2.4, and 4.8.3.4, indicates that the project may have benefits for the local economy.

One of the main impacts on recreational users and tourists visiting parks and wildlife refuges along the lower Columbia River would be visual impacts associated with the passing of an LNG carrier in the waterway. As we discussed in section 4.7.1.5, visual impacts on recreational users and tourists should not be significant, as LNG carriers would normally transit in the waterway at speeds between 8 to 12 knots, and would only be visible to park and wildlife refuge visitors for a short period.

State and Local Parks

In Pacific County, Washington, Cape Disappointment State Park occupies about 1,882 acres on the Long Beach Peninsula between the Pacific Ocean and the Columbia River. In Clatsop County, Oregon, on the opposite side of the Columbia River at its mouth, is Fort Stevens State Park, covering about 3,700 acres.

In Warrenton, Oregon, the Zones of Concern along the waterway for LNG marine traffic would overlap the Waterfront Trail, Carruthers Park, and the Fisherman's Memorial and Lighthouse Park. In Astoria, Oregon, the Zones of Concern would overlap the Maritime Memorial Park, 6th Street Viewing Dock, 14th Street Riverpark, Riverwalk Trail, Victory Monument and Doughboy Statue, Astoria Column, Shively Park, the 4-H fairgrounds, Tapiola Park, Warren Field, Fred Lindstrom Memorial Park, and Yacht Club Park. In Wahkiakum County, Washington, the Zones of Concern would overlap Skamokawa Vista Park and Wahkiakum County Fairgrounds in Skamokawa, and Erickson Park and Strong Park in Cathlamet. State and local parks are described further in section 4.7.1.4. We believe that with the measures to be implemented by NorthernStar, and the conditions outlined in the Coast Guard's WSR, the likelihood for impacts on these parks is extremely remote.

National Parks, Trails, and Wildlife Refuges

The Zones of Concern along the waterway for LNG marine traffic would overlap two elements of the LCNHP (Cape Disappointment State Park and Fort Stevens State Park), the LCNHT, the Lower Columbia River Water Trail, and two national wildlife refuges, including the LCNWR and JBHNR. We address potential impacts on the LCNHP and LCNHT in section 4.9, and further discuss the national wildlife refuges in section 4.7.1.4. We believe that with the safety and security measures and conditions outlined in the Coast Guard's WSR, there would be little possibility of a spill of LNG from a carrier in transit to the terminal, and that the potential for adverse impacts on national wildlife refuges within the Zones of Concern along the waterway is extremely remote.

Cruise Ships

During scoping, comments were received regarding potential project-related impacts on large, ocean-going cruise ships that use the navigation channel of the Columbia River to reach Astoria. The Port of Astoria has been visited by cruise ships since 1996, and has invested more than \$10 million in improvements at Pier No. 1 to accommodate these vessels (Port of Astoria, 2006b). Eighteen cruises were scheduled to call on the Port during 2007 between April and November. Nineteen cruise ships are scheduled to make Astoria a port-of-call in 2008. The Coast Guard also recognized this issue, and its WSR contains the following conditions:

- when any cruise ship is moored at Astoria, LNG carriers would be restricted to transiting in good visibility (6 miles or more);
- any cruise ship at Astoria would require separate waterfront security when an LNG carrier is in transit in the vicinity; and
- a cruise ship and an LNG carrier would not be placed in a meeting situation.

We believe that with implementation of the conditions of the WSR, the potential for LNG marine traffic in the waterway to adversely affect cruise ships traveling to or docking at Astoria is extremely remote.

We received comments on the draft EIS regarding potential impacts on cruise ships that travel between Astoria and Portland. No large ocean-going cruise ships (i.e., the type of cruise ship referred to in the WSR) travel beyond the Port of Astoria to Portland. Several smaller river cruise vessels travel between Portland and Astoria that could be affected by passage of the LNG carriers associated with the proposed project. However, we expect that impacts on these smaller vessels would be similar to the impacts on other recreational river users as discussed below.

Recreational Fishing

The ODFW estimated that in 2005, anglers from Washington and Oregon combined to total more than 400,000 fishing trips along the lower Columbia River between Bonneville Dam and Buoy 10 (Watts and Takata, 2006). According to NorthernStar's *River User Impact Analysis*, about 46,000 recreational fishing boats go out on the Columbia River estuary between February and October, based on per-day use data from 2004.

We do not believe that the proposed project would have significant impacts on recreational fishing boats on the lower Columbia River. As discussed in sections 4.7.1.4 and 4.8.1.7, fishing boats are used to dealing with commercial ship traffic, and would merely move out of the way of LNG carriers

passing by in the waterway. Nor would the safety and security zones imposed by the Coast Guard around LNG carriers in the waterway or at dock at the terminal limit access to fishing grounds.

Non-Fishing Recreational River Users

Non-fishing recreational river users include power boaters, sailboaters, charter boat services, river cruise services, jet-skiers, water-skiers, windsurfers, kite surfers, kayakers, and canoers. Non-motorized water craft may be using the Lower Columbia River Water Trail for daily excursions. Recreational river users can access the lower Columbia River via boat ramps at Cape Disappointment State Park, Chinook County Park, Knappton, Oneida, Skamokawa Vista Park, East Sunny Sands, County Line Park, and Willow Grove Park in Washington, and at Youngs Bay Marine Park, Netul Landing, John Day Park, Knappa Docks, Aldrich Point, Westport, Jones Beach, Beaver Boat Ramp and Park, and Dibblee Point Beach in Oregon. There are marinas located in Ilwaco and Cathlamet, Washington; and at Hammond, Warrenton, and Astoria in Oregon. In addition, personal watercraft rentals are available in Warrenton, Oregon, and kayak rentals are available in Cathlamet and Skamokawa, Washington, and Warrenton, Oregon. Recreational river use is discussed in more detail in section 4.7.1.4.

The moving safety and security zone imposed by the Coast Guard around LNG carriers in transit up the waterway to the terminal may have temporary impacts on recreational river users. During the passage of the LNG carrier, other river users would have to briefly move to other portions of the Columbia River outside of the safety and security zone. Windsurfers, jet-skiers, kayakers, and canoers tend to use shallow waters near shore, and outside of the navigation channel. Some small recreational craft may be affected by wakes from LNG carriers. However, current recreational river users already have to contend with large commercial vessels and their wakes. Any inconveniences caused by the passage of an LNG carrier would be short term, since those vessels would travel at speeds between 8 and 12 knots.

4.8.1.9 Environmental Justice

Executive Order 12898 on Environmental Justice requires that each federal agency address disproportionately high and adverse health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. As part of the preparation of this EIS, the NEPA review process must provide opportunities for effective community participation and involve consultation with affected communities. If the proposed action would result in significant adverse effects to minority or low-income populations or Native American tribes, the NEPA analysis should address those impacts as part of the alternatives analysis and identify appropriate mitigation measures to address the effects.

Tables 4.8.1-6 and 4.8.1-7 describe the ethnic and racial composition and income distribution of the communities occurring within the Zones of Concern associated with LNG carriers. Navy Heights, a suburb of Astoria, is the only community with a significantly higher percentage of people below poverty within the Zones of Concern along the waterway for LNG marine traffic. There are no predominantly minority communities within the Zones of Concern along the waterway for LNG marine traffic and the population of Native Americans is less than 2 percent of the total population. About 93 percent of the population of Warrenton is white non-Hispanic. Approximately 14.2 percent live below federal standards defining poverty. About 91 percent of the population of Astoria is white non-Hispanic. About 16 percent live below the poverty line. A little more than 94 percent of the population of Cathlamet is white non-Hispanic. About 15 percent are considered impoverished. Clatsop County in 2006 had an unemployment rate of about 5.7 percent (Bureau of Economic Analysis (BEA), 2007). In Pacific County in 2005, about 2,300 people per month received either state or federal non-medical assistance. In Wahkiakum County in 2005, about 320 people per month received either state or federal non-medical assistance. Therefore, neither low-income nor minority groups would be disproportionately affected by LNG carrier transit.

TABLE 4.8.1-6

Demographics of Communities Along the Waterway for LNG Marine Vessel Traffic ^a

State/County/Community	Total Population (2000)	Percent White	Percent Black or African American	Percent American Indian & Alaska Native	Percent Asian	Percent Native Hawaiian & Other Pacific Islander	Percent Other Race	Percent Hispanic or Latino – Any Race	Percent Minority
Oregon	3,421,399	86.5	1.6	1.3	2.9	0.2	7.5	8.0	13.5
Clatsop County	35,630	93.1	0.5	1.0	1.2	0.1	4.1	4.5	6.9
Astoria	9,813	91.0	0.5	1.14	1.9	0.2	5.3	5.9	9.0
Clifton	33	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fort Stevens ^b	322	93.2	0.3	0.0	1.6	0.0	4.9	2.2	6.8
Hammond ^b	158	94.3	0.6	0.0	1.9	0.0	3.2	1.3	5.7
Navy Heights ^c	627	76.2	0.4	2.4	0.9	0.6	19.5	22.9	23.8
Warrenton	4,096	92.5	0.2	1.3	1.7	0.1	4.2	2.9	7.5
Washington	5,894,121	81.8	3.2	1.5	5.4	0.4	7.7	7.4	18.2
Pacific County	20,984	90.5	0.2	2.4	2.0	0.1	4.8	5.0	9.5
Wahkiakum County	3,824	93.4	0.3	1.6	0.5	0.1	4.1	2.6	6.6
Altoona	40	75.0	0.0	12.5	0	0	12.5	0.0	25
Brookfield/Dahlia ^d	33	69.7	0.0	15.2	0	0	15.1	0.0	30.3
Cathlamet	565	94.1	0.5	1.6	0.8	0.0	3.0	0.5	5.9
Puget Island	798	94.1	0.3	1.7	0.2	0.0	3.7	2.5	5.9
Skamokawa	178	97.2	0.0	1.7	0.6	0.0	0.0	0.6	2.2

^a Populations considered potentially affected for the environmental justice analysis along the waterway for LNG marine vessel traffic include those communities within the Zones of Concern.

^b Information from the U.S. Census Bureau includes the communities of Fort Stevens and Hammond as part of the City of Warrenton.

^c Information from the U.S. Census Bureau includes the community of Navy Heights as part of the City of Astoria.

^d The communities of Brookfield and Dahlia are contained within the same Block in Wahkiakum County (Block 1103, Block Group 1, Census Tract 9501).

Sources: U.S. Census Bureau, Census 2000

TABLE 4.8.1-7				
Income Distribution of Communities Along the Waterway for LNG Marine Traffic				
State/County/Community	Total Population (2000) ^a	Per Capita Income in Dollars (1999)	Median Household Income in Dollars (1999)	Percentage of Persons Below Poverty (1999)
Oregon	3,421,399	20,940	40,916	11.6
Clatsop County	35,630	19,515	36,301	13.2
Astoria	9,813	18,759	33,011	15.9
Clifton	33	14,549	28,438	14.4
Fort Stevens ^b	322	16,587	35,000	14.5
Hammond ^b	158	16,587	35,000	14.5
Navy Heights ^c	627	12,730	25,043	25.3
Warrenton	4,096	16,874	33,472	14.2
Washington	5,894,121	22,973	45,776	10.6
Pacific County	20,984	17,322	31,209	14.4
Wahkiakum County	3,824	19,063	39,444	8.1
Altoona	40	16,297	35,893	9.8
Brookfield/Dahlia ^d	33	16,297	35,893	9.8
Cathlamet	565	18,588	33,409	15.1
Puget Island	798	22,444	48,906	9.4
Skamokawa	178	18,233	36,250	7.0
^a Populations considered potentially affected for the environmental justice analysis along the waterway for LNG marine vessel traffic include those communities within the Zones of Concern. ^b Information from the U.S. Census Bureau includes the communities of Fort Stevens and Hammond as part of the City of Warrenton. ^c Information from the U.S. Census Bureau includes the community of Navy Heights as part of the City of Astoria. ^d The communities of Brookfield and Dahlia are contained within the same Block in Wahkiakum County (Block 1103, Block Group 1, Census Tract 9501). Source: U.S. Census Bureau, Census 2000				

4.8.2 LNG Terminal

4.8.2.1 Population

Population statistics for areas where socioeconomic effects would occur due to construction of the LNG terminal area are provided in table 4.8.2-1. These areas vary widely in their population totals and densities. Both Clatsop and Columbia Counties in Oregon have population densities higher than the average for the State of Oregon (44.0, 71.5, and 36.6 persons per square mile, respectively). The highest population density in the area occurs within the Portland MSA, which has a population density of 381.5 persons per square mile. The least densely populated county affected by the project is Wahkiakum County, with an average density of 14.2 persons per square mile. Populations in the four-county area range from 3,755 persons in Wahkiakum County to 96,189 persons in Cowlitz County (U.S. Census Bureau, 2004).

TABLE 4.8.2-1					
Existing Population in the Areas Where Socioeconomic Effects Would Occur as a Result of Construction and Operation of the Bradwood Landing LNG Terminal and Natural Gas Sendout Pipeline					
State/County/ MSA or Community	Population			Population Density ^a	
	1990	2006 ^b	Percent Change	1990	2006 ^b
Oregon	2,842,321	3,700,758	30.2	29.6	38.6
Clatsop County	33,301	37,315	12.1	40.3	45.1
Columbia County ^c	37,557	49,163	30.9	57.2	74.9
Portland MSA	1,477,895	2,063,277 ^d	39.6	294.0	410.4 ^d
Washington	4,866,692	6,395,798	31.4	73.1	96.1
Wahkiakum County	3,327	4,026	21.0	12.6	15.2
Cowlitz County	82,119	99,905	21.7	72.1	87.7
Puget Island	734	798 ^d	8.7	97.9	106.4 ^d
^a Persons per square mile based on population and land area size: Oregon (95,996.79 square miles), Clatsop County (827.23 square miles), Columbia County (656.72 square miles), Portland MSA (5,027.66 square miles), Washington (66,544.06 square miles), Wahkiakum County (264.24 square miles), Cowlitz County (1,138.64 square miles) and Puget Island (7.5 square miles).					
^b Estimated.					
^c Included in population statistics for Portland MSA.					
^d Census Bureau 2006 data not available. Data from U.S. Census Bureau, 2000 Census data.					
Sources: U.S. Census Bureau, 1990.					
U.S. Census Bureau, 2006.					

No appreciable changes to the local population distribution or number are expected to occur as a result of the proposed LNG terminal. The total population change would equal the total number of non-local construction workers, plus any family members accompanying them. NorthernStar anticipates that the majority of the labor force for construction of the LNG terminal would come from Clatsop, Columbia, Wahkiakum, or Cowlitz Counties (i.e., four-county area),²¹ or from the Portland MSA (Columbia Pacific Building Trades Council, 2005). Ten or fewer specialty workers or managers may temporarily relocate to the area during construction of the proposed LNG terminal. Based on the average family size within the areas affected of 3.1 persons (U.S. Census Bureau, 2000), if 10 workers relocate to the study area, the population would increase by approximately 30 people. This potential population increase would be easily absorbed by the affected areas. NorthernStar has indicated that it is committed to hiring and training local residents during operation of the project. Based on commuting patterns at the nearby Wauna Mill (Georgia-Pacific, 2004), almost all of the permanent employees of the LNG terminal would likely reside within a radius of about 80 miles. Therefore, operation of the LNG terminal would not directly result in a noticeable population increase in the local community.

4.8.2.2 Housing

Housing statistics for the areas where socioeconomic effects would occur due to construction of the proposed LNG terminal are presented in table 4.8.2-2. Vacancy rates in the vicinity of the project range from 5.7 percent in the Portland MSA to 25.3 percent in Clatsop County. Temporary housing availability varies seasonally and ranges from bed and breakfasts to hotels and motels, and from studio apartments to four-bedroom homes. Based on information from local hotels, the tourist season in this region runs from June through September. During this season, vacancy rates average 15 percent. During the off-season, vacancy rates are approximately 45 percent (Astoria-Warrenton Area Chamber of Commerce, 2005). In addition, temporary housing is available in campgrounds and recreational vehicle (RV) parks, which provide over 2,000 individual sites in the four-county area.

²¹ Pacific County is not expected to provide a source of workers for either construction or operation of the LNG terminal.

State/County/MSA	Total Housing Units	Total Vacant Housing Units	Vacancy Rate (percent)	Median Gross Monthly Rent
Oregon	1,452,709	118,986	8.2	\$620
Clatsop County	19,685	4,982	25.3	\$543
Columbia County ^a	17,572	1,197	6.8	\$581
Portland MSA	786,300	44,524	5.7	\$672
Washington	2,451,075	179,677	7.3	\$663
Wahkiakum County	1,792	239	13.3	\$519
Cowlitz County	38,624	2,774	7.2	\$518
Puget Island	404	72	17.8	\$783

^a Housing statistics from Columbia County are also included in the Portland MSA.
Source: U.S. Census Bureau, 2000.

Construction and operation of the LNG terminal are not expected to affect the availability of housing in the study area. As discussed in section 4.8.2.1, NorthernStar would employ local workers who would reside within commuting distance of the project. Approximately 75 percent of the construction workforce for the LNG terminal would commute daily from the Portland MSA. It is assumed that commuting workers would not require temporary housing. This use of local workers depends primarily on union agreements, the contractor hired for the project, and the methods the contractor uses to hire subcontractors (Columbia Pacific Building Trades Council, 2005). NorthernStar estimates no money would be spent on temporary housing for the commuting construction workers.

During construction of the proposed LNG terminal, 10 or fewer workers may be hired from outside the area. Based on the average family size of 3.1 persons described in section 4.8.2.1, we estimate that as many as 30 people may move into the area as a result of construction of the LNG terminal. This relatively small number of non-local people requiring housing would not adversely affect the regional housing market.

4.8.2.3 Property Values

Comments were received during scoping regarding the potential effect of the project on property values. Property values on Puget Island are among the highest in Wahkiakum County due to the waterfront access and views. Factual projections of future land values on Puget Island would not be possible until the LNG terminal is in place and property sales data begin to accumulate (Wahkiakum County Commission, 2005).

There are few empirical studies on the impact of industrial facilities on nearby property values. A 1993 study conducted by the Argonne National Laboratory examined the economic impacts of the presence of “noxious” facilities on local wages and property values. Eight types of facilities were studied: nuclear power plants; coal-, gas-, or oil-fired power plants; military chemical weapons sites; hazardous waste sites; refineries; chemical weapon storage sites; former chemical weapon storage sites that are now contaminated; and LNG storage plants. The study examined the effects of 262 facilities on standardized 1,000-square-mile areas across the United States. Eleven of these were LNG facilities. The results of the study concluded that the presence of five of the eight types of “noxious” facilities have a significantly negative effect on property values and a positive effect on wages. However, the study concluded that the presence of an LNG facility did not have a significant positive or negative effect on either wages or property values (Clark and Nieves, 1993).

A 2006 study examined local county assessment records for neighborhoods surrounding existing LNG “peak storage” facilities in Newport and Portland, Oregon. The study found that property values around the Newport LNG plant are not depressed, and within 0.5 mile of the facility are about 25 homes with above average market value. Around the Portland LNG plant are many other industrial or commercial properties, and new businesses continue to move into the area. The study concluded that there is no evidence to support the concern that the presence of an LNG storage facility would reduce nearby property values (ECONorthwest, 2006).

4.8.2.4 Economy and Employment

Existing economic conditions in the areas where socioeconomic effects would occur due to construction of the LNG terminal are provided in table 4.8.2-3. Within these areas, average per capita income was slightly lower than the averages for Oregon and Washington (\$20,940 and \$22,973, respectively). In contrast, the per capita income for the Portland MSA was \$23,321, which was slightly higher than average for the State of Oregon. In 2004, the unemployment rates for counties within the study area were similar to or slightly higher than state averages, ranging from 5.0 percent within Clatsop County to 8.0 percent in Puget Island.

TABLE 4.8.2-3				
Existing Economic Conditions in the Areas Where Socioeconomic Effects Would Occur as a Result of Construction and Operation of the Bradwood Landing LNG Terminal and Natural Gas Sendout Pipeline				
State/County/MSA	Per Capita Income (2000)	Civilian Labor Force (2000)	Unemployment Rate (percent) (2006)	Top Industries by Employment (2000)
Oregon	\$20,940	1,740,298	5.4	Education, Health and Social Services (19.3%) Manufacturing (14.4%)
Clatsop County	\$19,515	17,656	5.0	Education, Health and Social Services (19.2%) Arts, Entertainment, Recreation, Accommodation, and Food Services (15.7%)
Columbia County	\$20,078	21,379	5.8	Manufacturing (22.1%)
Portland MSA	\$23,321	1,089,000 ^a	5.1	Education, Health and Social Services (15.8%) Education, Health and Social Services (21.7%) Trade, Transportation, and Utilities (20.2%)
Washington	\$22,973	2,979,824	5.0	Education, Health and Social Services (19.4%) Manufacturing (12.5%)
Wahkiakum County	\$19,063	1,691	6.5	Education, Health and Social Services (24.6%) Agriculture, Forestry, Fishing and Hunting, and Mining (14.6%)
Puget Island	\$22,444	374	8.0	Education, Health and Social Services (29.1%) Manufacturing (12.2%)
^a U.S. Department of Labor, Bureau of Labor Statistics, 2005. Sources: U.S. Department of Agriculture, Economic Research Service, 2004. U.S. Census Bureau, 2000. U.S. Department of Labor, Bureau of Labor Statistics, 2006.				

As discussed in section 4.8.2.1, most of the labor force for construction of the LNG terminal is expected to come from the four-county area or from the Portland MSA. NorthernStar anticipates that 10 or fewer specialty workers and managers may be hired from outside the study area for construction of the LNG terminal. Tables 4.8.2-4 and 4.8.2-5 list the estimated construction workforce for the LNG terminal and the counties of residence NorthernStar anticipates the workers to commute from, respectively.

TABLE 4.8.2-4		
Estimated Construction Workforce for the LNG Terminal		
Timeframe	Average Number of Workers per Month	Percent of Total Construction Workforce
Year 1	220	22.2%
Year 2	470	47.3%
Year 3	303	30.5%
Average Workforce	331	--
Peak Construction (months 20 - 26)	506	--

TABLE 4.8.2-5			
Sources of Construction Workers for the LNG Terminal			
Location	Average Number of Workers Commuting	Percent of Workers Commuting	Number of Workers Commuting During Peak Construction
Clatsop County	50	15	76
Portland MSA	248	75	380
Columbia County ^a	16	5	25
Washington	33	10	50
Total ^b	331	100	506
<p>Note: Sum of addends may not be the same as the total due to rounding.</p> <p>^a Construction workers from Columbia County are also included in the Portland MSA; therefore, they are not included in the project total.</p> <p>^b LNG terminal total does not include up to 10 specialty workers and managers that may be hired from outside the study area.</p> <p>Source: Columbia Pacific Building Trades Council, 2005.</p>			

NorthernStar estimates that an average of 331 workers would be employed during the 3-year LNG terminal construction period, with a peak workforce of 506 occurring between months 20 and 26. Approximately 75 percent of the construction workforce is expected to commute from the Portland MSA (5 percent of this total would reside in Columbia County). The remaining 25 percent is expected to commute from Clatsop County (15 percent) and Wahkiakum and Cowlitz Counties (10 percent). Workers are expected to commute to the project site daily, and would generally work four 10-hour days per week. The commute between Portland and the LNG terminal is about 80 miles. While this appears to be a long daily commute, sources indicate that compensation for commuting creates an incentive for workers to commute, rather than temporarily relocate (Columbia Pacific Building Trades Council, 2005).

Construction expenditures by NorthernStar would increase economic activity within the counties affected by the project, which would have a multiplier effect on the local economy. The notion of a multiplier effect rests upon the difference between the initial effect of a change, the actual expenditure by NorthernStar, and the total effects of that change. The total increase is calculated using the direct, indirect, and induced effects of the initial change. These effects are best described as:

- Direct Effects. The changes associated with the immediate change in final demand, such as the hiring of local construction workers and purchases of goods and services from local businesses.
- Indirect Effects. The production changes in backward-linked industries caused by the changing needs of the directly affected industries. For example, the additional purchases to address the increased demands for goods and services would be considered indirect effects.

- Induced Effects. The changes in household spending patterns caused by the changes in household income generated from the direct and indirect effects are induced effects.

To calculate this additional impact on the local economy, a data and software program called IMPLAN (Impact analysis for PLANning) was used to generate multipliers for output (total impact), employee compensation (payroll (i.e., wages and benefits)), and employment. IMPLAN uses an input-output model that examines the relationships between and among industries and assigns values to these based on national, state, and regional data. The most recent data available for this model is from 2004. IMPLAN was originally developed by the FS, in cooperation with the FEMA and the BLM (Olson and Lindall, 1999).

IMPLAN allows the user to build economic models to estimate the impacts of economic changes. Database sources for IMPLAN data are primarily government sources. IMPLAN accounts closely follow the accounting conventions used in the “Input-Output Study of the U.S. Economy” by the BEA) and the rectangular format recommended by the United Nations. For data analysis and manipulation, IMPLAN uses a sectoring scheme that has 509 sectors. This sectoring scheme is based on the North American Industry Classification System (NAICS) and closely follows the 1997 BEA Benchmark Study for the United States. The IMPLAN sector used for the construction portion of this analysis was sector 41 - Other New Construction. This IMPLAN sector includes those activities associated with the main category of Heavy and Civil Engineering Construction (NAICS 237). For the operation portion IMPLAN sector 31 - Natural Gas Distribution was used. This correlates to NAICS sector 2212, which is also Natural Gas Distribution.

IMPLAN analysis focuses on two impacts: economic impact and employment impact. Also included is a discussion of increased payroll, which is part of the total economic impact. Economic impact is calculated for amounts spent directly in the four-county study area (Clatsop and Columbia Counties, Oregon and Wahkiakum and Cowlitz Counties, Washington).²² Different percentages of the payroll and construction costs are expected to remain in the four-county area. For these reasons, payroll and construction costs are separated for calculation purposes. Expenditures for each category are estimated (direct impact) and the indirect and induced impacts are then calculated. Table 4.8.2-6 shows the estimated economic impact of construction of the LNG terminal.

TABLE 4.8.2-6					
Economic Impacts of Construction of the LNG Terminal					
Project Component/Impact	Project Total	Four-county Area Impact (30 percent of estimated workforce)			
		Direct Impacts	Output Multiplier ^a (approximate)	Indirect and Induced Effect	Total Four-county Impact
Economic Impact ^b	\$600,000,000	\$77,591,806	1.87	\$68,453,351 ^c	\$146,045,157 ^c
Payroll ^d	\$87,959,035	\$26,387,710	1.97	\$25,596,079 ^c	\$51,983,789 ^c
Employment ^e	331	99	1.83	82	181
^a	IMPLAN calculates the results of the multipliers based on a per million dollar change in final demand (total direct expenditures).				
^b	Payroll and expenditures over 3-year LNG terminal construction period.				
^c	Includes dollars spent by workers in the study area during construction.				
^d	Payroll over 3-year LNG terminal construction period.				
^e	Based on monthly averages.				

²² Although Pacific County could be affected during operation of the LNG terminal because it is located along the waterway, it is not expected to provide a source of workers for either construction or operation of the project and, therefore, was not included in the economic analysis.

Project-related employment and expenditures would have a direct and positive effect on employment and economy within the study area. Total construction costs for the LNG terminal are estimated to be \$600 million. NorthernStar estimates that total payroll (which includes both wages and benefits) for the construction of the LNG terminal would be \$88 million. Approximately \$26.4 million of this would go toward payroll for construction workers from the four-county area with payroll averaging \$8.8 million per year for the 3-year construction period. Payroll estimates for construction of the LNG terminal were based on published prevailing rates and do not reflect any negotiated rates that may apply. NorthernStar anticipates that approximately 30 percent of the workers employed for construction of the LNG terminal would commute from the four-county area and would spend their pay locally. Within the four-county area, NorthernStar estimates that total direct expenditures on goods, equipment, and services during construction of the LNG terminal would be \$77.6 million.

During construction of the proposed LNG terminal, construction work would increase the second year and decrease during the third year of construction. Direct increases in local payroll during construction of the LNG terminal would be approximately \$5.9 million during year 1, \$12.5 million during year 2, and \$8.1 million during year 3. Of this, 50 percent of these increases would go to workers in Clatsop County, 16 percent to Columbia County, and 34 percent to the Washington counties.

Operation of the Bradwood Landing Project would result in about 65 new permanent positions. In addition, tug operations necessary to support the LNG terminal would require about 40 employees. NorthernStar plans to hire and train local residents for operation of the facility. Based on the commuting patterns at Wauna Mill, which is located less than 3 miles south-southeast of the proposed LNG terminal, NorthernStar estimates that approximately 27 workers would come from Columbia County, 23 from Clatsop County, 12 from Cowlitz County, 2 from Wahkiakum County, and 1 from Clark or Pacific County. Table 4.8.2-7 shows the estimated annual impacts of operation for the project.

TABLE 4.8.2-7					
Annual Economic Impacts of Operation of the LNG Terminal					
Impact	Project Total	Four-county Area Impact (98 percent of estimated workforce)			
		Direct Impacts	Output Multiplier ^a (approximate)	Indirect and Induced Effect	Total Four-county Impact
Economic Impact (first year) (Includes payroll and expenditures)	\$30,000,000	\$15,900,000	1.28	\$4,452,000	\$20,352,000
Annual Payroll	\$3,900,000	\$3,900,000	1.61	\$2,379,000	\$6,279,000
Employment	65	65	2.74	113 ^b	178
^a IMPLAN calculates the results of the multipliers based on per million dollar change in final demand (total direct expenditures).					
^b Does not include the approximately 40 persons required to operate tugs.					

The estimated average salary for workers at the facility would be \$60,000 per year. Including the direct and indirect impacts, based on the distribution of workers discussed above, there would be an estimated annual income of about \$145,000 for workers from Wahkiakum County, \$919,000 for workers from Cowlitz County, \$1.7 million for workers from Clatsop County, and \$2 million for workers in Columbia County. Most indirect and induced employment impacts would be full- and part-time employment in the service sector.

As a portion of the operations cost, NorthernStar would lease three tugs from businesses in the four-county area at an annual cost of \$4 million. The IMPLAN multipliers used to calculate the impact of the LNG terminal are for the distribution of natural gas and do not capture the unique nature of an LNG

facility such as the impact of the tugs on the local economy. Therefore, the additional impact is not fully captured in the calculated impacts of operation. For example, a portion of the \$4 million would be spent by the local companies to hire approximately 40 crew and support personnel to operate the tugs. This additional local impact on employment is not reflected in the IMPLAN payroll or employment numbers, and would most likely benefit Wahkiakum County since tugs are expected to be stationed across from the LNG terminal in Wahkiakum County.

4.8.2.5 Tax Revenues

Construction and operation of the Bradwood Landing LNG terminal would have beneficial impacts on property and corporate tax revenue in Clatsop County. The LNG terminal would significantly strengthen the property tax base for the local school district and other government services in the local community. Property tax, calculated on the assessed value of the property, would be collected by Clatsop County and distributed to special districts in the county. Any additional public needs in the surrounding counties would need to be covered through other revenue sources including grants. The Clatsop County Assessment and Taxation Department and the Oregon Department of Revenue indicated that the property would most likely be assessed at 100 percent of its market value, which is estimated at \$600 million upon project completion (Solheim, 2005; Blacklock, 2005). It is anticipated that the LNG terminal would be located in Tax Code Districts 04-01 and 04-03. Based on the 2006-2007 tax rates for Tax Codes 04-01 and 04-03, NorthernStar would pay approximately \$7.8 million in annual property taxes upon completion of the LNG terminal. Of this amount, \$4.2 million would go to the Knappa School District. Based on current assessments, the total for all property tax revenue expected in Clatsop County in 2006-2007 is \$6,543,300 (Clatsop County, 2007). Based on the current tax rates, property tax revenue for Clatsop County and special districts would increase by 119.2 percent upon completion of the LNG terminal.

The increased property tax base upon construction of the LNG terminal could place the Knappa School District in the situation of having tax revenues that would improve educational opportunities. In general, any shortfall in local tax revenues is funded by state government. The Oregon Department of Revenue requests all school districts to tax at their maximum rate. If they do not, they are penalized by lower funding levels from the state. Any excess beyond requirements can be kept by the school district, which would be the case for the Knappa School District.

Of importance to Knappa Schools is the effect on bond levy rates. Assuming a one-time increase in the Knappa School District's assessed property value when the LNG terminal comes on line, residents of the district may see a decrease in the bond levy rate from 2.45 to 0.61 by 2015 per \$1,000 of assessed property value, according to estimates of the Investment Banker for the school district. The total tax rate for the Knappa School District would then be 5.2167 instead of 7.0567. This would result in total property taxes paid by NorthernStar of \$6.0 million, \$3.1 million of which would be collected due to the school district tax rate.

For the initial years of its operation, through approximately 2010, the project would have little or no state income tax liability because deductions for depreciation and amortization of investments and other expenditures are expected to exceed initial gross income. Beginning in 2011, NorthernStar projects that it would have annual taxable income from the operations in Oregon of about \$75 million to \$100 million. Based on current tax rates for corporations doing business in Oregon (6.6 percent), NorthernStar would have annual Oregon tax liability of about \$5 million to \$8 million beginning in 2011.

4.8.2.6 Local Infrastructure and Public Services

A range of public services are provided in the cities and counties in the vicinity of the proposed LNG terminal. Public services in the area include law enforcement and emergency services, schools, and utilities.

Table 4.8.1-4 provides an overview of existing hospitals, ambulance services, fire departments and law enforcement in the areas where socioeconomic effects would occur due to the proposed project. Two hospitals are located in Clatsop County (Columbia Memorial Hospital and Providence Seaside), with a combined total of 105 beds. St. John's Hospital serves Cowlitz County, and residents of Columbia County are served by an outpatient clinic in St. Helens that is open Monday through Friday (Legacy Health Systems, 2006). Wahkiakum County owns the Wahkiakum Family Practice Clinic, which provides family practice care (Wahkiakum County Commission, 2005).

Fire protection at the LNG terminal would be provided by the Westport Wauna Fire District, which is located about 6 miles southeast of the site, and by the Knappa-Svensen-Burnside Rural Fire Protection District (RFPD), located about 10 miles west of the site. The ODF is an oversight agency for Rural Fire Protection Districts in Oregon, and is a responder to forest fires on private and state owned lands. The closest ODF fire fighting unit is located in Clatskanie, Oregon. Wahkiakum County does not currently have a staffed fire department; however, the county does have a volunteer fire protection service.

The Clatsop County Sheriff's Office would be the primary law enforcement agency responsible for the LNG terminal. In 2005, the Clatsop County Sheriff's Office employed 60 officers and had 29 patrol vehicles. Upon completion of construction, NorthernStar would also employ its own security force, thereby reducing need for local public services.

We received comments during the scoping period regarding the current capacity of local public services to respond to an incident or fire at the LNG terminal. NorthernStar has indicated that trained personnel and fire fighting equipment would be maintained at the LNG terminal in the event of an emergency. The Coast Guard has determined that significant gaps exist in fire fighting capability for both shore and water side fire fighting response. In addition, both Clatsop County and the City of Clatskanie have filed requests, through the ODE, that FERC take into account gaps in local services that would need to be filled in order to ensure public safety, and properly respond to an accident or fire at the LNG terminal.

NorthernStar filed its first draft ERP on March 24, 2008. The ERP includes a cost-sharing plan that outlines how NorthernStar would fill resource gaps and supplement the first-responder capabilities of the local communities near its proposed LNG terminal. The ERP is discussed in more detail in section 4.11.6.

A total of 94 schools are located within the areas where socioeconomic effects would occur due to construction of the LNG terminal, with a total enrollment of about 33,300 students (School Tree, 2007). As discussed above, the LNG terminal would be located within the Knappa School District, which consists of one elementary school and one high school. Current enrollment in the Knappa School District is 603 students (School Tree, 2007). Because most workers would be expected to commute from their current residences, only a nominal increase in enrollment at the local public schools would occur as a result of the relocation of construction or operation workers and their families.

No utilities currently serve the site of the LNG terminal and none are available in the immediate vicinity. As a result, NorthernStar would construct an electrical substation, an on-site wastewater

treatment system, and a fire protection system. Power would be supplied by a new 115 kV power line connecting the Bradwood Landing LNG terminal and the existing PacifiCorp electric system. The use and purchase of power from PacifiCorp would not reduce supplies to other users in the local area. The wastewater treatment system is discussed in detail in section 4.3.1.3. The fire suppression system is discussed in section 2.8.1.3. Because the LNG terminal would have its own wastewater treatment, the project would not have an effect on any existing public wastewater treatment facilities. In addition water would be provided by an on-site well and the Columbia River, so no municipal water supply would be necessary.

Fire and other emergencies at the proposed LNG terminal could require the services of local fire departments and emergency response units, as discussed above. Other than the services of local first responders, we do not believe that construction and operation of the LNG terminal would have any other adverse impacts on local infrastructure and public services. The vast majority of the workers at the terminal would commute from within a radius of about 80 miles. As current residents of the region, these workers are already part of the local tax base, and would be accounted for in the provision of local infrastructure and public services by nearby cities and counties. Because few non-local workers would relocate to the area for this project, only a small number of new students would need to be absorbed into the local school district.

4.8.2.7 Transportation and Traffic

Road Traffic

Construction of the Bradwood Landing LNG terminal could affect transportation and traffic in the project area by increasing the number of vehicle trips per day on area roads as a result of commuting and construction vehicle traffic. Construction workers traveling to and from the LNG terminal site could generate up to 1,500 vehicle trips per day (NorthernStar anticipates a peak workforce of up to 506 workers when construction of the LNG terminal is underway). Workers and construction traffic would largely access the LNG terminal via Oregon State Route 30, Clifton Road, and Bradwood Road. It is also possible that workers commuting from Cowlitz and Wahkiakum Counties could travel on Washington State Route 4 and take the Puget Island Ferry to reach the proposed LNG terminal.

Highway 30 is a two-lane, east-west highway that connects Astoria to Portland. Traffic counts completed by the ODOT in 2004 for Highway 30 near the proposed Bradwood Landing LNG terminal site were 6,600 average daily trips; however, traffic levels are higher during the summer tourist season (ODOT, 2004). An independent traffic impact analysis conducted in May 2006 by CTS Engineers, in consultation with the ODOT and Clatsop County, found 6,200 average daily trips over 2 days on Highway 30 at Clifton Road. The traffic count data revealed that the morning peak hour occurs between 6:00 and 7:00 AM and the evening peak hour occurs between 3:00 and 4:00 PM. Truck traffic (vehicles with three or more axles) accounted for about 19 percent of both daily and peak hour traffic volumes through the intersection (CTS Engineers, 2006).

Most of the construction workers would park in the construction parking area located southeast of the Taylorville interchange at Highway 30. From this parking area, the workers would be bussed to the LNG terminal site to the maximum extent possible. A smaller parking area would be provided at the proposed LNG terminal site.

During construction of the Bradwood Landing Project, NorthernStar anticipates an average of 30 trucks per day delivering construction equipment and supplies to the LNG terminal and along the pipeline route. However, during peak construction, up to about 80 trucks would make deliveries to the LNG terminal and along the proposed pipeline route. The increased traffic levels associated with construction

of the LNG terminal would be temporary and limited to the period of construction (about 3 years). To minimize additional impacts on traffic, NorthernStar would minimize trips to and from Bradwood, and would develop a traffic management plan. Some of the traffic minimization techniques proposed by NorthernStar include:

- Use of the railroad to bring in heavy loads of material. These materials include plate steel for the tanks, rebar, concrete, piping, structure steel, pilings, etc.
- An on-site rock quarry may be used for the production of concrete aggregate.
- Construction workers would park their vehicles at the construction parking area on Highway 30. Buses would then be used to move workers to the job site. In addition, NorthernStar has committed to establishing policies to encourage workers to use carpooling and vanpooling to further reduce the potential for traffic impacts.
- Delivery of materials by truck would be scheduled so as to not coincide with movement of the buses bringing construction workers to and from the site.

Following construction, the LNG terminal would operate 24 hours per day, 7 days per week. Peak site activity would vary throughout the day and week depending primarily on the schedule of LNG carrier arrivals. As discussed in section 4.8.2.4, the equivalent of 50 full-time staff would be employed to operate the facility and an additional 15 employees would provide security. The anticipated traffic volume resulting from operation of the LNG terminal, even during peak operation periods, would not significantly increase the existing traffic volumes on local area roadways. Traffic resulting from operation of the LNG terminal is expected to be fewer than 125 vehicle trips per day.

Clifton Road is an approximately 20-foot-wide paved road currently maintained by Clatsop County that intersects with Highway 30. The traffic impact analysis found that, currently, Clifton Road experiences fewer than 50 vehicles per day in this area.

Clifton Road is a two-lane road that is cut into the side of a slope for the most part, and in several places is too narrow for two large trucks to pass safely at normal speed. As the road travels north from Highway 30 and the parking area to Bradwood it loses several hundred feet of elevation. Clifton Road follows Hunt Creek towards Bradwood. To the west of the road the slope rises; to the east of the road the slope falls towards the creek. During the planning process for the Bradwood Landing Project, NorthernStar consulted with the ODOT and Clatsop County regarding modifications to Clifton Road to reduce impacts of traffic associated with the project. As a result of those consultations, prior to construction of the LNG terminal, Clifton Road would be widened to 28 feet, resulting in two 12-foot travel lanes with a 2-foot shoulder on each side of the road. An east-bound turning lane and a west-bound deceleration lane would be installed on Highway 30 at the intersection of Clifton Road. On April 14, 2008, the Clatsop County Board of Commissioners voted to approve variances for NorthernStar's use of Clifton Road (The Daily Astorian, 2008).

About 2.4 miles from Highway 30, Clifton Road intersects with Bradwood Road. After this intersection, Clifton Road continues northwest along the Columbia River to the Town of Clifton. Bradwood Road is currently a 1,150-foot-long gravel road that connects Clifton Road and the LNG terminal site. NorthernStar would widen Bradwood Road to 24 feet by clearing and grading the area directly adjacent to the existing road. Following clearing and grading, the road would be paved in order to accommodate the large trucks required for the project. Impacts on traffic are not anticipated as a result of planned improvements to or increased use of Bradwood Road because it is not currently used by the public.

The existing Hunt Creek Bridge, located on Bradwood Road, is not adequate to withstand the anticipated vehicle loads associated with construction of the project. Therefore, NorthernStar would replace the bridge with a new one built of four 75-foot-long, 3-foot-high, pre-cast concrete deck bulb T-girders. These would be supported on concrete-filled steel piles that would be placed above the MHHW elevation. See section 2.4.1.1 for additional details regarding the Hunt Creek Bridge replacement.

Ship Traffic

Many commercial and recreational vessels utilize the Columbia River. Annual ship traffic at the mouth of the Columbia River in recent years has been roughly 2,000 round-trips.

Dredging of the turning basin may interfere with commercial and recreational vessel use of the Columbia River. Because the temporary mooring of the dredge barges would occupy a relatively large portion of the channel throughout dredging operations, this equipment might present an obstruction to navigation. Transit and mooring of the dredge barges would be required to comply with applicable COE and Coast Guard regulations. In addition, dredging would only occur between November and January, when river use is lowest. Barges would not be used to bring supplies to the LNG terminal during construction.

Operation of the LNG terminal itself would not affect commercial or recreational uses of the Columbia River. None of the structures to be constructed as part of the ship berth would be located within the navigation channel. Navigational marking and operation of the structures would be conducted in accordance with applicable Coast Guard and COE regulations. Impacts on ship traffic associated with the arrival and departure of LNG carriers during operation of the proposed LNG terminal were previously discussed in section 4.8.1.7.

Train Traffic

One set of railroad tracks currently passes through the proposed Bradwood Landing LNG terminal. The PWRR historically connected Portland with Astoria. Although PWRR owns the tracks and appurtenances associated with the railroad, the underlying right-of-way and railroad bridges are owned by the ODOT. It may be possible for NorthernStar to use the rail line for delivery of materials by train during project construction.

Originally known as the Astoria and Columbia River Railroad and completed in 1898, the PWRR is discussed as an historic resource in section 4.9. Passenger train service through the terminal site was abandoned in 1952 due to low ridership.²³ Anecdotal information collected by NorthernStar indicates that, with the exception of the brief period described below, a train has not run through the terminal site since at least 1987. In fact, soil covered the railroad tracks for at least 12 years prior to the clearing of the tracks to allow the Lewis & Clark Explorer Train (LCET) to temporarily operate from 2003 to 2005. From 2003 to 2005, during the bicentennial celebration of the Lewis and Clark expedition, the LCET provided summer-only passenger train service between Portland and Astoria. The LCET was heavily subsidized, and the service was terminated in 2005 when the subsidy ended.

Since the termination of the LCET service, a train has not operated through the Bradwood Landing terminal site. There is currently no traffic on the railroad, and the PWRR has no plans to operate trains west of Wauna. In 2006, a segment of tracks were washed out west of Bradwood, approximately half-way to Astoria. The tracks have not yet been repaired, although the PWRR is in discussions with the local diking districts to repair the dikes and restore the tracks.

²³ <http://www.nationalcorridors.org/df/df06022003.shtml>

NorthernStar proposes to modify the railroad right-of-way owned by the ODOT. The modification would consist of rerouting the segment of the railroad tracks that runs through the proposed LNG terminal property up to 250 feet south of its present location.

In November 2005, NorthernStar, PWRR, and the ODOT agreed to enter into a Railroad Relocation Agreement. To date, the alignment of the planned relocation has been reviewed and accepted by the railroad management as consistent with their future plans. However, the agreement has not yet been finalized. Therefore, **we recommend that:**

- **NorthernStar should file a copy of the final Railroad Relocation Agreement with the Secretary prior to LNG terminal construction.**

As discussed in section 4.11.4, the proposed relocation of rail track routing would be within the thermal exclusion zone for the LNG tank impoundment area. Therefore, in response to our recommendation in the draft EIS, NorthernStar provided procedures for coordinating with the railroad company to ensure safe rail transit through the Bradwood Landing LNG terminal property.²⁴

An upset condition could be an act of nature, such as an earthquake or severe storm; a fire at the terminal or surrounding site; or a hydrocarbon leak. Events that require an emergency response are not likely to occur, or would be very rare (with the exception of severe storms, which are still infrequent). Regardless of the unlikelihood of an upset condition at the facility, it is still necessary to have executable procedures in place for the notification of the railroad. These procedures would only be used if the PWRR resumes train service along the tracks through the proposed Bradwood Landing LNG terminal property.

Because only one set of railroad tracks runs through the Bradwood Landing property, the railroad may schedule future trains so that there is either an east bound train or a west bound train running at any one time. Railroads operate trains on a routine schedules. Therefore, if trains were to run through the LNG terminal property, NorthernStar would know the train schedule in advance, and be able to coordinate its response procedures with the PWRR.

The PWRR has a dispatch operator that is reachable by direct phone line 24 hours per day, 7 days per week. If there is an upset event at the terminal, NorthernStar would call the railroad dispatch operator, who would call the train engineer, and tell the engineer to stop the train short of the terminal until the all clear is given.

Non-Emergency Operational Upsets

In the event of non-emergency operational upsets, a notification shall be made to the PWRR providing the following information:

- Description of upset/activity: scheduled or unscheduled maintenance, equipment failure, etc.
- Location at facility of upset: wharf, control room building, etc.
- Anticipated duration: when will upset condition be remedied; when will routine operations commence?

²⁴ On October 15, 2007, NorthernStar filed its response to our recommended environmental condition 41 from the draft EIS. This document is available for viewing by the public through the FERC's internet webpage at www.ferc.gov using the elibrary link. Type in Docket no. CP06-365, and the appropriate date, and look up accession number 2007018-0212.

- Any safety issues: description of any issues that may result in an increase, or otherwise influence safety or railroad passage or track use.
- Change of status: any change to operational upset conditions or other information previously reported.

An initial notification to the PWRR would be made as part of the initial action to any facility emergency response. For non-emergency operational upset situations, NorthernStar would notify the PWRR dispatcher when conditions at the terminal return to normal and would include a final recommendation regarding the use of the railroad. The dispatcher would communicate the all clear to the train engineer.

Emergency Response Conditions

A number of emergency response events have specific response plans. These include:

- spill or release
- severe weather
- fire
- bomb threat
- earthquake
- terrorist incident
- LNG carrier response

In the event of an emergency response, an initial notification shall be made to the PWRR consisting of the following information:

- Description of upset/activity: LNG spill, fire, etc.
- Recommendation of immediate action by railroad: whether conditions and/or risks are such that a train should be stopped outside the terminal until the situation improves.

A follow-on notification shall be made providing the following clarifying information as it becomes available:

- Location at facility of emergency: wharf, control room building, etc.
- Anticipated duration of emergency: when will the emergency be remedied; when will terminal and/or Emergency Responders stand down from response operations?
- Any intermediate safety issues: description of any issues which may result in an increase, or otherwise influence safety, railroad passage, or track use; safety related information in addition to that provided in the initial notification.

Recovery actions from an emergency response condition depend on the nature, severity, and in some cases, the duration of the event. Emergency responses may be handled completely by Bradwood Landing terminal personnel or, for responses to events of significant magnitude, it may be appropriate to establish a Unified Command. In the case of a Unified Command structure for the response, the all clear communication to the PWRR dispatcher would be made jointly by the Unified Command and NorthernStar. The dispatcher would communicate the all clear to the train engineer.

4.8.2.8 Recreation and Tourism

Comments were received during scoping regarding the potential project-related impacts on local recreational activities and tourism. Developed recreational facilities near the LNG terminal include Erikson City Park, Strong Waterfront Park and Trail, Elochoman Slough Marina, and Skyline golf course in Cathlamet, about 2.5 miles to the north. Skamokawa Vista Park is located about 4.3 miles from the LNG terminal. We believe that because of this distance, these recreational facilities would not be adversely affected by the construction or operation of the LNG terminal. Recreational activities near the LNG terminal include use of the Columbia River by boaters, including users of the Lower Columbia River Water Trail, and use of public beaches along the river. These activities are discussed in detail in sections 4.7.1.4 and 4.7.2.6. The main impact the LNG terminal may have on recreational river users would be from dredging the maneuvering area adjacent to the navigation channel. Operation of the LNG terminal should not have any direct impacts on recreation, because this parcel is on privately owned land without public access. However, there could be indirect visual impacts on recreational users of the Columbia River, Clatsop State Forest, JHBNWR, the Elochoman Slough Marina, and Skamokawa Vista Park (see section 4.7.2.7).

There are no easily accessible data to measure the current status of tourism in the region that comprises the waterway, LNG terminal, and pipeline components of the Bradwood Landing Project. Tourist activities could include trips to the lower Columbia River and ocean beaches via Highway 30 in Oregon or Highway 4 in Washington, visits to local museums and historical sites, and attendance at local festivals held periodically at Cathlamet, Skamokawa, and Astoria. About 18 ocean-going cruise ships each year come up the Columbia River to dock at Astoria, 24 miles down river from the LNG terminal. In addition, several smaller river cruise vessels travel between Portland and Astoria. The impact of tourism on the local economy includes revenue generated by sales of supplies, food, and beverage services; recreational outfitters (such as the local kayaking companies); and lodging. NorthernStar calculated that the annual tourist industry generates about \$361 million in travel spending in Clatsop and Columbia Counties, Oregon, and about \$204 million in travel spending in Pacific, Wahkiakum, and Cowlitz Counties, Washington (see table 4.8.2-8).

TABLE 4.8.2-8			
Direct Travel Impacts in the Vicinity of the Bradwood Landing Project			
Area	Travel Spending (\$ million)	Employee Earnings (\$ million)	Employment
Oregon	7,367.2	1,793.9	87,590
Clatsop County	351.9	106.8	5,290
Columbia County	26.1	5.0	370
Washington	12,701	3,833	143,660
Cowlitz County	112.8	27.6	1,630
Pacific County	104.0	28.8	2,080
Wahkiakum County	3.1	0.9	60
Sources: Dean Runyan Associates, 2007. State of Washington, Department of Community, Trade, and Economic Development, 2006.			

The operation of the Bradwood LNG terminal would not displace or remove any existing businesses. The closest businesses to the LNG terminal are the Columbia River Front Farm House and Columbia River Front Lodge, which both serve as vacation rental homes, located immediately across the Columbia River on Puget Island at CRM 39. There are at least three other bed and breakfast type accommodations on Puget Island (Redfern Farm, Rog's Retreat, and Columbia River Beach House). We believe that construction and operation of the LNG terminal would have no direct adverse affects on those

commercial establishments. Potential visual impacts on businesses in the vicinity of the LNG terminal are discussed in section 4.7.2.7.

One of the main potential impacts on tourism in the area would be project-related vehicle traffic. This was previously discussed in section 4.8.2.7. The impacts of LNG marine traffic on tourism related to use of the Columbia River was previously discussed in section 4.8.1.7.

4.8.2.9 Environmental Justice

Populations considered potentially affected for the environmental justice analysis due to the proposed LNG terminal include those communities occurring within the Zones of Concern associated with an LNG carrier while docked at the LNG terminal. Tables 4.8.2-9 and 4.8.2-10 describe the ethnic and racial composition and income distribution of these communities, respectively. Within these areas, there are no predominantly low-income or minority communities and the population of Native Americans is less than 2 percent of the total population. About 94 percent of the population of Puget Island is white non-Hispanic. Only 9.4 percent live below federal standards defining poverty. Similarly, 100 percent of the population of Clifton is white non-Hispanic and 14.4 percent live below the poverty line. Minorities comprise a smaller percentage of the population in both Puget Island and Clifton than the county average (6.6 and 6.9 percent, respectively). Poverty levels for both Puget Island and Clifton are slightly higher than Wahkiakum and Clatsop Counties (8.1 and 13.2 percent, respectively). However, based on the rural setting at the proposed LNG terminal site, neither low-income nor minority groups would be disproportionately affected by the project.

TABLE 4.8.2-9									
Demographics in the Vicinity of the Bradwood Landing LNG Terminal ^a									
State/County/Community	Total Population (2000)	Percent White	Percent Black or African American	Percent American Indian & Alaska Native	Percent Asian	Percent Native Hawaiian & Other Pacific Islander	Percent Other Race	Percent Hispanic or Latino – Any Race	Percent Minority
Oregon	3,421,399	86.5	1.6	1.3	2.9	0.2	7.5	8.0	13.5
Clatsop County	35,630	93.1	0.5	1.0	1.2	0.1	4.1	4.5	6.9
Clifton	33	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Washington	5,894,121	81.8	3.2	1.5	5.4	0.4	7.7	7.4	18.2
Wahkiakum County	3,824	93.4	0.3	1.6	0.5	<0.1	4.1	2.6	6.6
Cathlamet	565	94.1	0.5	1.6	0.8	0.0	3.0	0.5	5.9
Puget Island	798	94.1	0.3	1.7	0.2	0.0	3.7	2.5	5.9

^a Populations considered potentially affected for the environmental justice analysis for the LNG terminal include those communities occurring within the Zones of Concern associated with an LNG carrier while docked at the LNG terminal.

Source: U.S. Census Bureau, Census 2000

4.8.3 Pipeline Facilities

Construction and operation of the proposed pipeline would occur in Clatsop and Columbia Counties, Oregon and Cowlitz County, Washington. In addition, due to the large construction workforce, socioeconomic effects relating to construction of the pipeline would extend into Wahkiakum County and the Portland MSA, where approximately 86 percent of the construction workforce for the proposed pipeline is expected to reside. Because Columbia County is within the Portland MSA, there is some duplication of data in the discussion below.

TABLE 4.8.2-10				
Income Distribution in the Vicinity of the Bradwood Landing LNG Terminal ^a				
State/County/Community	Total Population (2000)	Per Capita Income (1999)	Median Household Income (1999)	Percentage of Persons Below Poverty (1999)
Oregon	3,421,399	20,940	40,916	11.6
Clatsop County	35,630	19,515	36,301	13.2
Clifton	33	14,549	28,438	14.4
Washington	5,894,121	22,973	45,776	10.6
Wahkiakum County	3,824	19,063	39,444	8.1
Cathlamet	565	18,588	33,409	15.1
Puget Island	798	22,444	48,906	9.4
^a Populations considered potentially affected for the environmental justice analysis for the LNG terminal include those communities occurring within the Zones of Concern associated with an LNG carrier while docked at the LNG terminal.				
Source: U.S. Census Bureau, Census 2000				

4.8.3.1 Population

The counties affected by the pipeline facilities vary widely in their population totals and densities (see table 4.8.2-1). No appreciable changes to the local population distribution or number are expected to occur as a result of the construction and operation of the proposed natural gas sendout pipeline. As described in section 4.8.2.1, NorthernStar indicated that the vast majority of its workers would reside within a radius of about 80 miles; however, NorthernStar has stated that some specialized out-of-state workers with previous pipeline construction experience may be employed for construction of the pipeline. For the purposes of this analysis, we have determined that the minimum number of specialized out-of-state workers required during construction of the proposed pipeline would be 10. Based on the average family size of 3.1 persons described in section 4.8.2.1, if 10 non-local workers are employed and bring their families, about 30 people would relocate to the area during construction of the proposed pipeline. We think the local population could easily absorb 30 more people without adverse effects.

4.8.3.2 Housing

Housing statistics for the counties affected by construction of the proposed pipeline are presented in table 4.8.2-2. Construction and operation of the pipeline facilities are not expected to affect housing in the study area. As discussed in section 4.8.2.1, NorthernStar would use mostly local workers. NorthernStar has estimated that as many as 30 people may temporarily relocate to the area as a result of the project. We think there is sufficient available housing to accommodate all non-local workers and their families.

4.8.3.3 Property Values

Comments were received during scoping regarding loss of income, use, and property value due to the proposed pipeline easements. The easements would give NorthernStar a right-of-way in which to construct, operate, and maintain the pipeline. In return, NorthernStar would compensate the landowner for use of the land. The easement agreement between NorthernStar and the landowner would specify compensation for damage to property during construction, loss of use during construction, and loss of renewable and nonrenewable or other resources. NorthernStar would seek to negotiate a mutually acceptable agreement. However, if the project is authorized by the FERC, that approval conveys with it the right of eminent domain under section 7h of the NGA. Therefore, if negotiations fail to produce an agreement, NorthernStar could initiate condemnation proceedings, and the value of the easement and the amounts for compensatory damages would be determined by the local district or state courts.

The impact a pipeline may have on the value of a tract of land depends on many factors, including the size of the tract, the values of adjacent properties, the presence of other utilities, the current value of the land, and the current land use. Subjective valuation is generally not considered in appraisals. This is not to say that the pipeline would not affect resale values. A potential purchaser of property may make a decision to purchase land based on his or her planned use, such as agricultural, future subdivision, or second home on the property in question. If the presence of a pipeline renders the planned use infeasible, it is possible that a potential purchaser would decide not to purchase the property. However, each potential purchaser has different criteria and differing capabilities to purchase land.

INGAA conducted a national case study to determine if the presence of a pipeline on a piece of property affected the property value or sales price of the property. The *INGAA Foundation Natural Gas Pipeline Impact Study* (INGAA, 2004) found that there was not a significant impact on the sales price of properties located along natural gas pipelines. It was further determined that neither the size of the pipeline (diameter) nor the product carried by a pipeline has any significant impact on sales price. Whatcom County, Washington also analyzed the impacts on property values associated with pipelines to determine the effect the Olympic pipeline explosion had on sales of real estate on or near the pipeline route. Its analysis determined that the explosion of the pipeline, which transported liquid petroleum fuel, had little effect on property values (Whatcom County, 2001).

4.8.3.4 Economy and Employment

The existing economic conditions in the pipeline project area are presented in table 4.8.2-3. As discussed in section 4.8.2.1, most of the labor force for construction of the pipeline facilities is expected to commute to the project area from within an 80-mile radius, including the Portland MSA. Tables 4.8.3-1 and 4.8.3-2 list the estimated construction workforce and the counties of residence that NorthernStar anticipates the workers to commute from, respectively.

TABLE 4.8.3-1		
Estimated Construction Workforce for the Pipeline Facilities		
Timeframe	Average Number of Workers per Month	Percent of Total Construction Workforce
HDD (months 1 - 8)	12	6.0%
Pipeline Construction (months 9 - 16)	133	74.5%
Peak Construction (month 13)	313	19.5%

TABLE 4.8.3-2			
Sources of Construction Workers for the Pipeline Facilities			
Location	Average Number of Workers Commuting	Percent of Workers Commuting	Number of Workers Commuting During Peak Construction
Clatsop County	3	2	6
Portland MSA	114	86	269
Columbia County ^a	8	6	19
Cowlitz County	13	10	31
Wahkiakum County	3	2	6
Pipeline Total ^b	133	100	313
<p>Note: Sum of addends may not be the same as the total due to rounding.</p> <p>^a Construction workers from Columbia County are also included in the Portland MSA; therefore, they are not included in the project total.</p> <p>^b Pipeline total does not include specialty workers that may be hired from outside the study area.</p> <p>Source: Columbia Pacific Building Trades Council, 2005.</p>			

NorthernStar estimates that 313 workers would be employed during peak construction of the pipeline, occurring during month 13 of pipeline construction. Approximately 86 percent of the construction workforce for the pipeline is expected to commute from the Portland MSA, including Columbia County. The remainder would commute from Cowlitz County (10 percent), Clatsop County (2 percent), and Wahkiakum County (2 percent). Workers are expected to commute to the project site daily and would generally work four 10-hour days per week.

Construction expenditures by NorthernStar would increase economic activity within the counties affected by the project, which would have a multiplier effect on the local economy (see section 4.8.2.4). Table 4.8.3-3 shows the estimated economic impact of construction of the pipeline facilities.

TABLE 4.8.3-3					
Economic Impacts of Construction of the Pipeline Facilities					
Impact	Project Total	Four-county Area Impact (30 percent of estimated workforce)			
		Direct Impacts	Output Multiplier ^a (approximate)	Indirect and Induced Effect	Total Four-county Impact
Economic Impact ^b	\$126,000,000	\$10,320,000	1.82	\$8,542,200	\$18,862,200
Payroll ^c	\$22,000,000	\$4,400,000	1.64	\$2,816,000	\$7,216,000
Employment ^d	133	27	1.72	36	73
^a IMPLAN calculates the results of the multipliers based on a per million dollar change in final demand (total direct expenditures).					
^b Payroll and expenditures over 16-month pipeline construction period.					
^c Payroll over 16-month pipeline construction period.					
^d Based on monthly averages.					

Project-related employment and expenditures would have a direct and positive effect on employment and economy within the study area. Total construction costs for the pipeline facilities are estimated to be \$126 million. NorthernStar estimates that total payroll (which includes both wages and benefits) for the construction of the pipeline facilities would be \$22 million. Within the four-county area, NorthernStar estimates that total direct expenditures on goods, equipment, and services during construction of the pipeline facilities would be \$10.3 million.

NorthernStar anticipates that the first 8 months of pipeline construction would be required to complete the HDDs. The following 8 months would be required to complete the rest of the pipeline. The average local monthly payroll during pipeline construction would be about \$550,000. Based on NorthernStar's estimates for where workers would reside, the average payroll dollars per month generated by workers would be \$275,000 in Cowlitz County, \$165,000 in Columbia County, and about \$55,000 per month in both Wahkiakum and Clatsop Counties.

4.8.3.5 Tax Revenues

Construction and operation of the Bradwood Landing Project would have beneficial impacts on property and corporate tax revenue in the counties affected by the project. Property taxes on the pipeline would be assessed by and paid to Clatsop and Columbia Counties in Oregon and Cowlitz County in Washington. Property taxes for a piece of property are generally based on the actual use of the land. Pipeline construction would not change the general land use, but future construction of aboveground structures on the permanent right-of-way would be precluded. Based on the portion of the pipeline in each of the counties and tax rates from the different taxing entities, the apportioned amounts of the property taxes paid would be approximately \$284,029 to Clatsop County, \$518,465 to Columbia County,

and \$740,250 to Cowlitz County. NorthernStar has estimated that total pipeline property taxes would be \$1,542,744.

In addition to the state taxes described above, Washington municipal taxes may apply. Cities and towns in Washington are allowed to impose local Public Utilities and Business and Occupation Taxes. For example, the City of Longview, which is the principal city in Cowlitz County, imposes a Public Utilities Tax of 6 percent of gross receipts on any company in the business of “furnishing or distributing natural gas.” It is not clear whether merely transporting natural gas is subject to tax. Longview also imposes a Business and Occupation tax at the rate of 0.2 percent on service businesses. This tax apparently would apply if the city’s Public Utilities Tax does not apply. Applying today’s rates, NorthernStar estimates that its local tax liability may range between \$30,000 and \$1,200,000, depending on which tax applies. This liability may be less, and possibly zero, if NorthernStar’s gross receipts from gas transportation activities are apportionable outside any city limits.

4.8.3.6 Local Infrastructure and Public Services

As discussed in section 4.8.2.6, a range of public services are provided in the cities and counties in the vicinity of the LNG terminal, which also includes the area of the pipeline. Table 4.8.1-4 provides an overview of existing hospitals, ambulance services, fire departments and law enforcement in the vicinity of the proposed project, including the pipeline. A discussion of the potential impacts of the proposed project on local hospitals, ambulance services, utilities, and schools is provided in section 4.8.2.6. A discussion of potential impacts on local fire protection districts and law enforcement agencies is provided below.

Fire protection along the western portion of the pipeline route in Oregon would be provided by the Westport Wauna Fire District, Knappa-Svensen-Burnside RFPD in Clatsop County, and the Clatskanie RFPD in Columbia County, with support from the ODF for the rural fire protection districts. Along the eastern portion of the pipeline route in Washington the closest fire protection district is the Cowlitz County Fire Protection District No. 6, which serves the Longview area. Due to the largely rural setting through which the proposed pipeline would pass, law enforcement would be provided by the Clatsop County Sheriff’s Office, Columbia County Sheriff’s Department, and the Cowlitz County Sheriff’s Office.

Fire and other emergencies along the proposed route could require the services of local fire departments and law enforcement agencies, as discussed above. Both Clatsop County and the City of Clatskanie, Oregon have commented about concerns that the project may result in a strain on current resources to provide fire protection in the case of an emergency involving the LNG terminal and associated pipeline.

NorthernStar filed its first draft ERP on March 24, 2008. The ERP includes a cost-sharing plan that outlines how NorthernStar would fill resource gaps and supplement the first-responder capabilities of the local communities near its proposed LNG terminal. The ERP is discussed in more detail in section 4.11.6.

In addition, as discussed in section 4.11.9, due to current safety regulations governing the construction design, monitoring, and operation of interstate natural gas pipelines, we believe the potential for an accident involving the sendout pipeline is very low. Therefore, we do not believe that construction and operation of the proposed pipeline would result in adverse impacts on local infrastructure and public services.

4.8.3.7 Transportation and Traffic

Construction of the pipeline facilities could affect transportation and traffic in the project area by increasing the number of vehicle trips per day on area roads as a result of commuting and construction vehicle traffic as well as temporarily closing some minor roads during pipeline construction. A map of the project area is included as figure 2.1-1.

As previously discussed, during construction of the Bradwood Landing Project, NorthernStar anticipates an average of 30 trucks per day delivering construction equipment and supplies to the LNG terminal and along the pipeline route. However, during peak construction, up to about 80 trucks would make deliveries to the LNG terminal and along the proposed pipeline route. NorthernStar is currently consulting with Clatsop County regarding impacts on traffic due to construction vehicle traffic along Clifton Road (see section 4.8.2.7).

Pipeline construction workers would park their vehicles at the construction parking area located southeast of the Taylorville interchange at Highway 30. Buses would then be used to move workers to the job site. In addition, NorthernStar has committed to establishing policies to encourage workers to use carpooling and vanpooling to further reduce the potential for traffic impacts.

Additional vehicle traffic would result from equipment or material deliveries into and out of the proposed pipe storage and contractor yards each day. NorthernStar would use existing public and private roads that intersect the right-of-way to obtain access during construction. Load limits on public roads would be observed to prevent damage to the road surface, road bed, culverts, and bridges. Access road modifications proposed by NorthernStar are limited to grading and the addition of gravel to prevent rutting. Upon completion of the pipeline facilities installation, previously existing roads that were used for access would be returned to original or better condition, or as otherwise requested by the landowner.

NorthernStar would apply for all permits necessary for road access and crossings, and would comply with all permit stipulations. Any special requirements due to traffic volumes and weight limitations would be addressed via this process. Additionally, NorthernStar would coordinate construction activities with jurisdictional highway authorities, emergency responders, school transportation departments, other local groups such as private homeowners associations, and individual homeowners to minimize traffic impacts associated with the construction of the pipeline. Traffic flow for general access, and in particular for emergency response, would be maintained along roads which are the sole access to homes and communities.

NorthernStar and all contractors associated with the project would comply with all posted speed limits, and would exercise good judgment with regard to safe speeds in potentially hazardous situations. Temporary speed limits may be required in work zones to assure safe passage for vehicles, and would be posted where necessary.

Traffic impacts associated with the pipeline construction would be localized and temporary. NorthernStar would video or photograph access roads and crossing locations prior to construction or utilization of the roadway to establish a record of the pre-existing condition. Any damages to roadways associated with the construction of the pipeline, including access, would be repaired to the pre-existing condition. During construction, roadways would be maintained in a passable condition utilizing temporary repairs if necessary.

Pipeline construction across major roads would be accomplished by boring or HDD under the roadbed. Boring requires temporary extra workspace on both sides of the crossing for excavating bore pits to the depth of the pipeline. The bore pits are typically located just outside of the road right-of-way limits; however, site-specific conditions such as the presence of structures or waterbodies may require the

bore pits and temporary extra workspace to be moved within the road right-of-way. Little or no disruption of traffic would occur at road crossings that are bored. Most smaller, unpaved roads and driveways would be open-cut, then restored to preconstruction conditions or better. If an open-cut crossing were to require extensive construction time, provisions would be made for temporary detours or other measures to allow for the safe flow of traffic during construction. Table 4.8.3-4 lists the roads and highways crossed by the pipeline route and NorthernStar's proposed crossing method.

These increased traffic levels associated with construction of the pipeline would be temporary and limited to the period of construction (about 16 months).

We received comments on the draft EIS regarding potential impacts on narrow roads that have been identified by NorthernStar as proposed access roads to be used during construction of the pipeline (e.g., Whitewater Road, in Cowlitz County, Washington). The commentor identified this as a 1.5-lane road with blind corners and no turnouts for passing traffic. It is possible that use of these types of roads would not be feasible without some additional improvements (e.g., widening) to accommodate the large trucks and vehicles that would be required during construction. In addition, the ODOT, in its comments on the draft EIS stated that it would need to reevaluate traffic impacts at the Clifton Road intersection after NorthernStar submits its road approach application. The ODOT identified preliminary mitigation measures that would be required, including construction of a left turn lane on Highway 30 at Clifton Road, widening the highway shoulder to accommodate right turning vehicles, and radii improvements. Therefore, **we recommend that:**

- **NorthernStar should consult with the ODOT, WDOT, and appropriate local agencies in the development of its final traffic management plan. The final traffic management plan should include the design for improvements along Highway 30 and Clifton Road, and measures to reduce impacts on narrow roads that would be used to access the construction right-of-way. Prior to construction of the LNG terminal and pipeline, NorthernStar should file with the Secretary its final traffic management plan, and documentation of consultations with the ODOT, WDOT, and local county government agencies, with the Secretary for the review and written approval of the Director of OEP.**

4.8.3.8 Recreation and Tourism

The Bradwood Landing pipeline would not directly affect any national, state, county, or local parks or designated recreation and public interest areas. The HDD under the Columbia River between MPs 19.0 and 19.8 should avoid impacts on the LCNHT and Lower Columbia River Water Trail, and islands in the Columbia River that form part of the JBHNR. The Bradley State Scenic Viewpoint is located about 1,000 feet west of MP 1.7. There are parks and recreational facilities in the City of Clatskanie, about 2.5 miles south of the pipeline around MP 13.4, and in the Cities of Longview and Kelso, about 4 miles south of the pipeline in the vicinity of MP 34. These recreational and public use areas are discussed in section 4.7.3.6.

The primary potential impact on recreation and tourism in the area resulting from construction and operation of the pipeline would be project-related vehicle traffic. This was previously discussed in section 4.8.2.7. Visual impacts are addressed in section 4.7.3.7.

TABLE 4.8.3-4

Roads Crossed by the Bradwood Landing Pipeline Route

Road ^a	MP	State	County	Proposed Crossing Method ^b
Unnamed Road	0.4	OR	Clatsop	HDD
Unnamed Road	0.6	OR	Clatsop	HDD
Unnamed Road	0.7	OR	Clatsop	HDD
Unnamed Road	0.7	OR	Clatsop	HDD
Unnamed Road	2.1	OR	Clatsop	Open-cut
Unnamed Road	2.4	OR	Clatsop	Open-cut
Unnamed Road	3.0	OR	Clatsop	Open-cut
Unnamed Road	3.6	OR	Clatsop	HDD
Unnamed Road	3.7	OR	Clatsop	Open-cut
Unnamed Road	3.9	OR	Clatsop	Open-cut
Unnamed Road	4.7	OR	Clatsop	Open-cut
Unnamed Road	4.8	OR	Clatsop	Open-cut
Unnamed Road	5.7	OR	Clatsop	Open-cut
River Ranch Lane	6.0	OR	Clatsop	Bore
Unnamed Road	6.6	OR	Columbia	Open-cut
Unnamed Road	7.5	OR	Columbia	Open-cut
Unnamed Road	7.8	OR	Columbia	Open-cut
Unnamed Road	8.1	OR	Columbia	Open-cut
Unnamed Road	8.3	OR	Columbia	Open-cut
Unnamed Road	8.4	OR	Columbia	Open-cut
Unnamed Road	8.5	OR	Columbia	HDD
Woodson Road	8.6	OR	Columbia	HDD
Webb District Road	10.0	OR	Columbia	HDD
Midland District Road	10.1	OR	Columbia	HDD
Unnamed Road	10.3	OR	Columbia	Open-cut
Unnamed Road	10.5	OR	Columbia	Open-cut
Unnamed Road	12.3	OR	Columbia	Open-cut
River Front Dike Road	13.2	OR	Columbia	HDD
Erickson Dike Road	13.3	OR	Columbia	HDD
Unnamed Road	13.4	OR	Columbia	Open-cut
Collins Road No. 2	14.2	OR	Columbia	Open-cut
Lewis Road	15.0	OR	Columbia	Open-cut
Unnamed Road	15.5	OR	Columbia	Open-cut
Collins Road No. 1	15.8	OR	Columbia	Open-cut
Hermo Road	16.9	OR	Columbia	Open-cut
Unnamed Road	17.2	OR	Columbia	Open-cut
Unnamed Road	17.4	OR	Columbia	Open-cut
Unnamed Road	17.7	OR	Columbia	Open-cut
Unnamed Road	18.3	OR	Columbia	Open-cut
Unnamed Road	18.8	OR	Columbia	Open-cut
Unnamed Road	18.9	OR	Columbia	Open-cut
Unnamed Road	19.0	OR	Columbia	HDD
WA State Highway 4	19.6	WA	Cowlitz	HDD
Whitewater Road (AKA Old Mill Creek Road)	19.6	WA	Cowlitz	HDD
Robertson Road	20.4	WA	Cowlitz	HDD
Abernathy Creek Road	21.1	WA	Cowlitz	HDD
McAdams Road	21.1	WA	Cowlitz	HDD
Bunker Hill Road	22.2	WA	Cowlitz	Open-cut

TABLE 4.8.3-4 (cont'd)

Roads Crossed by the Bradwood Landing Pipeline Route

Road ^a	MP	State	County	Proposed Crossing Method ^b
Unnamed Road	22.5	WA	Cowlitz	Open-cut
Germany Creek Road	22.9	WA	Cowlitz	Bore
Fall Creek Road	23.0	WA	Cowlitz	Open-cut
Unnamed Road	23.1	WA	Cowlitz	Open-cut
Unnamed Road	23.5	WA	Cowlitz	Open-cut
Unnamed Road	24.6	WA	Cowlitz	Open-cut
Unnamed Road	24.7	WA	Cowlitz	Open-cut
Unnamed Road	25.4	WA	Cowlitz	Open-cut
Eufaula Heights Road	26.3	WA	Cowlitz	Open-cut
Graseth Poston Road	26.6	WA	Cowlitz	Open-cut
Carlton Loop Road	28.0	WA	Cowlitz	Bore
Coal Creek Road	28.0	WA	Cowlitz	Bore
Unnamed Road	28.6	WA	Cowlitz	Open-cut
Unnamed Road	28.7	WA	Cowlitz	Open-cut
Unnamed Road	28.7	WA	Cowlitz	Open-cut
Unnamed Road	28.9	WA	Cowlitz	Open-cut
Unnamed Road	28.9	WA	Cowlitz	Open-cut
Unnamed Road	29.2	WA	Cowlitz	Open-cut
Unnamed Road	29.2	WA	Cowlitz	Open-cut
Unnamed Road	29.4	WA	Cowlitz	Open-cut
Unnamed Road	29.5	WA	Cowlitz	Open-cut
Columbia Heights Road	31.7	WA	Cowlitz	Open-cut
Unnamed Road	31.9	WA	Cowlitz	Open-cut
Unnamed Road	32.7	WA	Cowlitz	Open-cut
Unnamed Road	32.7	WA	Cowlitz	Open-cut
Unnamed Road	32.7	WA	Cowlitz	Open-cut
Unnamed Road	32.8	WA	Cowlitz	Open-cut
Unnamed Road	32.8	WA	Cowlitz	Open-cut
Stoneyridge Road	33.2	WA	Cowlitz	Open-cut
Westside Highway	34.2	WA	Cowlitz	HDD
Unnamed Road	34.4	WA	Cowlitz	HDD
Unnamed Road	34.4	WA	Cowlitz	HDD
Unnamed Road	34.9	WA	Cowlitz	HDD
Unnamed Road	35.0	WA	Cowlitz	HDD
Unnamed Road	35.2	WA	Cowlitz	HDD
Interstate Highway 5 Service Road – Southbound	35.3	WA	Cowlitz	HDD
Interstate Highway 5 - Southbound	35.3	WA	Cowlitz	HDD
Interstate Highway 5 - Northbound	35.3	WA	Cowlitz	HDD
Interstate Highway 5 Service Road – Northbound	35.3	WA	Cowlitz	HDD
Unnamed Road	35.7	WA	Cowlitz	Open-cut
Unnamed Road	35.8	WA	Cowlitz	Open-cut
Unnamed Road	35.9	WA	Cowlitz	Open-cut
Unnamed Road	36.3	WA	Cowlitz	Open-cut

^a Roads, railroads, utilities, and pipelines were digitized manually based on photo interpretation and available desktop data.

^b The crossing methods were identified based on photo interpretations of the crossed features. The actual crossing methods used during construction may vary depending on the conditions and features of the roads and railroads and in accordance with applicable permits.

4.8.3.9 Environmental Justice

Tables 4.8.3-5 and 4.8.3-6 describe the ethnic and racial composition and income distribution of the counties and communities crossed by the pipeline route. There are no predominantly low-income or minority communities in the area surrounding the pipeline facilities. Therefore, these groups would not be disproportionately affected by the project.

TABLE 4.8.3-5									
Demographics of Communities Crossed by Bradwood Landing Pipeline Route									
State/County/Community	Total Population (2000)	Percent White	Percent Black or African American	Percent American Indian & Alaska Native	Percent Asian	Percent Native Hawaiian & Other Pacific Islander	Percent Other Race	Percent Hispanic or Latino – Any Race	Percent Minority
Oregon	3,421,399	86.5	1.6	1.3	2.9	0.2	7.5	8.0	13.5
Clatsop County	35,630	93.1	0.5	1.0	1.2	0.1	4.1	4.5	6.9
Wauna	2	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Columbia County	43,560	94.4	0.2	1.3	0.6	0.1	3.4	2.5	5.6
Washington	5,894,121	81.8	3.2	1.5	5.4	0.4	7.7	7.4	18.2
Cowlitz County	92,948	91.8	0.5	1.5	1.3	0.1	4.8	4.6	8.2
Eufaula Heights	724	94.6	0.6	2.0	0.4	0.0	2.4	0.3	5.4
Source: U.S. Census Bureau, Census 2000									

TABLE 4.8.3-6				
Income Distribution of Communities Crossed by Bradwood Landing Pipeline Route				
State/County/Community	Total Population (2000)	Per Capita Income (1999)	Median Household Income (1999)	Percentage of Persons Below Poverty (1999)
Oregon	3,421,399	20,940	40,916	11.6
Clatsop County	35,630	19,515	36,301	13.2
Wauna	2	14,549	28,438	14.4
Columbia County	43,560	20,078	45,797	9.1
Washington	5,894,121	22,973	45,776	10.6
Cowlitz County	92,948	18,583	39,797	13.9
Eufaula Heights	724	29,648	67,188	2.3
Source: U.S. Census Bureau, Census 2000				

4.9 CULTURAL RESOURCES

Section 106 of the NHPA, as amended, requires that the FERC take into account the effects of its undertakings (including authorizations under sections 3 and 7 of the NGA) on properties listed on, or eligible for listing on, the NRHP, and to provide the ACHP an opportunity to comment on the undertaking. NorthernStar, as a non-federal party, is assisting the FERC in meeting its obligations under section 106 and the implementing regulations at 36 CFR 800.

The COE and Coast Guard also have responsibilities for considering effects of their undertakings on historic properties, under the NHPA. However, as lead federal agency for this project, the FERC will address compliance with the act jointly for all cooperating agencies in this EIS.

4.9.1 Results of Cultural Resources Overviews and Inventories

NorthernStar's cultural resources consultant (Historical Research Associates, Inc. (HRA)) conducted archival research and a site file search at both the Oregon and Washington SHPOs in June 2005. HRA met with the Oregon SHPO in July 2005 to discuss the proposed project. The Oregon SHPO indicated that a submerged survey of the proposed turning basin in the Columbia River for the LNG terminal was not necessary. In January 2006, HRA consulted with Washington SHPO about the area of potential effect (APE) for the pipeline. NorthernStar's cultural resources contactors (HRA and URS) have conducted inventories of portions of the APE that were accessible, and have submitted reports to the FERC and the SHPOs. The survey reports included overviews and the results of the inventories, which are discussed below.

4.9.1.1 Waterway for LNG Marine Traffic

In a letter dated November 24, 2006, we requested the opinion of the Washington SHPO about the potential for LNG marine traffic to affect historic properties along the waterway to the proposed Bradwood Landing LNG terminal. In response, the Washington SHPO, in a letter to the FERC dated November 27, 2006, requested a description and map of the APE for the LNG marine transit route.

In a January 4, 2007 data request, we asked NorthernStar to provide the Washington and Oregon SHPOs with maps and a narrative description of the APE for the LNG carrier transit route along the Columbia River from the sea buoy to the proposed Bradwood Landing LNG terminal, and consult with the SHPOs regarding the potential for LNG marine traffic to have any adverse effects on historic properties. In a January 16, 2007 filing, NorthernStar indicated that it would provide the requested data to the SHPOs in early February 2007 and expected to complete consultations on this issue by mid-April 2007. On March 13, 2007, we requested that NorthernStar address the potential impacts LNG marine traffic may have on historic properties along the waterway and within the Zones of Concern. NorthernStar responded to that request with a filing on May 10, 2007.

NorthernStar's May 10, 2007 filing identified 19 known shipwrecks within the Columbia River adjacent to the LNG marine traffic route in Oregon. In addition, 18 shipwrecks have been recorded along the Pacific Coast west of Fort Stevens State Park in Oregon overlapped by the Zones of Concern. One shipwreck, the *Isabella*, near Astoria, Oregon, is listed on the NRHP. The NRHP eligibility of the other shipwrecks is unknown. LNG marine traffic to the Bradwood Landing LNG terminal would have virtually no potential to impact any of those shipwrecks, because the shipwrecks are situated in shallow water outside of the currently maintained navigation channel, and an LNG carrier that loses steerage and strays away from the navigation channel would likely run aground before reaching the location of any of the shipwrecks.

The LCNHT follows the lower Columbia River to its mouth. While there are numerous campsites related to the 1804-1806 Lewis and Clark expedition along the lower Columbia River, none have been recorded as archaeological sites.

The LCNHP consists of 12 park sites near the mouth of the Columbia River, stretching from Long Beach, Washington to Cannon Beach, Oregon. Two elements of the LCNHP, Cape Disappointment State Park (including the Lewis and Clark Interpretive Center) in Washington, and Fort Stevens State Park in Oregon, would be overlapped by the Zones of Concern for LNG marine traffic in the waterway to the proposed Bradwood Landing LNG terminal. The other 10 elements of the LCNHP are outside of the Zones of Concerns and would not be affected by the project. LNG marine traffic in the waterway would have no adverse effects on the LCNHT and the LCNHP. Our reasons supporting this determination are explained below.

There are multiple sites listed on the NRHP along the shoreline of the Columbia River within the Zones of Concern in the state of Washington, including two historic districts. The Cape Disappointment Historic District was listed on the NRHP in 1975 and covers 18,000 acres. It includes eight structures, including the Cape Disappointment Lighthouse, originally completed in 1856, and the remnants of Fort Canby, a military installation established in 1875. The Skamokawa Historic District was listed on the NRHP in 1976, covers 8,000 acres, and includes 21 primary and 56 secondary structures. At Altoona, the Double-ended Columbia River Gillnet Boat was listed on the NRHP in 1978 as an individual structure. There are three NRHP-listed sites in Cathlamet: the Pioneer Cemetery (45WK58), Kimball-Butler House (45WK59), and Pioneer Church (45WK60).

There are also a number of NRHP-listed sites along the waterway and within the Zones of Concern in Oregon, including the Fort Stevens Military Reservation (35CLT85), added as an individual site in 1971. In Warrenton, the Daniel Knight Warren House is listed on the NRHP as a single dwelling. There are three NRHP Historic Districts in Astoria: the Astoria Downtown Historic District, listed on the NRHP in 1998, encompassing 540 acres and including 61 contributing buildings or structures and 64 non-contributing resources; the Uniontown-Alameda Historic District, listed in 1988, covering 754 acres and including 134 contributing elements and 82 non-contributing; and the Shively-McClure Historic District with 241 contributing and 171 non-contributing resources. Individual structures listed on the NRHP in Astoria include: the Astor Hotel, Astoria Column, Bartlett House, Cherry House, Old City Hall, County Courthouse, Old County Jail, Doughboy Apartments, Elks Building, Elmore Cannery, Elmore Salmon Cannery, Erickson-Larsen Ensemble Building, Erickson-Larsen House, Fire House No. 2, Ferguson House, Fisher House, three Flavel houses, Foard House, Fort Astoria, Gilbert House, two Grace Episcopal Churches, Gray House, Griffin House, Hobson House, Holmes House, Jualo-Palo House, Kinney Cannery, Leinenweber House, Liberty Theater, Lightship Columbia, Macklin House, Noonan-Norblad House, Page House, Post Office, Rovainen House, Seeborg House, Structure at 229 Alameda, Structure at 265 Alameda, Structure at 110 Washington, Svensen Blacksmith Shop, Union Fishermens Coop, Victory Monument, Wharf and Bonded Warehouse, Andrew Young House, and Benjamin Young House.

It is highly unlikely that LNG marine traffic in the waterway to the proposed Bradwood Landing could have any adverse effects on historic properties in the lower Columbia River or along its shoreline. About 125 LNG carriers per year would transit to the proposed terminal, which would represent an increase of about 7 percent in commercial vessel traffic on the Columbia River. In our opinion, use of an existing dredged navigation channel would have little potential to impact submerged historic properties within the navigation channel. In addition, we think the potential for effects on shoreline cultural resources along the LNG marine traffic route would be low. LNG marine traffic should not result in significant shoreline erosion affecting historic properties. Further discussions about LNG marine traffic, and potential shoreline erosion are provided elsewhere in this EIS.

Commentors on our draft EIS raised concerns about the potential for leaks from LNG carriers having impacts on historical parks and trails located along the waterway, and potential visual impacts on visitors to the parks. We discuss potential visual impacts on recreational resources from LNG marine traffic in the waterway in section 4.7.1.5. LNG carriers would be visible to users of the various elements of the LCNHP along the shore of the lower Columbia River for several minutes at a time. These carriers would represent only a minor increase to the current use of the river by commercial vessels.

As discussed in section 4.3.2.2, LNG carriers are double hulled, which would assure that fuel and oil are kept on board, and makes the potential for a fuel or oil spill unlikely. Furthermore, each LNG carrier would maintain a SOPEP as required by international convention.

In the unlikely event of an LNG carrier incident that would result in an LNG spill and fire, effects would vary for different kinds of historic properties, depending upon their location within the different Zones of Concern. There would be less impacts on sites located in Zone 3 compared to sites located in Zone 1. Historic buildings could be affected by a pool fire, while a buried prehistoric site may not. However, a buried archaeological site may be affected by a fire-fighting response, such as the use of bulldozers to clear a fire break. Adverse effects from a project-related fire could be minimized by coordination with fire suppression agencies. NorthernStar indicated that it would produce a Cultural Resources Management Plan that would outline procedures for coordination with first responders in order to protect historic properties in such situations. With the implementation of NorthernStar's proposed safety and security measures and the conditions outlined in the Coast Guard WSR, the possibility of an LNG spill and associated pool fire from an LNG carrier en route to the terminal is very low, and impacts on historic properties along the waterway or within the Zones of Concern would be less than significant.

4.9.1.2 LNG Terminal

A portion of the LCNHT follows the lower Columbia River. The Lewis and Clark expedition camped on November 6, 1805 in the vicinity of Cape Horn, opposite of Puget Island, in modern Wahkiakum County, Washington, toward the end of their journey westward to the Pacific Ocean. The next day they proceeded by canoe, with a local Native American guide, down the north side of the Columbia River, and camped on November 7, 1805 west of Jim Crow Point, opposite of Pillar Rock, in Wahkiakum County, Washington. The Lewis and Clark expedition spent the winter of 1805-1806 at Fort Clatsop, west of modern Astoria, Oregon, and in March of 1806 began their return journey up the Columbia River eastward. Taking their canoes along the south side of the river, they camped on March 23, 1806 just below the mouth of John Day River in Clatsop County, Oregon. On March 24, 1806, they camped at Aldrich Point, Clatsop County, Oregon, and on March 25, 1806, they camped just below the mouth of the Clatskanie River in Columbia County, Oregon (Moulton, 2002). There are no known Lewis and Clark campsites at the Bradwood Landing LNG terminal location.

During their trip through the project area, Lewis and Clark identified the Native Americans near the mouth of the Columbia River on the north (Washington) side as members of the Wahkiakum Tribe, while the Native Americans on the south (Oregon) side were referred to as the Cathlamet Tribe. Modern ethnographers group both the Wahkiakum and Cathlamet bands together within the Cathlamet linguistic division of the Lower Chinook Nation (Silverstein, 1990). Ray (1938) mapped an ethnohistoric Indian village at the mouth of Coal Creek in Cowlitz County, Washington, two villages in the vicinity of the modern town of Cathlamet, Washington, one on Tenasillahe Island, and one near modern Knappa, Oregon. Lewis and Clark noted an Indian cemetery, with the dead entombed in canoes raised above the ground, at the Cathlamet village in the vicinity of Knappa (Moulton, 2002). An archaeological site near Knappa has been recorded as 35CLT37 (also called Hlilusqahih or the Knappa Docks Site), and was listed on the NRHP in 1984. Also listed on the NRHP in 1984 was the Indian Point Site, recorded as 35CLT34, near Svensen, Oregon.

The LCNHT through the project area has not been officially documented or nominated for the NRHP. HRA considers the LCNHT to be potentially eligible for the NRHP. According to the NPS Trail Manager, the LCNHT in this area is not owned or maintained by the NPS, but rather should be managed by the agencies with jurisdiction over the waterway, including the COE and the ODSL (Bowden et al., 2006a).

In response to a comment on the draft EIS from the DOI, FERC staff contacted Dan Wiley, Chief of Integrated Resources Stewardship for the NPS in Omaha, Nebraska, to obtain his comments and concerns about the project prior to the production of this final EIS. Mr. Wiley stated that his main concern about potential project impacts on the LCNHT was that the locations of Lewis and Clark campsites derived from the historical literature may not be correct. However, he indicated that there have been no comprehensive surveys of the LCNHT along the lower Columbia River, or recent investigations by the NPS, or other scholars, to identify new potential locations for Lewis and Clark campsites in the project vicinity (Wiley, 2008)

The Bradwood Landing LNG terminal would have no adverse effects upon the LCNHT, because no physical remnants of the Lewis and Clark expedition have been recorded in the APE, and LNG marine traffic and NorthernStar's proposed dredging for the turning basin is similar to and consistent with current activities in the Columbia River. The Columbia River navigation channel is utilized by about 2,000 commercial ships traveling to upriver ports each year, and is dredged and maintained by the COE. HRA's cultural resources survey of the proposed LNG terminal tract found no archaeological sites that can be associated with the Lewis and Clark expedition. Moreover, the place where the main terminal facilities would be situated at Bradwood Landing is covered with fill from past river dredging; thus any potential archaeological sites pre-dating the twentieth century in this area would be deeply buried beneath the dredge piles.

As a result of its literature review and file search, HRA identified two previous cultural resources investigations that covered portions of the LNG terminal tract, and two other archaeological surveys nearby (one covering part of Tenasillahe Island and one covering a small area on Puget Island). None of these investigations recorded any cultural resources; although one report mentioned an unrecorded prehistoric site at the former townsite of Bradwood. The closest previously recorded site to the LNG terminal is a prehistoric midden, site 35CLT32, located about 2,674 feet northwest of the APE for the terminal, at the southern shore of Clifton Channel.

HRA speculated that there may be an unrecorded prehistoric site at the northeastern end of the parcel controlled by NorthernStar for its LNG terminal, adjacent to where an 1871 river chart showed the location of "Joe's Fishery." This was an historic fishing spot in the Columbia River, on the south side of Puget Island, named after Joe Falangus, a Greek fish buyer who settled at Clifton, Oregon (Helwig, 2000), a town located about 1 mile west of the Bradwood LNG terminal. HRA indicated that it could not find the exact location of the potential Joe's Fishery archaeological site because the construction of the railroad and an historic basalt mining operation may have modified the topography in the area of Hunts Mill Point.

The 1871 river chart labeled the point of Oregon shore adjacent to "Joe's Fishery" as "Hunts Mill Point." Through archival research, HRA identified the location of the historic Henry Hunt homesite and lumber mill, operated from about 1843 to 1852, along Hunt Creek within NorthernStar's LNG terminal property. However, the location of the Hunt mill has not yet been examined with an on-the-ground cultural resources survey, and this potential historic-archaeological site is currently unrecorded.

HRA also mentioned a lumber mill built by A.W. Clark and J.B. Robinson in 1910 and operated by the Oregon Timber and Lumber Company (OTLC). This mill was associated with a logging railroad

that the 1930 Metzger map showed going up along the west side of Hunt Creek from its mouth. The exact location of the OTLC mill has not yet been clearly identified; nor has it been recorded as an historic-archaeological site. The logging railroad has also not yet been recorded.

The Astoria and Columbia River Railroad (ACRR, now called the PWRR) was completed between Astoria and Goble, Oregon in 1898, and was acquired by the Northern Pacific Railroad in 1911 (Helwig, 2000). In the terminal area, historic maps show the rail stop of “Parsons,” named after the 1895 landowner. HRA recorded the ACRR within the terminal property as an historic-archaeological site and evaluated the railroad as potentially eligible for the NRHP.

In August 2005, HRA conducted a walkover survey covering 28 acres at NorthernStar’s LNG terminal property, with limited shovel testing. The survey recorded historic-archaeological site 35CLT88, which represents the remains of the historic townsite of Bradwood and the associated Bradley-Woodard lumber mill. The physical remains still extant at this site include dock pilings along the shore (representing the remains of the mill dock and logging railroad trestle to the mill); a concrete foundation (related to a mill); a mill pond; a concrete structure (possibly the vault at the former mill office); an open-air pole barn (built about 1985); and associated artifacts, including metal barrels, bottle glass, ceramic sherds, bricks, and concrete, lumber, and metal fragments. The majority of the site is covered with dredge material piles, deposited between 1966 and 2003.

Fred Bradley of Michigan began acquiring timber land in the project area around 1901, and in 1930 formed the Bradwood-Woodard Lumber Company in partnership with Walter Woodard of Cottage Grove, Oregon. They contracted with the COE to bring in dredged material from the Columbia River, on top of which they built a new mill at Parsons, which started operations in 1934, specializing in hemlock and silver fir. The old OTLC logging railroad along Hunt Creek was rebuilt and extended up the slopes of Nicolai Mountain to the south, and was ready for the first trains (using a Shay locomotive engine) to run by 1932. The logging railroad operated until the summer of 1938, and was conveyed on a trestle to a log dump at the river. After that, logs were trucked in, and dumped into the mill pond. The mill complex included a planing mill, chipping mill, wigwag burner and drying kilns, dry storage building, train maintenance building, powerhouse, and main office. Finished lumber was taken out by ships via the dock. West of the mill dock, the U.S. Navy built a pier and observation house in the early 1940s. In 1958, Pacific Power and Light ran a 12-kV electric power line into Bradwood and Clifton. At its peak, operating as the Columbia Hudson Lumber Company, the mill had about 170 employees (Helwig, 2000).

The company town of Bradwood was erected adjacent to the lumber mill by 1934. The town originally consisted of a Main Street lined by 23 homes. Additional buildings included a boarding house, about 13 bachelor’s quarters, cookhouse, bathhouse, a nurse’s/doctor’s office, a union hall, a school (which operated from 1932 to 1942), and a company store, which also housed the post office. At the time of the mill’s closing in 1962, there were 47 residences in the town of Bradwood.

A portion of the mill burned in a fire in 1965. Analysis of a 1966 aerial photograph showed only the planing mill, office, train maintenance shop, and another building visible north of the railroad. The logging railroad tracks and trestle had been removed. Most of the houses at the eastern end of Bradwood were still standing in 1966, but the bachelor houses and garages on the west end of town had been torn down. Only eight houses were observed in a 1978 aerial photograph, and the pier to the former Navy observation house had been removed by that date (AMEC, 2005). A former resident visiting Bradwood in 1983 found only the store and four houses, in various states of disrepair, remained. The mill complex was in ruins. The last five residents of Bradwood left in 1985. In 1998, the same visitor noted that all buildings were gone, and the townsite bulldozed (Helwig, 2000).

In 1946 Bradley-Woodard sold the mill to Don Buchanan and Associates, operating as the Bradwood Lumber Company. A year later it passed to the Columbia Hudson Lumber Company. A portion of the townsite was acquired in 1946 by Roy Leonard, the first plant manager and secretary for the Bradley-Woodard Company, and first Bradwood postmaster. The property was acquired by the Starker family in 1977, and then was transferred in 1987 to a partnership which included Kenneth Leahy, who became sole owner in 2001. The Bradwood site has been used to receive materials dredged from the Columbia River by the COE, with documented fill disposal events occurring in 1966 (274,000 cubic yards), 1973 (217,000 cubic yards), and 2002 (382,000 cubic yards). Mr. Leahy intended to sell the dredged material as masonry sand, and export it by rail, but testing of the material indicated it was not suitable for that purpose (AMEC, 2005).

HRA evaluated the Bradwood site as not eligible for the NRHP. NorthernStar provided a copy of its LNG terminal cultural resources survey report to the Oregon SHPO on February 9, 2006. A revised copy of this report (Bowden et al., 2006a) was filed with the FERC on November 16, 2006.

4.9.1.3 Pipeline Facilities

A literature and site file search conducted by HRA in June 2005 revealed that 27 previous archaeological investigations have been conducted within 0.5 mile of the proposed pipeline route. Eight sites have been previously recorded within 150 feet of the pipeline. A 1991 survey of the KB Pipeline, which would be paralleled by a portion of the NorthernStar pipeline, recorded no cultural resources.

The LCNHT follows the lower Columbia River, although the portion of the trail through the project area has not been documented or nominated to the NRHP. The NPS does not own or manage any lands associated with the LCNHT along the lower Columbia River. Ownership of the river is divided between the states of Oregon and Washington, with the shoreline in the project area mostly under private control. No Lewis and Clark campsites have been recorded along the pipeline route. The proposed pipeline would cross under the Columbia River using HDD methods between about MPs 19.0 and 19.6.

During their westward journey down the Columbia River, the Lewis and Clark expedition camped near the mouth of the Kalama River, in what is now Cowlitz County, Washington, on November 5, 1805, and camped near Cape Horn, Wahkiakum County, Washington, on November 6, 1805. In his journal, William Clark mentioned an abandoned Indian village on the north side of the Columbia River, just past the mouth of the Cowlitz River. The next day the expedition stopped briefly at a Wahkiakum Indian village of four houses, where they traded fish hooks for roots, some fish, three dogs, and two otter skins.

On the return trip east, up the Columbia River, the Lewis and Clark expedition camped near the mouth of the Clatskanie River in Columbia County, Oregon, on March 25, 1806. They wrote of visiting a Cathlamet fishing camp on Puget Island, and another Cathlamet camp near the mouth of the Clatskanie River. The next day they camped on an island (maybe Walker or Dibble Island) in the river near present-day Longview. On March 26, 1806, Lewis and Clark noted an “old village” opposite the lower end of what they called “Fannys Island” (probably Crims Island) in Columbia County, Oregon, where they met Cathlamet Indians, giving metals to their chiefs and receiving roots and fish in return (Moulton, 2002).

Meriwether Lewis, on March 27, 1806, indicated that the principal village of the “Skillutes” was located a few miles above the mouth of the Cowlitz River. In 1811, the fur trader Gabriel Franchere called them the “Kreluit” Indians (Franchere, 1854). Ray (1938) clarified that this was probably the Cowlitz tribe, and labeled this village “Mansela.”

At Port Westward, archaeological investigations at site 35CO16 yielded numerous aboriginal artifacts and perhaps human remains. The fur trader Alexander Ross in 1811 mentioned “the great Whill Wetz village” was situated on the north side of the Columbia River at Oak Point (Ross, 1849). George Gibbs, who went down the Columbia River by steamboat as part of Issac Stevens’ railroad survey expedition in 1853-1855, called this the village of Coonaic. HRA believes that NorthernStar’s HDD under the Columbia River should avoid impacting site 35CO16.

HRA pointed out that the pipeline would pass near the Abernathy Cemetery, dating to 1866, including the graves of Alexander Abernathy, one of the first Euro-Americans to settle around Oak Point in the 1850s, and his family. The Abernathy Cemetery, containing about eight headstones, located on the former land claim of Alexander Abernathy, is surrounded by a white rail fence, and currently maintained by the local community (Taylor, 1964). It is illustrated on the USGS topographic quadrangle map at about MP 19.7. The cemetery, which has not yet been recorded as an archaeological site, should be avoided by NorthernStar’s HDD under the Columbia River.

At about MP 3.9 the pipeline would cross the ACRR/PWRR, completed in 1898. HRA believes the ACRR is potentially eligible for the NRHP. However, it appears that the portion of the railroad crossed by the pipeline has not yet been recorded or specifically evaluated in terms of integrity. Adverse effects on the railroad would be avoided because the pipeline would be installed beneath the railroad through conventional bore methods.

HRA inspected a 200-foot-wide corridor along the pipeline route in locations where NorthernStar had obtained landowner permission. As of October 2006, about 25.2 miles of the proposed route had been surveyed for cultural resources. No new archaeological sites were recorded during this survey. HRA believes that the proposed Bradwood Landing pipeline should avoid or have no effect on previously identified or recorded sites 35CLT32, 35CO12, 35CO14, 45CW2, the Abernathy Cemetery, and the Bradwood Mill and Town (35CLT88). The project should have no adverse effects on the ACRR, LCNHT, and 35CO16. Previously recorded sites 35CO11 and 45CW124 still need to be evaluated because they are located within parcels which have not yet been surveyed. A revised survey report for the pipeline (Bowden, et al., 2006b) was filed with the FERC on November 16, 2006.

4.9.1.4 Ancillary Facilities

URS conducted a cultural resources inventory of the proposed power line to the LNG terminal, including an alternative power line route and an access road. In total about 82 acres were inspected, including a 100-foot-wide corridor along 1.6 miles for the originally proposed power line route, 1.5 miles for the new preferred alternative, and 3.5 miles along the proposed access road. URS identified seven isolated finds and one site during its power line surveys. All of the isolated finds are remains of historic tree stump springboard scars, recommended as not eligible for listing on the NRHP. The site is a segment of the historic route of U.S. Highway 30 (field designation PL8), originally constructed in about 1921 as a gravel road, paved in about 1930, and abandoned when a new road alignment was built in about 1956. URS believes the road segment it recorded in the APE is not eligible for the NRHP because it lacks integrity.

In addition, URS documented a cultural resources inventory of 5 acres at the intersection of modern Highway 30 and Clifton Road. No cultural resources were identified at this location. On August 21, 2006, NorthernStar filed a revised cultural resources inventory report (McDaniel and Kelly, 2006) covering the power line.

4.9.2 Unanticipated Discovery Plan

The cultural resources inventory report for the LNG terminal, filed February 22, 2006, included a Plan and Procedures for the Unanticipated Discovery of Cultural Resources and Human Remains (Discovery Plan). This plan addressed comments provided by the Oregon SHPO in a January 20, 2006 filing by the ODE on an earlier submitted draft Discovery Plan. A Discovery Plan was filed by NorthernStar for the pipeline on March 14, 2006. The Oregon SHPO requested a revision to the Discovery Plan in its April 4, 2006 review of NorthernStar's cultural resources reports. NorthernStar filed a revised Discovery Plan for the LNG terminal on August 21, 2006, and filed a revised Discovery Plan for the pipeline on November 6, 2006.

4.9.3 Native American Consultation

The FERC acknowledges that it has trust responsibilities to Indian tribes, and so, on July 23, 2003, it issued a "Policy Statement on Consultations with Indian Tribes in Commission Proceedings" in Order 635. That policy statement included the following key objectives:

- The Commission will endeavor to work with Indian tribes on a government-to-government basis, and will seek to address the effects of proposed projects on tribal rights and resources through consultations; and
- The Commission will assure that tribal resources and interests are considered whenever the Commission's actions or decisions have the potential to adversely affect Indian tribes or Indian trust resources.

Our NOI, issued September 13, 2005, described the proposed project, including use of the waterway for LNG marine traffic. The NOI was sent to Indian tribal government leaders and resource agencies, and other Native Americans who may have historically occupied or used the project area, may attach religious or cultural significance to sites in the region, or may be interested in potential project impacts on cultural resources. Copies of the NOI were mailed to the Northwest Regional Office of the U.S. Bureau of Indian Affairs (BIA), CRITFC, Northwest Indian Fisheries Commission, Affiliated Tribes of Northwest Indians, Oregon State Legislative Commission on Indian Services, Washington Governor's Office of Indian Affairs, Confederated Tribes of the Grand Ronde Reservation, Confederated Tribes of the Siletz Reservation, Confederated Tribes of the Warm Springs Reservation, Confederated Tribes of the Umatilla Reservation, Cowlitz Indian Tribe, Chinook Nation, Chehalis Confederated Tribes, Nisqually Tribe, Shoalwater Bay Tribe, Yakama Nation, and Nez Perce Tribe (see table 4.9.3-1). The NOI was also sent to both the Oregon and Washington SHPOs.

In response to our NOI, we received filed written comments about the project from the CRITFC and Nez Perce Tribe. The CRITFC and the Confederated Tribes of the Warm Springs Reservation requested direct consultations with the FERC, and staff made presentations about the project and FERC's review process to the CRITFC on November 17, 2005, and to the Warm Springs Tribal Council on January 24, 2006. Members of the Nez Perce Tribal Council were in attendance during our presentation to the CRITFC. In addition, representatives from the CRITFC and the Nez Perce Tribe attended interagency and public meetings held for this project.

TABLE 4.9.3-1

Native American Consultations for the Bradwood Landing Project

Indian Tribe/Native American Organizations Addressed in the FERC NOI issued September 13, 2005	Date Contacted by NorthernStar	Responses
BIA, Northwest Regional Office, Portland, OR	July 27, 2005 November 28, 2005	September 7, 2007 - commented to the FERC on the draft EIS.
Affiliated Tribes of Northwest Indians, Portland, OR	July 27, 2005 November 28, 2005	December 2, 2005 - Affiliated Tribes of Northwest Indians requested to be informed by NorthernStar of project review status and additional studies.
Oregon Legislative Commission on Indian Services, Salem, OR c/o Karen Quigley, Executive Director	July 27, 2005 November 28, 2005	November 23, 2005 - Commission on Indian Services requested that NorthernStar contact the Siletz and Grand Ronde Tribes.
Confederated Tribes of Grand Ronde, Grand Ronde, OR c/o Cheryle Kennedy, Tribal Chair; and Khani Shultz, Cultural Resources	July 27, 2005 November 28, 2005	August 26 and 30, 2005 – Grande Ronde Tribes requested copies of archaeological survey reports from NorthernStar and to be notified in the event of a discovery during construction.
Confederated Tribes of Siletz, Siletz, OR c/o Delores Pigsley, Tribal Chair; and Robert Kennta, Cultural Resources	July 27, 2005 November 28, 2005	No response documented.
Confederated Tribes of Warm Springs, Warm Springs, OR c/o Olney Patt, Tribal Chair; and Sally Bird, Cultural Resources	July 27, 2005 November 28, 2005	Warm Springs Tribes requested direct consultations with the FERC. January 24, 2006 - FERC staff made presentation to Warm Springs Tribal Council.
Washington Governor's Office of Indian Affairs, Olympia, WA	July 27, 2005 November 28, 2005	No response documented.
Cowlitz Indian Tribe, Longview, WA c/o John Barnett, Tribal Chair; and Mike Iyall, Natural Resources Director	July 27, 2005 November 28, 2005	October 17, 2006 – Cowlitz Indian Tribe wrote a letter to NorthernStar expressing tentative support for the Bradwood Landing Project. Requested that NorthernStar continue to consult with the tribe regarding potential impacts on ecological and cultural resources.
Chinook Nation, Chinook, WA c/o Gary Johnson, Chair	July 27, 2005 November 28, 2005	No response documented.
Chehalis Confederated Tribes, Oakville, WA c/o David Burnett, Tribal Chair	July 27, 2005 November 28, 2005	No response documented.
Nisqually Tribe, Olympia, WA c/o Dorian Sanchez, Tribal Chair	July 27, 2005 November 28, 2005	December 19, 2005 - Nisqually Tribe inquired of NorthernStar if project would be within their territory.
Shoalwater Bay Tribe, Tokeland, WA c/o Chalene Nelson, Tribal Chair	July 27, 2005 November 28, 2005	No response documented.
Yakama Nation, Toppenish, WA c/o Jerry Meninick, Tribal Chair	July 27, 2005 November 28, 2005	No response documented.
Columbia River Inter-Tribal Fish Commission, Portland, OR c/o Olney Patt, Executive Director; and Rob Lothrop	July 27, 2005 November 28, 2005	July 14 and October 17, 2005 - CRITFC sent written comments to the FERC. August 8 and October 26, 2005, and January 25 and September 13, 2006 - CRITFC staff attended interagency and public project meetings. November 17, 2005 - FERC staff made presentation to CRITFC. December 21, 2007 – commented to the FERC on the draft EIS
Northwest Indian Fisheries Commission, Olympia, WA	July 27, 2005 November 28, 2005	No response documented.

TABLE 4.9.3-1 (cont'd)

Native American Consultations for the Bradwood Landing Project

Indian Tribe/Native American Organizations Addressed in the FERC NOI issued September 13, 2005	Date Contacted by NorthernStar	Responses
Confederated Tribes of the Umatilla Reservation, Pendleton, WA c/o Antone Minthorn, Tribal Chair; and Carl Merkle, Natural Resources Nez Perce Tribe, Lapwai, ID c/o Rebecca Miles, Tribal Chair; and Ryan Sedberry, attorney		No response documented. October 17, 2005 - Nez Perce Tribe sent written comments to the FERC. November 17, 2005 - members of Nez Perce Tribal Council attended presentation by FERC staff to CRITFC. January 25 and September 13, 2006 – tribal representatives attended interagency meetings. December 21, 2007 - commented to the FERC on draft EIS.

The Nez Perce Tribe commented on our draft EIS in a letter to the FERC dated December 21, 2007. Among other issues, the tribe requested continued consultations with the FERC, receipt of notices, and invitations to meetings. In a March 12, 2008 email to the FERC's third-party environmental contractor (NRG), an attorney for the Nez Perce Tribe requested that the tribe be invited to the next meeting between the FERC and the NMFS to discuss revisions to the BA and EFH assessment. As an intervenor, the Nez Perce Tribe already receives all notices issued by the FERC for this proceeding. At this time, no additional meetings are planned between the FERC staff and the NMFS. In a February 7, 2008 telephone call between staff and an attorney representing the Nez Perce Tribe, we requested that the tribe provide more specific information about what it wants in terms of the nature of future consultations.

Both the CRITFC and Nez Perce Tribe expressed concern that the project could affect fishery resources protected by tribal treaty rights. In addition, the Nez Perce Tribe raised concerns about the project-related impacts on the lower Columbia River estuary caused by dredging and other activities. This EIS discusses potential impacts on water resources in section 4.3.2, aquatic resources in section 4.5, and federally-listed threatened and endangered salmon species in section 4.6. Indian treaty fishing rights are discussed in section 4.8.1.7.

In letters dated July 27 and November 28, 2005, NorthernStar provided information about the project to Indian tribes and Native American organizations that may have an interest in potential project impacts on cultural resources. The letters were sent to the BIA, Oregon Legislative Commission on Indian Services, Washington Governor's Office of Indian Affairs, CRITFC, Northwest Indian Fisheries Commission, Affiliated Tribes of Northwest Indians, Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz, Confederated Tribes of Warm Springs, Cowlitz Indian Tribe, Chehalis Confederated Tribes, Nisqually Tribe, Shoalwater Bay Tribe, Yakama Nation, and Chinook Tribe.

In response to NorthernStar's consultation program, the Oregon Legislative Commission on Indian Services emailed HRA, NorthernStar's cultural resources contractor, to indicate that the Confederated Tribes of Grand Ronde and Confederated Tribes of Siletz should be contacted about this project. The Confederated Tribes of Grand Ronde requested that HRA provide the tribe with copies of the results of the cultural resources inventories, and the tribe should be contacted if any native archaeological materials are discovered. The Nisqually Tribe contacted HRA to inquire if the project would cross its traditional territory. The Affiliated Tribes of Northwest Indians contacted HRA to obtain more information about the status of the archaeological survey along the pipeline route. In a letter to NorthernStar, dated October 17, 2006, the Cowlitz Indian Tribe expressed tentative support for the project, but requested that NorthernStar continue to consult with the tribe regarding potential impacts on ecological and cultural resources.

Table 4.9.3-1 summarizes consultations with Native Americans. In addition, the FERC provided copies of the draft EIS to Indian tribes and other Native American organizations listed in Appendix A. No traditional cultural properties were identified within the APE by HRA, the SHPOs, Indian tribes, or other Native American organization.

Since the production of the draft EIS for this project, NorthernStar has not documented any additional consultations with Indian tribes. Nor has it documented that it sent copies of the requested cultural resources reports to the Confederated Tribes of Grande Ronde or other interested tribes. Therefore, **we recommend that:**

- **Prior to construction of the LNG terminal and pipeline, NorthernStar should file with the Secretary:**
 - a. **documentation that it re-initiated consultations with all Indian tribes listed on table 4.9.3-1 of the final EIS, and copies of correspondence to and from Indian tribes that expressed interest in its project after the issuance of the draft EIS (in August 2007); and**
 - b. **documentation that it provided copies of revised reports of cultural resources investigations to all Indian tribes that have expressed an interest in the project, including the Confederated Tribes of the Grande Ronde Reservation, and copies of any comments the tribes may have on those reports.**

4.9.4 Compliance with the NHPA

We have fulfilled our obligations to address compliance with the Native American Religious Freedom Act, section 101(d)(6) of the NHPA, and 36 CFR 800.2(c)(2). At our request, NorthernStar documented consultations with Indian tribes and appropriate Native American groups that might have an interest in the project. Through our NOI, we contacted Indian tribes that may have historically occupied or used the project area and might attach religious or cultural significance to historic properties in the APE. No tribe identified any traditional cultural properties which may be affected by the project. Nor were any religious, cultural, or sacred sites that may be affected by the project identified by NorthernStar's cultural resources consultant (HRA), or by the SHPOs.

Under the ACHP's regulations for implementing section 106 of the NHPA, the federal agencies consult with the appropriate SHPOs, identify historic properties, and make determinations of project effects. In a letter dated April 4, 2006, the Oregon SHPO commented on the first draft archaeological survey reports submitted by NorthernStar. The Oregon SHPO agreed with HRA that the project would likely not have an adverse effect on either the LCNHT or the ACRR. We concur.

The Oregon SHPO requested that the draft cultural resources reports be revised to address specific comments. In data requests dated February 9, March 7, and June 30, 2006, the FERC staff also requested revisions to the draft survey reports. NorthernStar filed revised inventory reports on August 21 and November 16, 2006, to address staff and SHPO comments.

In a letter addressed to NorthernStar, dated November 22, 2006, the Oregon SHPO commented on the revised cultural resources survey reports. The Oregon SHPO believes effects on previously recorded site 35CO16 are undefined until additional details about the HDD under the Columbia River are provided. Nor can project effects on the historic Hunt Mill be determined until after NorthernStar provides the results of an archaeological investigation of the old mill location. Lastly, the SHPO questioned the evaluation of the mill town of Bradwood, and requested additional data to support HRA's site assessment.

The Washington SHPO commented on HRA's pipeline survey report in a letter to the FERC dated November 27, 2006. The Washington SHPO requested certain changes to the report, and a plan for future actions, including a schedule for future surveys.

We have not yet completed the process of complying with section 106 of the NHPA for NorthernStar's proposed facilities. Cultural resources surveys for the entire proposed pipeline route and associated ancillary facilities have not been completed because landowner permission has not been

obtained for all parcels. Once cultural resources surveys and evaluations are complete, the FERC, in consultations with the cooperating agencies and the Oregon and Washington SHPOs, will make determinations of NRHP eligibility and project effects. If any historic properties would be affected by the proposed project, we would seek ways to resolve adverse effects.

To ensure that the Commission's responsibilities under the NHPA and its implementing regulations are met, **we recommend that:**

- **NorthernStar should defer construction and use of its proposed facilities, including related ancillary areas for staging, storage, temporary work areas, and new or to-be-improved access roads until:**
 - a. **NorthernStar files with the Secretary all additional required cultural resources survey and evaluation reports, any necessary treatment/avoidance plans, and a cultural resources management plan;**
 - b. **NorthernStar files with the Secretary comments of the Oregon and Washington SHPOs on all cultural resources investigation reports and plans;**
 - c. **the ACHP has been given an opportunity to comment, if any historic properties would be adversely affected by the project; and**
 - d. **the Director of OEP reviews and approves all cultural resources investigation reports and plans, and notifies NorthernStar in writing that treatment plans/mitigation measures may be implemented or construction may proceed.**

All material filed with the Commission containing location, character, and ownership information about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: "CONTAINS PRIVILEGED INFORMATION - DO NOT RELEASE."

4.10 AIR QUALITY AND NOISE

4.10.1 Air Quality

4.10.1.1 Waterway for LNG Marine Traffic

Climate

The proposed waterway for LNG marine traffic would extend from the territorial seas boundary, 12 nautical miles from shore, up the Columbia River to the proposed LNG terminal site at CRM 38. The proposed waterway is within the coastal Columbia River Valley climate region. The climate of the project area is characterized by mild temperatures throughout the year due to the influence of weather systems that have been moderated by traveling over the Pacific Ocean. The normal movement of air masses is from west to east. Rain and drizzle, with fog and low clouds, are frequent from the late fall to early summer months. Warmer, breezy periods with little precipitation are common in the summer and early fall months.

Local winds in the project area generally follow the course of the Columbia River due to terrain effects along the river valley. In the winter, wind speeds reach 20 miles per hour or more about 5 to 10 percent of the time. Visibility is diminished by fog to below 0.5 mile about 3 to 6 days per month. Ice forms occasionally on the river but is seldom heavy enough to affect navigation. Winds during the summer are typically light.

At the mouth of the river, advection fog is common during summer months, with radiation fog affecting the river overall during other months. Precipitation is very common.

Ambient Air Quality Standards

The proposed waterway for LNG marine traffic would pass through both Oregon and Washington. Ambient air quality standards for these states, as well as federal ambient air quality standards, are discussed below

National Ambient Air Quality Standards

The EPA has established National Ambient Air Quality Standards (NAAQS) for seven criteria pollutants: SO₂, CO, nitrogen dioxide (NO₂), ozone, particulate matter less than 10 microns in diameter (PM₁₀), particulate matter less than 2.5 microns in diameter (PM_{2.5}), and lead. The NAAQS were set at levels the EPA believed were necessary to protect human health (primary standards) and human welfare (secondary standards). The NAAQS along with the appropriate Significant Impact Levels (SIL) and relevant estimated background concentrations for the project area are listed in table 4.10.1-1. Most ambient background concentrations were provided by the ODEQ on January 4, 2006 (CO and NO₂) and March 8, 2006 (PM₁₀ and SO₂). In addition, ambient background concentrations for ozone are based on monitoring data collected at Sauvie Island, Oregon.

State Ambient Air Quality Standards: Oregon

For most criteria pollutants, Oregon Ambient Air Quality Standards (OAAQS) are the same as federal NAAQS. However, Oregon has set more stringent standards for SO₂. The Oregon SO₂ standards (in ppm) and equivalent concentrations in µg/m³ are shown in table 4.10.1-2.

TABLE 4.10.1-1						
National Ambient Air Quality Standards						
Air Pollutant	Averaging Period	Background Level	Primary Standard	Secondary Standard	Percent of Primary NAAQS	SIL for NAAQS
SO ₂ (µg/m ³)	3-Hour ^a	65	NA	1,300	NA	25
	24-Hour ^a	30	365	NA	0.08	5
	Annual ^b	5	80	NA	0.06	1
CO (µg/m ³)	1-Hour ^a	2,000	40,000	NA	0.05	2,000
	8-Hour ^a	1,400	10,000	NA	0.14	500
NO ₂ (µg/m ³)	Annual ^b	15	100	100	0.15	1
Ozone (ppm)	1-Hour ^a	0.077	0.12	0.12	0.64	NA
	8-Hour ^c	0.061	0.08	0.08	0.76	NA
PM ₁₀ (µg/m ³)	24-Hour ^a	30	150	150	0.20	5 (1.0 in Oregon)
	Annual ^b	15	50 ^f	50 ^f	0.31	1 (0.2 in Oregon)
PM _{2.5} (µg/m ³)	24-Hour ^d	NA	35	35	NA	NA
	Annual ^b	NA	15	15	NA	NA
Lead ^e	NA	NA	NA	NA	NA	NA
^a The second highest designation indicates that the concentration listed is representative of the second highest concentration measured at the monitoring station. ^b The annual average concentration. ^c The fourth highest designation indicates that the concentration listed is representative of the fourth highest concentration measured at the monitoring station. ^d The 98th percentile 24-hour concentration. ^e Lead is not monitored in Oregon or Washington. ^f The historical annual PM ₁₀ NAAQS was revoked, effective December 18, 2006. µg/m ³ micrograms per cubic meter						

TABLE 4.10.1-2		
Oregon SO ₂ Ambient Air Quality Standards		
Averaging Period	Oregon Standards	
	Ppm	Equivalent µg/m ³
1-Hour ^a	NA	NA
1-Hour ^b	NA	NA
3-Hour ^a	0.50	1,300
24-Hour ^a	0.10	260
Annual ^a	0.020	52
^a Not to be exceeded more than once per calendar year. ^b Not to be exceeded more than twice per 7-day period.		

State Ambient Air Quality Standards: Washington

For most criteria pollutants, Washington Ambient Air Quality Standards (WAAQS) are the same as federal NAAQS. However, Washington has standards for total suspended particulates (TSP) and has set more stringent standards for SO₂. The Washington TSP and SO₂ standards (in ppm) and equivalent concentrations in µg/m³ are shown in table 4.10.1-3.

TABLE 4.10.1-3			
Washington TSP and SO ₂ Ambient Air Quality Standards			
Averaging Period	TSP Standards		SO ₂ Standards
	µg/m ³	ppm	Equivalent µg/m ³
1-Hour ^a	NA	0.40	NA
1-Hour ^b	NA	0.25	NA
3-Hour ^a	NA	NA	NA
24-Hour ^a	150	0.10	260
Annual ^a	60	0.020	52
^a	Not to be exceeded more than once per calendar year.		
^b	Not to be exceeded more than twice per 7-day period.		

Existing Air Quality

The counties along the proposed waterway for LNG marine traffic are Clatsop County in Oregon and Wahkiakum and Pacific Counties in Washington. These counties are currently designated as attainment or unclassifiable for all NAAQS criteria pollutants. Marine vessels are a primary source of air pollution, with a secondary contribution from nearby industrial facilities. Operation of the proposed project would result in additional marine vessel emissions from the arriving and departing LNG carriers as well as supporting tug boats and escort boats.

Air Quality Control Regions

Air Quality Control Regions (AQCR) were established by the EPA and local agencies, in accordance with section 107 of the CAA, as a means to implement the CAA and comply with the NAAQS through state implementation plans. The AQCRs are intra- and interstate regions such as large metropolitan areas where the improvement of the air quality in one portion of the AQCR requires emission reductions throughout the AQCR. The counties crossed by the project's marine traffic along the proposed waterway are Clatsop County, Oregon, which is in the Northwest Oregon Intrastate AQCR (40 CFR 81.249); Wahkiakum County, Washington, which is in the Portland Interstate AQCR (40 CFR 81.51); and Pacific County, Washington, which is in the Olympic-Northwest Washington Intrastate AQCR (40 CFR 81.187).

Regulatory Requirements for Air Quality

The entire LNG marine transit route is an attainment area and therefore not subject to a General Conformity determination. LNG carriers are mobile sources and thus not subject to permitting under the CAA.

Air Quality Impacts and Mitigation

LNG carriers are mobile sources that transit the Pacific Ocean. As the LNG carriers enter the waterway, they would be assisted by two tugboats and a waterside security escort during their journey along the Columbia River. Estimated criteria and GHG emissions from LNG carriers, tugs, and security vessels are summarized in tables 4.10.1-4 and 4.10.1-5.

TABLE 4.10.1-4								
Estimated Air Emissions from the LNG Carriers, Tugs, and Security Vessels (PM ₁₀ , SO ₂ , NO _x , and CO)								
Source	PM ₁₀		SO ₂ ^a		NO _x		CO	
	maximum lb/hr	Tpy	maximum lb/hr	tpy	maximum lb/hr	tpy	maximum lb/hr	Tpy
Security Vessels ^b	0.1	0.1	0.0	0.0	0.5	0.3	1.2	1.2
Tugs ^c	4.4	5.2	1.3	1.6	175.6	209.6	21.2	24.8
LNG Carriers ^d	17.8	7.0	1,630.1	644.6	706.4	278.9	106.5	43.4
Total	22.8	12.8	1,641.1	655.0	894.6	499.8	135.7	75.6
^a The SO ₂ emissions from the LNG carriers are based on an estimated fuel sulfur content of 4.5 weight percent for ship main engines and generators in transit. Emissions from LNG carriers at berth are based on burning bog with a side stream of liquid fuel. ^b Emissions from security vessels are based on those vessels utilizing gasoline-powered outboard motors. Two security vessels would accompany each LNG carrier to/from berth to Astoria. One security vessel would be on standby during docking while the LNG carrier is in port. ^c Emissions from tugs providing both upriver and downriver LNG carrier support estimated assuming the tugs would be based in Longview. Two tugs would escort each LNG carrier from Buoy 10 to port. A third additional tug would travel from Longview to the Bradwood Landing Terminal to provide berthing/unberthing support. ^d Emissions from LNG carriers in transit include both upriver and downriver operations.								

TABLE 4.10.1-5							
Estimated Air Emissions from the LNG Carriers, Tugs, and Security Vessels (VOCs, CO ₂ , and CH ₄)							
Source	VOCs		CO ₂		CH ₄ ^a		Tpy
	lb/hr	lb/hr	lb/hr	tpy	lb/hr	tpy	
Security Vessels ^b	2.8	2.2	971	986	--	--	
Tugs ^c	2.1	2.4	11,768	14,028	--	--	
LNG Carriers (transit) ^d	11.9	5.1	46,066	19,007	--	--	
LNG carriers (at berth)	2.8	2.6	3,065	2,785	20.0	18.2	
Total	19.6	12.3	61,870	36,806	20.0	18.2	
^a Emission factors of CH ₄ from the combustion of liquid fuel in ship engines are not available and have therefore been assumed to be negligible. ^b Emissions from security vessels are based on those vessels utilizing gasoline-powered outboard motors. Two security vessels would accompany each the LNG carrier to/from berth to Astoria. One security vessel would be on standby during docking while the LNG carrier is in port. ^c Emissions from tugs providing both upriver and downriver LNG carrier support estimated assuming the tugs would be based in Longview. Two tugs would escort the LNG carrier from Buoy 10 to port. A third additional tug would travel from Longview to the Bradwood Landing terminal to provide berthing/unberthing support. ^d Emissions from LNG carriers in transit include both upriver and downriver operations.							

Emission estimates are based on transit between entry into U.S. waters (approximately 24 nautical miles beyond the mouth of the Columbia River) and the proposed Bradwood Landing terminal, and assume slow cruise speeds and maneuvering speeds. The ships used to transport LNG to and from the LNG terminal would be under the jurisdiction of the Coast Guard, which has the authority to dictate ship speed and navigation.

Ships are anticipated to deliver LNG to the proposed terminal approximately 125 times per year, with each delivery lasting up to 24 hours. Due to the limited number of ships and the short time frame of each visit, LNG carriers are expected to be present at the terminal approximately 34 percent of the year. Receptors close to the LNG carrier route may experience elevated levels of regulated pollutants.

Although the emissions from marine vessel traffic are large, the emissions would be periodic and transient. Therefore we do not expect regionally significant air quality impacts would occur.

NorthernStar completed an air dispersion modeling analysis of the LNG carrier emissions from the on-board electrical generator during hotelling operations (Bradwood Landing Evaluation of AAQS and Prevention of Significant Deterioration (PSD) Increment Consumption from LNG Carrier Vessel Emissions during Offloading, July 13, 2006). Using an EPA-approved dispersion model, impacts of criteria pollutants from the LNG carriers plus the preliminary modeled impacts from the LNG terminal, competing sources, and background concentrations were added together and compared to the applicable federal NAAQS and Prevention of Significant Deterioration (PSD) Increments. Detailed results are presented in section 4.10.1.2.

If a marine LNG spill occurred, any unignited LNG would vaporize; because LNG is mostly composed of methane. No criteria air pollutants would be associated with the vaporized LNG. However, methane is considered a GHG and may contribute to global warming. The dispersion of the methane vapors would cause a temporary decrease in the ambient air quality. Wildlife and humans occupying the water's surface near the release could intercept the vapor cloud prior to dispersion and suffer asphyxiation. The duration of exposure to any substantial pollutant concentrations would be short and would not pose a significant health risk to sensitive receptors given the distance to shore from a potential LNG spill. Therefore, there would be no significant impacts on air quality in the unlikely event of a marine LNG spill.

However, if ignition to the vapor cloud would occur, combustion emissions would be released to the atmosphere. Natural gas combustion typically is not complete in spill scenarios. The products of incomplete combustion of natural gas include criteria pollutants, hazardous air pollutants, unburned hydrocarbons, and soot (carbon particulates). The maximum increases in ambient air pollutant concentrations due to the natural gas vapor cloud fire would occur downwind of the LNG spill. These ambient air pollutant concentrations would likely exceed short-term NAAQS and State Ambient Air Quality Standards over the duration of the fire as well as soot deposition and diminished visibility due to soot transport. In the more populated areas of the transit route receptors would be exposed to higher pollutant concentrations for the short duration of the fire. The types and amounts of emissions from the ignition of an LNG pool would depend on many factors, but the emissions to any one localized area would be temporary and depend on weather and other conditions along the waterway. Emissions at a particular location that would arise from ignited vegetation and any nearby man-made structures would likely have greater levels of unburned hydrocarbons and hazardous air pollutants. Any acute exposures to smoke from LNG and induced fires may lead to range of problems such as a worsening of asthma conditions, irritation of the eyes, nose and throat, and difficulty breathing. In sensitive populations (children, elderly, chronically ill) symptoms of exposure may be of greater magnitude.

4.10.1.2 LNG Terminal

Climate

The proposed Bradwood Landing LNG terminal would be located in Clatsop County, Oregon, within the coastal Columbia River Valley climate region, described in section 4.10.1.1. Clatsop County is one of the six counties designated as the Northwest Region by the ODEQ.

The National Weather Service (NWS) maintains a climate station at the Astoria Regional Airport in Astoria, Oregon, located in Clatsop County and the Kelso-Longview Regional Airport in Cowlitz County, Washington. Climate data from these stations are available from the Western Regional Climate

Center from January 1, 1899 to the present. These data should be representative of conditions in the area of the proposed terminal.

Ambient Air Quality Standards

The federal and Oregon ambient air quality standards applicable to this portion of the project are discussed in 4.10.1.1 above.

Existing Air Quality

Clatsop County is currently designated as attainment or unclassifiable for all NAAQS criteria pollutants. Motor vehicles are a primary source of air pollution, with large industrial facilities accounting for less than 15 percent of most types of criteria pollutants. Other sources of air pollution include human activities such as outdoor burning, using wood stoves, and using non-road vehicles (e.g., gasoline-powered lawn mowers, motor boats, etc.).

Construction of the proposed terminal would cause temporary combustion emissions associated with operating construction equipment and vehicles. Fugitive dust would also be generated by site preparation activities and equipment travel. These emissions would occur during the projected 36-month construction period. The bulk of long-term emissions for the Bradwood Landing Project would be emitted from stationary sources at the proposed LNG terminal.

Air Quality Control Regions

The Bradwood Landing LNG terminal would be located in the Northwest Oregon Intrastate AQCR (40 CFR 81.249).

Regulatory Requirements for Air Quality

Emissions from all phases of construction and operation of the proposed LNG terminal would be subject to applicable state and federal air regulations. Most air quality regulatory programs address emissions from stationary sources of air pollution; these programs would primarily affect ongoing operations at the proposed LNG terminal. Air quality regulations affecting LNG terminal construction are primarily concerned with reducing emissions associated with construction equipment and fugitive dust.

The new stationary air emission sources associated with operating the proposed LNG terminal include seven SCVs, one emergency generator, and one diesel firewater pump. These stationary sources are listed in table 4.10.1-6.

TABLE 4.10.1-6			
Stationary Source Information			
Air Emission Source (quantity)	Heat Rating (MMBtu/hr)	Horsepower Rating (bhp)	Energy Source
SCVs (7)	120 (each)	NA	Natural Gas
Emergency Generator (1)	5.52	1075	Diesel Fuel
Emergency Firewater Pump (1)	1.21	405	Diesel Fuel
bhp	brake horsepower		
MMBtu/hr	million British thermal units per hour		

The proposed terminal air emission sources are regulated at the federal level by the CAA, as amended, and at the state level by OAR. In addition to state regulations, the federal regulations established as a result of the CAA that are potentially applicable to the project include:

- Mobile Source Regulations;
- New Source Performance Standards (NSPS);
- PSD review or nonattainment New Source Review;
- Nonattainment New Source Review;
- Title V Operating Permits;
- National Emission Standards for Hazardous Air Pollutants (NESHAP);
- Federal Class I Area Protection;
- General Conformity; and
- Chemical Accident Prevention.

Federal Air Quality Requirements

Mobile Source Regulations

Title II of the CAA Amendments of 1990 – These regulations contain provisions relating to highway and off-road mobile sources and are aimed at reducing pollution from heavy-duty diesel engines, including marine and locomotive engines.

40 CFR 69, 80, and 86, Final Rule, Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements – This rule requires a reduction in emissions from on-road diesel engines and establishes sulfur limits for diesel fuel. Currently, the requirements are for new engines only and the standards will begin to take effect in model year 2007. Although the emissions standards are for new engines only, the reduced sulfur diesel fuel, which is required to have a sulfur content less than 0.05 percent (500 parts per million by weight (ppmw)), a limit that was lowered to 15 ppmw starting in June 2006, would also reduce particulate and SO_x emissions from existing diesel engines.

40 CFR 9 and 69 et al., Final Rule, Control of Emissions of Air Pollution from Non-road Diesel Engines and Fuel – This rule requires emissions reductions from non-road diesel engines by establishing emissions limits and sulfur content limits. This rule targets agricultural equipment, construction equipment, and other non-road diesel engines. As with the previous rule, the reduced sulfur fuel would lower emissions from existing diesel engines even though the emissions limits would only apply to new engines.

Both non-road and highway use vehicles and construction equipment used for the project would be required to use the new low sulfur diesel fuel as soon as it is commercially available.

New Source Performance Standards

NSPS regulations (40 CFR 60) establish pollutant emission limits and monitoring, reporting, and recordkeeping requirements for various emission sources based on source type and size. The NSPS apply to new, modified, or reconstructed sources.

Subpart Db of 40 CFR 60 applies to industrial, commercial, or institutional steam generating units that are modified, constructed, or reconstructed after June 19, 1984 and have maximum heat input rates of more than 29 MW or 100 million British thermal units per hour (MMBtu/hr). Subpart Db establishes specific emissions limits for SO₂ (for coal and oil fired units) and PM (for coal fired units). The SCVs

proposed for this project would be designed to have direct contact and intermixing of the combustion gases and the heat transfer medium, and available EPA guidance states that these units should not be considered “steam generating units;” therefore, the requirements of NSPS Db do not apply.

Subpart Kb of 40 CFR 60 applies to any volatile organic liquid storage unit that is modified, constructed, or reconstructed after July 23, 1984 and that has a capacity of 40 m³ or greater. Subpart Kb exempts large tanks that store a liquid with a maximum true vapor pressure of less than 3.5 kilopascals (kPa). The two LNG storage tanks at the proposed terminal would each have a nominal capacity of 160,000 m³ and store liquids with a maximum true vapor pressure of less than 3.5 kPa based on the maximum pressure expected during the warmest calendar month. Consequently, the LNG storage tanks would not be subject to Subpart Kb.

Subpart IIII of 40 CFR 60 applies to stationary compression ignition internal combustion engines that are modified, constructed, or reconstructed after July 11, 2005. The emergency generator and fire pump engine would be subject to this regulation. The manufacturers of post-2007 units must certify that the engines would comply with the standards for the useful life of the engine. The Bradwood Landing Project emergency engines would be ordered after 2008 and would comply with these standards.

Prevention of Significant Deterioration

Title I of the CAA establishes guidelines for the preconstruction/modification review of large air emission sources. Construction of sources in attainment areas must be reviewed in accordance with the PSD regulations. To be classified as a new major PSD source, the potential emissions from the source must be: either greater than 100 tons per year (tpy) for any pollutant regulated by the EPA under the CAA for sources that are among the 28 source categories listed in section 169 of the CAA, or greater than 250 tpy for any pollutant regulated by the EPA under the CAA for sources that are not among the 28 source categories listed in section 169 of the CAA. A BACT analysis and detailed dispersion modeling are required if a facility is classified as a major PSD source.

The applicability threshold for PSD review for the proposed LNG terminal is 250 tpy, based upon a determination by the ODEQ that the facility does not include any sources among the 28 listed source categories. Tables 4.10.1-7 and 4.10.1-8 present the annual maximum potential criteria pollutant and GHG emissions from the proposed LNG terminal and relevant PSD threshold criteria. We have removed lead from the list of criteria pollutants because emissions of lead from the SCVs and from fugitive emission leaks would be zero due to an absence of lead contamination in the vaporized LNG.

As shown in tables 4.10.1-7 and 4.10.1-8, the maximum emissions from the proposed LNG terminal would be less than 250 tpy for each of the criteria pollutants. Therefore, the proposed LNG terminal would not be a federal major source and would not be subject to PSD review.

Nonattainment New Source Review

Title I of the CAA establishes guidelines for the preconstruction/modification review of large air emission sources. Construction of sources in nonattainment areas must be reviewed in accordance with the New Source Review regulations. As discussed above for the waterway and LNG terminal and in section 4.10.1.3 for the pipeline, the entire project area is located in attainment or unclassifiable areas. Consequently, nonattainment New Source Review does not apply to this project.

TABLE 4.10.1-7								
Operating Air Emissions Summary for Proposed LNG Terminal (NO _x , CO, SO ₂ , and PM ₁₀ /PM _{2.5}) ^a								
Emission Unit (Quantity)	NO _x		CO		SO ₂		PM ₁₀ /PM _{2.5}	
	tpy	lb/hr ^b	tpy	lb/hr ^b	tpy	lb/hr ^b	tpy	lb/hr ^b
SCVs (7) ^c	121.9	27.8	199.3	45.5	0.1	2E-2	13.4	3.4
Emergency Firewater Pump (1) ^d	0.3	12.5	0.1	2.7	3E-2	0.8	2E-2	0.9
Emergency Generator (1) ^d	0.4	14.0	0.2	5.9	2E-2	4.4	2E-2	0.8
Fugitive Emissions	NA	NA	NA	NA	NA	NA	NA	NA
Total ^e	122.6	54.3	199.6	54.1	0.2	5.2	13.4	5.1
PSD Threshold Criteria	250	NA	250	NA	250	NA	250	NA
^a	Emissions of beryllium, mercury, sulfuric acid mist, asbestos, vinyl chloride, fluorides, hydrogen sulfide, total reduced sulfur, reduced sulfur compounds, chlorofluorocarbons, halons, and ozone depleting substances are negligible.							
^b	Maximum hourly emissions.							
^c	The calculations for the SCVs assume seven heaters operating at maximum capacity (120 MMBtu/hour/unit).							
^d	Emergency generator and firewater pump potential emissions calculations based on 52-hour-per-year operation.							
^e	Total emission rates in lb/hr assume that the firewater pump and emergency generator are both operating.							
NS	not significant							

TABLE 4.10.1-8							
Operating Air Emissions Summary for Proposed LNG Terminal (VOCs, Pb, CO ₂ , and CH ₄) ^a							
Emission Unit (Quantity)	VOCs		CO ₂		CH ₄		
	tpy	lb/hr ^b	tpy ^f	lb/hr ^f	tpy	lb/hr ^b	
SCVs (7) ^c	19.9	4.5	65,500	314,170	NE	NE	
Emergency Firewater Pump (1) ^d	3E-2	1.0	NE	NE	NE	NE	
Emergency Generator (1) ^d	2E-2	0.8	NE	NE	NE	NE	
Fugitive Emissions	4.6	1.1	NE	NE	NE	NE	
Total ^e	24.5	7.4	65,500	314,170	NE	NE	
PSD Threshold Criteria	250	NA	NA	NA	NA	NA	
^a	Emissions of beryllium, mercury, sulfuric acid mist, asbestos, vinyl chloride, fluorides, hydrogen sulfide, total reduced sulfur, reduced sulfur compounds, chlorofluorocarbons, halons, and ozone depleting substances are negligible.						
^b	Maximum hourly emissions.						
^c	The calculations for the SCVs assume seven heaters operating at maximum capacity (120 MMBtu/hour/unit).						
^d	Emergency generator and firewater pump potential emissions calculations based on 52-hour-per-year operation.						
^e	Total emission rates in lb/hr assume that the firewater pump and emergency generator are both operating.						
^f	Emissions of CO ₂ from the SCVs are based on a terminal sendout rate of 1 Bscfd and assuming 1.31% of the sendout (26,000 lbs/hr of natural gas) is used to fuel the SCVs during the vaporization process.						
NE	not estimated						
NA	not applicable						

Title V Operating Permits

Title V of the CAA requires states to establish an air operating permit program. The requirements of Title V are outlined in 40 CFR 70 and the permits required by these regulations are often referred to as Part 70 permits. The EPA has delegated the authority to issue Part 70 permits to the ODEQ. Part 70 permit program requirements are codified in OAR 340-218 and fee requirements are codified in OAR 340-220.

If a facility's potential to emit exceeds the criteria pollutant or hazardous air pollutant (HAP) thresholds, the facility is considered a Title V major source. Under Part 70, the major source threshold

for an air emission source in Oregon is 100 tpy for PM₁₀, PM_{2.5}, SO₂, CO, NO_x, VOCs, or lead. As shown in tables 4.10.1-4 and 4.10.1-5, the potential emissions for NO₂ (the primary component of NO_x) and CO at the proposed LNG terminal exceed 100 tpy. Therefore, the LNG terminal would be a major source of air emissions and would require a Part 70 permit.

The Title V major source HAP thresholds for a source are 10 tpy of any single HAP or 25 tpy of all HAPs in aggregate. Potential HAP emissions from the proposed LNG terminal (in aggregate) would be 6.94 tpy from stationary sources, which are below the major source thresholds.

National Emission Standards for Hazardous Air Pollutants

The NESHAPs, codified in 40 CFR 61 and 63, regulate HAP emissions. Part 61 was promulgated prior to the 1990 Clean Air Act Amendments (CAAA) and regulates only eight types of hazardous substances (asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride).

The 1990 CAAA established a list of 189 HAPs; resulting in the promulgation of Part 63. Part 63, also known as the Maximum Achievable Control Technology (MACT) standards, regulates HAP emissions from major sources of HAP emissions and specific source categories that emit HAPs. Part 63 defines a major source of HAPs as any source that has the potential to emit 10 tpy of any single HAP or 25 tpy of HAPs in aggregate.

LNG storage and processing facilities are not one of the source categories regulated by Part 61; therefore, the requirements of Part 61 are not applicable to the proposed facility. Part 63 establishes HAP emission standards for marine vessel loading operations (Subpart Y); oil and gas production facilities (Subpart HH); natural gas transmission and storage facilities (Subpart HHH); industrial, commercial, and institutional boilers and process heaters (Subpart DDDDD); and reciprocating internal combustion engines (Subpart ZZZZ). These subparts establish requirements for major sources of HAPs only. As indicated above, the potential HAP emissions (in aggregate) from LNG terminal stationary sources would be 6.94 tpy. The single largest HAP emitted by the terminal would be hexane with a potential to emit of 6.49 tpy. Therefore, the LNG facility would not be a major source of HAPs and would not be subject to the NESHAPs.

Federal Class I Area Protection

The U.S. Congress designated certain lands as Mandatory Federal Class I (Class I) areas in 1977. Class I areas were designated because the air quality was considered a special feature of the area (e.g., national parks or wilderness area). These Class I areas, and any other areas that have been redesignated Class I areas since 1977, are given special protection under the PSD program. The PSD program establishes air pollution increment increases that are allowed by new or modified air pollution sources. If the new stationary source is required to comply with PSD program requirements and is near a Class I area, the source is required to determine its impacts at the nearby Class I area(s). The source is also required to notify the appropriate federal land manager(s) for the nearby Class I area(s).

As explained previously, the proposed LNG terminal would not be subject to PSD regulations. The proposed pipeline also would not be subject to PSD regulations. Therefore, federal Class I area protection provisions would not apply to this project; however, impacts on Class I areas are discussed below and shown in table 4.10.1-12.

General Conformity

A conformity analysis must be conducted if a federal action will generate emissions that will exceed the conformity thresholds levels (*de minimis*) of the pollutant(s) for which an air basin is designated as a nonattainment area or a maintenance area. Because the project area would not be located in a nonattainment or maintenance area, general conformity would not apply to the Bradwood Landing project.

Chemical Accident Prevention

The chemical accident prevention provisions, codified in 40 CFR 68, are federal regulations designed to prevent the release of hazardous materials in the event of an accident and minimize potential impacts if a release does occur. Portions of 40 CFR 68 are incorporated by reference in OAR 340-244-0230. Oregon regulations reference the federal list of substances and threshold quantities for determining applicability to stationary sources. If a stationary source stores, handles, or processes one or more substances on this list in a quantity equal to or greater than specified in the regulation, the facility must prepare and submit a *Risk Management Plan* (RMP). If a facility does not have a listed substance on site, or the quantity of a listed substance is below the applicability threshold, the facility does not have to prepare an RMP. In the latter case, the facility still must comply with requirements of the general duty provisions in section 112(r)(1) of the 1990 CAAA if there is any regulated substance or other extremely hazardous substance on site.

Stationary sources are defined in 40 CFR 68 as any buildings, structures, equipment, installations, or substance-emitting stationary activities belonging to the same industrial group, located on one or more contiguous properties, under the control of the same person (or persons under common control), and from which an accidental release may occur. However, the federal definition also states that the term “stationary source” does not apply to transportation, including storage incidental to transportation, of any regulated substance or any other extremely hazardous substance. The term “transportation” includes transportation subject to oversight or regulation under 49 CFR 192, 193, or 195 or a state natural gas or hazardous liquid program for which the state has in effect a certification to DOT under 49 USC § 60105. Based on federal definitions excluding transportation and storage incidental to transportation, an RMP is not required for this facility based on federal regulations.

State Air Quality Requirements

Oregon Construction Permit

Oregon requires each facility that will be subject to the Oregon Title V permit program to obtain a permit to construct before beginning to construct, install, establish, develop, or operate any air contaminant source (OAR 340-216). To meet this requirement, NorthernStar initially submitted an application to the ODEQ in April 2006 for an Air Contaminant Discharge Permit (ACDP) addressing both construction and operation of the LNG terminal. The ODEQ requested that NorthernStar obtain site specific meteorological data and use the data to refine their air dispersion modeling results. NorthernStar provided this information in March 2007 and supplemental information in April 2007. The ODEQ determined that the application was incomplete because it did not include a Land Use Compatibility Statement. The ODEQ stated that it would work informally on the permit application while NorthernStar works to resolve land use issues with Clatsop County.

Oregon Title V Permit

As mentioned previously, the Bradwood Landing LNG terminal's projected potential emissions would trigger Oregon Title V permit requirements (OAR 340-218). NorthernStar would obtain a Title V permit before commencing operations and would pay Title V operating permit fees (OAR 340-220).

Plant Site Emission Limits

Facilities that require Oregon Title V permits and/or an ACDP must obtain plant site emission limits (PSEL) for all regulated pollutants (OAR 340-222-0020). These PSELs are incorporated into the facility's Title V permit and/or ACDP. For pollutants whose potential to emit exceeds significant emission rates (SER), the proposed LNG terminal would likely receive site-specific PSELs set equal to the facility's potential to emit. Table 4.10.1-9 shows the projected potential to emit for criteria pollutants. Based on this information, the proposed terminal would be likely to receive source-specific PSELs for CO and NO_x. Generic PSELs equal to the relevant SERs would likely be set for PM₁₀, SO₂, and VOCs, as well as other pollutants.

TABLE 4.10.1-9		
Significant Emission Rates and Terminal Potential to Emit		
Pollutant	Significant Emission Rate (tpy)	Potential to Emit (tpy)
CO	100	199.6
NO _x	40	122.6
PM ₁₀	15	13.4
SO ₂	40	0.2
VOCs	40	24.5

Air Quality Impact Analysis

Under Oregon regulations in OAR 340-222-0041(3)(C), an Air Quality Impact Analysis (AQIA) is required for any criteria pollutant that exceeds the SER threshold. NO_x, which will be modeled as NO₂, and CO emissions would exceed the SER and would be included in the air quality analysis.

Dispersion modeling methods would estimate the maximum off-site ambient concentrations for project emissions that exceed the SER. The maximum off-site concentrations would then be compared to the following Oregon SILs:

- CO: 2,000 µg/m³ based on a 1-hour average and 500 µg/m³ based on an 8-hour average; and
- NO_x: 1 µg/m³ based on an annual average.

For pollutants with maximum off-site ambient concentrations less than the applicable SIL, no further impact assessment would be required and compliance with NAAQS is demonstrated. If impacts are significant, a more refined analysis would be required to demonstrate compliance with NAAQS. The refined analysis must show that total modeled impacts plus total competing NAAQS source impacts plus general back concentrations would be less than the NAAQS for all averaging times.

The ODEQ mandated that NorthernStar model the impact associated with operational emissions from the stationary sources, as well as emissions from LNG carriers (see section 4.10.1.1). Due to the lack of representative ambient air quality data, the ODEQ requested that NorthernStar collect

meteorological data for one year at the site of the proposed terminal. This data collection was completed in February 2007 and NorthernStar conducted air dispersion modeling using the site-specific meteorological data. Results of the modeling analysis are documented in a March 22, 2007 Air Quality Modeling Report to the ODEQ.

The analysis included a review of the proposed terminal emissions. Based on the review, CO and NO_x were required to be modeled for comparison to applicable air quality standards. The modeling analysis was conducted using the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) modeling program (AERMOD), version 07026, with PRIME downwash algorithms, processed site-specific meteorological data, and USGS digital elevation model terrain data. NorthernStar requested and obtained from the ODEQ competing source information, which was included in the impacts analysis, along with appropriate background concentrations.

The terminal sources of CO and NO_x were modeled to determine if predicted impacts would exceed the SILs. The maximum modeled off-site concentrations were predicted to exceed the 8-hour CO and annual NO_x SILs and to be below the 1-hour CO SIL. As a result, background concentrations were added to the maximum modeled concentrations from the terminal plus the competing sources for comparison to the CO and NO_x AAQS. Table 4.10.1-10 documents the results of the AAQS compliance demonstration and shows that emissions from the terminal are expected to be below the NAAQS and OAAQS.

TABLE 4.10.1-10						
AAQS Dispersion Modeling Results Summary (Terminal)						
Pollutant	Averaging Period	Terminal +Competing Source Modeled Concentration (µg/m ³)	Background Concentration ^a (µg/m ³)	Total Impact (µg/m ³)	AAQS (µg/m ³)	Standard Exceeded (Yes/No)
CO	1-hr	1,721	2,000	3,721	40,000	No
	8-hr	544	1,400	1,944	10,000	No
NO ₂	Annual	21.6 ^b	15	36.6	100	No

^a Background concentrations provided by Mark Bailey of the ODEQ.

^b Annual NO_x results reduced by Ozone Limiting default factor of 0.75 to estimate equivalent NO₂ concentration.

The modeled project impacts were also evaluated for compliance with the applicable PSD increment thresholds. There are no PSD increments for CO. The NO₂ PSD increment is 25 µg/m³. As required, the terminal plus the competing source modeled concentrations were compared to the increment. Since the modeled concentration of 21.6 µg/m³ was below the applicable increment, no further analysis was required.

A prior modeling analysis conducted by NorthernStar dated July 13, 2006 documented the results of modeling the LNG carrier emissions, while hotelling, from the on-board electrical generator. The modeling was conducted using AERMOD with local meteorological data, since the site specific meteorological data was not yet available. The analysis included an assessment of the proposed CO, NO₂, PM₁₀, and SO₂ emissions for comparison to the applicable AAQS and increments. Table 4.10.1-11 below documents the results of the analysis. It should be noted that the estimated emission rates from the LNG carriers listed in tables 4.10.1-4 and 4.10.1-5 have been updated and are lower than those used for the modeling analysis conducted in July 2006. As a result, the impacts presented in table 4.10.1-11 are conservative. The estimated impacts are below the NAAQS and OAAQS; therefore, we do not expect significant air quality impacts.

TABLE 4.10.1-11						
AAQS Dispersion Modeling Results Summary (Terminal and LNG Carrier)						
Pollutant	Averaging Period	LNG Carrier Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Background Concentration ^a ($\mu\text{g}/\text{m}^3$)	Total Impact ^b ($\mu\text{g}/\text{m}^3$)	AAQS ($\mu\text{g}/\text{m}^3$)	Standard Exceeded (Yes/No)
CO	1-hr	96.2	2,000	3,721	40,000	No
	8-hr	17.5	1,400	1,944	10,000	No
NO ₂	Annual	0.75 ^c	15	37.4	100	No
PM ₁₀	24-hr	1.24	30	31.2	150	No
	Annual	0.02	15	15.0	50	No
SO ₂	3-hr	501.21	65	566.2	1300	No
	24-hr	83.2	30	113.2	365	No
	Annual	0.98	15	16.0	80	No
^a Background concentrations provided by Mark Bailey of the ODEQ. ^b Total Impacts listed for CO and NO ₂ include modeled concentrations from the LNG carriers, terminal plus competing sources (from table 4.10.1-10), and background. Total impacts listed for PM ₁₀ and SO ₂ include modeled concentrations from the LNG carrier and background only since the emissions from the terminal of those pollutants do not exceed the ODEQ's Air Quality Impact Analysis (AQIA) thresholds and did not require an analysis. ^c Annual NO _x results reduced by Ozone Limiting default factor of 0.75 to estimate equivalent NO ₂ concentration.						

Since the project would be located within 200 kilometers of a federal Class I area, modeling was also conducted to demonstrate compliance with the Class I area NO₂ increment of 2.5 $\mu\text{g}/\text{m}^3$. Table 4.10.1-12 presents the modeled annual average NO₂ concentrations for comparison to the significance level.

TABLE 4.10.1-12					
Class I Area Dispersion Modeling Results Summary (Terminal)					
Area Name	State	Distance/ Direction from Terminal (km)	Terminal Modeled Concentration ^a ($\mu\text{g}/\text{m}^3$)	Class I Area Significance Level ($\mu\text{g}/\text{m}^3$)	Significance Level Exceeded (Yes/No)
Columbia River Gorge National Scenic Area ^b	Oregon and Washington	100 / ESE	0.01	0.10	No
Mount Rainer Nation Park	Washington	137 / NE	0.03	0.10	No
Mount Adams Wilderness Area	Washington	145 / East	0.02	0.10	No
Mount Hood Wilderness Area	Oregon	150 / SE	0.02	0.10	No
Goat Rocks Wilderness Area	Washington	153 / ENE	0.02	0.10	No
Olympic National Park	Washington	154 / North	0.02	0.10	No
^a Values listed above are the maximum concentration 50 km from the terminal in the direction specific to each area of interest. ^b Not a federal Class I Area but required by the ODEQ to be analyzed.					

All modeled concentrations at distances of 50 kilometers from the terminal would be below the significance level; therefore, no further analysis was required to demonstrate acceptable project impacts. Based upon this screening we do not anticipate significant impacts on Class I areas.

Oregon Major New Source Review

Oregon implements a Major New Source Review Program encompassing new facility construction or modification in nonattainment and attainment/unclassifiable areas (OAR 340-224).

Because the planned project is located in attainment/unclassifiable areas for all criteria pollutants, only the PSD portion of Oregon's Major New Source Review Program is potentially applicable. The Oregon Major New Source Review Program uses the same applicability determination as is used for the federal PSD program. As mentioned previously, projected potential emissions from the proposed Bradwood Landing LNG terminal would not exceed the federal major source PSD threshold. Therefore, the proposed facility would not be subject to Oregon's Major New Source Review Program.

General Emission Standards

The proposed LNG terminal would be subject to three provisions from Oregon's general emission standards in OAR 340-226. The first provision mandates that particulate emissions from any individual source may not exceed 0.1 grains per standard cubic foot of effluent (OAR 340-226-210).

The second provision requires that certain emission units at stationary sources meet Typically Achievable Control Technology (TACT). The SCVs would be subject to TACT because the Bradwood Landing LNG facility would require a permit, and the SCVs each would have emissions of more than 1 tpy and would not be subject to major source New Source Review, New Source Performance Standards, or other emission limits specified in OAR 340-226-130(2)(a). Procedures for identifying air pollution control equipment and emission reduction processes that meet TACT are not included within Oregon's regulatory text. However, if the ODEQ notifies NorthernStar that it intends to make a TACT determination for the SCVs, then the proposed facility would need to submit any requested information and comply with the final TACT determination.

Finally, the general emission standards also mandate that "the highest and best practicable treatment and control of air contaminant emissions must in every case be provided." However, a source is deemed to be in compliance with the "highest and best" requirement if it is in compliance with all other applicable requirements in OAR 340, Divisions 200 through 268. Because NorthernStar intends to comply with each applicable requirement, the Bradwood Landing LNG terminal facility would be in compliance with the "highest and best practicable treatment."

Fuel Burning Equipment and Fuel Sulfur Content

The proposed LNG terminal would use fuel burning equipment that would be subject to particulate limits and fuel sulfur content limits under OAR 340-228. Under this rule, "fuel burning equipment" is defined as equipment (other than internal combustion engines) whose purpose is to produce heat or power by indirect heat transfer. Several of the standards in OAR 340-228 would not apply to certain emission units, as follows.

- The firewater pump would be exempt from this rule because it would be an internal combustion engine.
- The SCVs would be exempt from SO₂ limits because they burn natural gas.
- The emergency generator would be exempt from SO₂ limits because its heat input capacity is less than 150 MMBtu/hr.

However, particulate limits would apply to the SCVs and the emergency generator. This equipment would be subject to an emission limit of 0.1 grain of particulate per standard cubic foot of effluent. In addition, two sulfur content limits would apply to fuels that are sold, distributed, or used by the proposed facility (with the exception of fuel used exclusively for propulsion and auxiliary power for vessels, railroad locomotives, or diesel motor vehicles).

- Residual fuel oil may not contain more than 1.75 percent sulfur by weight.
- Distillate fuel oil may not contain more than 0.3 percent sulfur by weight for ASTM (American Society for Testing and Materials) Grade 1 fuel oil, or 0.5 percent sulfur by weight for ASTM Grade 2 fuel oil.

Visible Emission and Nuisance Requirements

State visible emissions and nuisance abatement regulations are codified in OAR 340-208. Both construction and operation phases of the proposed LNG terminal would be subject to visible emission limits stated in terms of opacity. In Oregon, the LNG terminal may not emit contaminants causing opacity to equal or exceed 20 percent in any period or periods aggregating more than 3 minutes in any hour. In addition, no person may create an observable deposition of particulate matter on another person's property (OAR 340-208-540).

The state of Oregon imposes specific fugitive emission control requirements on facilities that are located within “special control areas” or are determined to be a nuisance by the ODEQ. The proposed Bradwood Landing LNG terminal would not be located in a special control area because it would not be located in counties or basins listed in OAR 340-204-0070, nor would it be located within 3 miles of the corporate limits of a city having a population of 4,000 people or more. Fugitive emission requirements within OAR 340-208-210 would apply to the facility only if it were deemed to be a nuisance. If the ODEQ determined that the project was a nuisance, NorthernStar would need to enter into a Best Work Practices Agreement with the ODEQ. NorthernStar’s terminal ESC Plan contains BMPs for dust suppression, which would include the use of groundwater from the on-site well. No chemicals would be used for dust suppression.

Energy Facility Siting Requirements (Oregon Department of Energy)

Most large energy facilities in Oregon are under the jurisdiction of the Oregon Energy Facility Siting Council (Council). The Oregon legislature determines what types of energy facilities require Council review. An energy facility developer must apply to the Council for a site certificate and must supply information about the proposed facility and the proposed site.

In 1997, the Oregon legislature gave the Energy Facility Siting Council authority to set CO₂ emissions standards for new energy facilities. Division 24 of the Council’s rules, beginning at OAR 345-024-0500, contains specific standards for base load gas plants, non-base load (peaking) power plants and non-generating energy facilities that emit carbon dioxide. The standard for non-generating energy facilities is expressed as a rate of emissions per horsepower hour: 0.504 pounds of CO₂/hp-hr. CO₂ would be formed during the operation of the Bradwood Landing LNG terminal as a primary product of diesel and gas combustion in the SCVs, emergency generator, and emergency firewater pump engine. In 2005, the Council had initiated development of additional criteria for LNG terminals.

The EPCRA of 2005 contains a provision that the FERC has exclusive jurisdiction over LNG import facilities. As a result, the Council has stated that it would not be asserting jurisdiction over LNG import terminals. As well, the ODE stopped all work related to rulemaking for LNG facilities.

Oregon Governor Ted Kulongoski directed state agencies to participate in the FERC’s review of any LNG import terminals in Oregon. He designated the ODE as the lead agency in working with FERC on proposed projects, including the coordination of state agency response on any application. The Governor also designated the ODE as the state’s lead agency for working with FERC on LNG import terminal safety and security issues.

Although the Council acknowledges that the FERC has jurisdiction over the siting of LNG import terminals and there are no specific standards for LNG facilities, the ODE has requested that the Bradwood Landing Project voluntarily comply with the CO₂ standards for non-generating energy facilities. CO₂ is not a federally regulated pollutant but is considered a GHG, along with other gases such as methane and chlorofluorocarbons. GHG emissions are the primary driver of the increase in global mean temperature, known as global warming. NorthernStar has agreed to voluntarily comply with the ODE's request.

Air Quality Impacts and Mitigation

Construction of the proposed LNG terminal would have temporary adverse impacts on air quality due to fugitive dust emissions. Construction at the terminal site would include dredging of the river channel to accommodate LNG carriers, construction of the wharf and docking facilities, and construction and installation of on-site equipment. Construction at the proposed terminal site would occur over approximately 3 years.

NorthernStar proposes to reduce fugitive emissions from terminal construction areas. When dust is considered to be a possibility during a specific site construction activity in the terminal area, mitigation measures would be included in the task-specific method statement for the work. The terminal ESC Plan states that the ODEQ's BMPs for dust control (EP-13) would be followed to stabilize soil from wind erosion and to reduce dust generated by construction activities. However, NorthernStar would use only water, which would be obtained from the on-site water well, and would not use other types of dust palliatives. Stockpiled materials would be stabilized either by applying water or by covering. Dust control would be provided daily (or as often as needed depending on wind conditions, time of year, and the physical conditions of the site). Water applied for dust control would be applied evenly and without over-watering to avoid runoff that could result in erosion.

The concrete plant located at the terminal site would be operated in a manner designed to minimize the risk of cement dust releases. The environmental coordinator would conduct regular inspections to ensure that BMPs are employed to reduce fugitive dust emissions. In addition, NorthernStar proposes to pave Bradwood Road, which provides access to the area from paved Clifton Road.

Construction of the LNG terminal would also result in tailpipe emissions from a variety of sources, including cranes, forklifts, front end loaders, dump trucks, graders, generators, vibratory rollers, concrete pumps and trucks, water trucks, and pick-up trucks. Non-road construction vehicle emissions were estimated using emission factors from the EPA AP-42 compilation. During construction of the LNG terminal, construction equipment is assumed to operate 10 hours per day, 5 days per week, with the exception of the dredge and associated equipment. In tables 4.10.1-13 and 4.10.1-14, the estimated construction emissions are summarized. In addition, total NO_x, CO, and VOC emissions during construction of the LNG terminal are compared to regional air emissions estimated from 2002 ODEQ data for Clatsop and Columbia Counties.

Impacts associated with construction vehicles are difficult to estimate based on the time and space variant characteristics of the emissions. Estimates are complicated by the fact that the construction equipment would not follow defined paths (such as paved roadways) and would frequently change speed and direction. Furthermore, due to the intermittent and temporary nature of these emissions, their long-term impact on air quality would be minimal. In addition, the primary pollutants emitted by the construction vehicles would be NO_x and CO. The ambient air quality standard for NO₂ is an annual average and the CO standards are significantly higher than any other standards (see table 4.10.1-1). For these reasons, the short-term and intermittent NO₂ and CO emissions from the construction vehicles are not expected to exceed the NAAQS for NO₂ or CO.

TABLE 4.10.1-13								
Estimated Total and Peak Hourly Construction Emissions for LNG Terminal (NO _x , CO, SO ₂ , and PM ₁₀)								
Emission Source	NO _x		CO		SO ₂		PM ₁₀	
	tons ^a	lb/hr	tons ^a	lb/hr	tons ^a	lb/hr	tons ^a	lb/hr
LNG Terminal								
Construction Equipment	583.3	149.6	716.8	183.8	84.2	21.6	33.9	8.7
Dredging Equipment	83.6	232.1	15.8	44.0	4.0	11.1	4.6	12.7
Construction Tug	12.5	312.7	1.0	24.8	3.1	77.1	0.3	7.8
Earth-Moving Fugitives	0.0	0.0	0.0	0.0	0.0	0.0	24.3	6.2
Commuter and Delivery Vehicles	1.5	0.4	3.1	0.8	neg	0.0	79.6	20.4
Natural Gas to Purge Nitrogen	0.0	NE	0.0	NE	0.0	NE	0.0	NE
Construction Total ^b	680.9	694.8	736.7	253.4	91.3	109.8	142.7	55.8
ODEQ Regional Estimates ^c	6,500.0	NA	32,600	NA	NA	NA	NA	NA
Percent of Regional Emissions	10.5	NA	2.3	NA	NA	NA	NA	NA
^a	These emission levels represent total emissions for the 3-year construction period for the terminal and the 7-month construction period for the pipeline.							
^b	The total construction emissions are summed for the entire construction period and peak hourly emissions. These emission numbers are conservative because peak hourly emissions from the LNG terminal construction activities are expected to occur at different times during the project, which would result in lower emissions that are presented in the table.							
^c	The regional NO ₂ , CO, and VOC emission estimates include man-made emissions in Clatsop and Columbia Counties.							
neg	negligible							
NA	not applicable							
NE	no estimate							

TABLE 4.10.1-14								
Estimated Total and Peak Hourly Construction Emissions for LNG Terminal (PM _{2.5} , VOCs, CO ₂ , and CH ₄)								
Emission Source	PM _{2.5}		VOCs		CO ₂		CH ₄	
	tons ^a	lb/hr	tons ^a	lb/hr	tons ^a	lb/hr	tons ^a	lb/hr
LNG Terminal								
Construction Equipment	33.9	8.7	21.2	5.4	41,758.0	10,707.0	185.8	47.7
Dredging Equipment	4.1	11.3	3.2	8.8	4,466.0	12,406.0	15.3	42.4
Construction Tug	0.3	7.8	0.1	2.0	819.0	20,480.0	Neg	neg
Earth-Moving Fugitives	2.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Commuter and Delivery Vehicles	8.2	2.1	4.0	1.0	332.0	85.1	<0.1	<0.1
Natural Gas Purge Nitrogen	0.0	NE	15.5	NE	0.0	NE	460.0	NE
Construction Total ^b	48.9	30.5	44.0	17.2	47,375.0	43,678.0	661.1	90.1
ODEQ Regional Estimates ^c	NA	NA	960.0	NA	NA	NA	NA	NA
Percent of Regional Emissions	NA	NA	4.6	NA	NA	NA	NA	NA
^a	These emission levels represent total emissions for the 3-year construction period for the terminal and the 7-month construction period for the pipeline.							
^b	The total construction emissions are summed for the entire construction period and peak hourly emissions. These emission numbers are conservative because peak hourly emissions from the LNG terminal construction activities are expected to occur at different times during the project, which would result in lower emissions than are presented in the table.							
^c	The regional NO ₂ , CO, and VOC emission estimates include man-made emissions in Clatsop and Columbia Counties.							
neg	negligible							
NA	not applicable							
NE	no estimate							

To reduce tailpipe emissions from vehicles, NorthernStar proposes to use the following measures to reduce emissions from construction equipment and commuter vehicles:

- limit truck idling as much as possible;
- properly maintain construction equipment in accordance with manufacturers' specifications or standard practices;
- encourage construction workers to carpool to the construction site; and
- implement a shuttle service to or from retail services and food establishments during lunch hours, or provide lunch services at the site.

Operation of the LNG terminal would result in air emissions from: stationary equipment (SCVs and emergency engines), LNG carriers, security vessels, and tugs. The Bradwood Landing LNG terminal would operate 24 hours per day, 7 days per week (8,760 hours per year). Typically, six SCVs would operate to achieve an average LNG sendout rate of 1.0 Bcfd. To achieve a peak sendout rate of 1.3 Bcfd, the seventh SCV would also operate. The diesel firewater pump and the diesel emergency generator would be operated on an emergency basis and for 1 hour each week for testing. Results of an AQIA evaluating operation of the proposed LNG terminal are discussed above in the State Air Quality Requirements section.

During LNG unloading operations, the proposed terminal would include a vapor management system to handle the BOG. During normal operations, no vapors would be discharged to the atmosphere; instead, vapors would be contained and recycled or used for fuel. In the event of non-routine conditions such as evacuating vapors from equipment before maintenance or to avoid overpressure conditions, vapors would be vented to the atmosphere. The vapor management system would include a vent to discharge vapors at a safe elevation. No flares would be used at the terminal facility.

Finally, NorthernStar would implement a policy to address local complaints regarding nuisance emissions. NorthernStar proposes to set up a contact telephone number that would allow citizens to call the site environmental coordinator and report nuisance emissions. The proposed policy would include a requirement to respond to complaints by conducting a terminal inspection and take corrective action. A written report of the complaint and actions taken would be kept on file at the facility.

4.10.1.3 Pipeline Facilities

Climate

The associated proposed 36.3-mile natural gas sendout pipeline would cross Clatsop and Columbia Counties in Oregon and Cowlitz County in Washington. The proposed pipeline route is within the coastal Columbia River Valley climate region, described in section 4.10.1.1. Clatsop and Columbia Counties are two of the six counties designated as the Northwest Region by the ODEQ.

Climate data from the NWS climate stations at Astoria Regional Airport in Clatsop County and the Kelso-Longview Regional Airport in Cowlitz County are available from the Western Regional Climate Center from January 1, 1899 to the present. These data should be representative of conditions in the area of the proposed pipeline route.

Ambient Air Quality Standards

The NAAQS and state AAQS applicable to the counties where the pipeline would be constructed are described in section 4.10.1.1.

Existing Air Quality

Clatsop, Columbia, and Cowlitz Counties are all currently designated as attainment or unclassifiable for all NAAQS criteria pollutants. Motor vehicles are a primary source of air pollution in each county, with large industrial facilities accounting for less than 15 percent of most types of criteria pollutants. Cowlitz County in Washington has some concentrated industrial development, including paper mills and power plants. Other sources of air pollution in both states include human activities such as outdoor burning, using wood stoves, and using non-road vehicles (e.g., gasoline-powered lawn mowers, motor boats, etc.).

Construction of the proposed pipeline would cause temporary gasoline and diesel combustion emissions associated with operating construction equipment and vehicles. Fugitive dust would also be generated by site preparation activities and equipment travel. These emissions would occur during the projected 7-month construction period.

Air Quality Control Regions

Like the Bradwood Landing LNG terminal, the Clatsop County portion of the proposed pipeline would be located in the Northwest Oregon Intrastate AQCR (40 CFR 81.249). The remaining portion of the pipeline in Columbia and Cowlitz counties would be located in the Portland Interstate AQCR (40 CFR 81.51).

Regulatory Requirements for Air Quality

Emissions from all phases of construction and operation of the proposed pipeline would be subject to applicable state and federal air regulations. Most air quality regulatory programs address emissions from stationary sources of air pollution. Because no compression facilities are proposed for the pipeline, there will be few air quality compliance requirements applicable to ongoing pipeline operations. Air quality regulations affecting pipeline construction are primarily concerned with reducing emissions associated with construction equipment and fugitive dust.

The proposed pipeline air emission sources are regulated at the federal level by the CAA, as amended, and at the state level by OAR and Washington's SWCAA.

Federal Air Quality Requirements

The federal air quality requirements that pertain to the Bradwood Landing Project are discussed above in section 4.10.1.2. Specific regulations applicable to the proposed pipeline would be those applicable to emissions from mobile sources (i.e., construction equipment) and fugitive dust emissions.

State Air Quality Requirements

The Oregon state air general emission standards, discussed in section 4.10.1.2 relative to the LNG terminal, would also be applicable to the proposed pipeline.

In Oregon, the construction and operation phases of the proposed pipeline would be subject to visible emission limits stated in terms of opacity. The pipeline project may not emit contaminants causing opacity to equal or exceed 20 percent in any period or periods aggregating more than 3 minutes in any hour. In addition, no person may create an observable deposition of particulate matter on another person's property (OAR 340-208-540).

In Washington, SWCAA Regulation 400-040 imposes fugitive dust emission controls on activities such as pipeline construction. These rules require that persons take reasonable precautions to prevent the release of air contaminants from the construction activities.

A new Washington regulation (SWCAA Regulation 400-045) became effective on December 15, 2005, that creates a permit program for non-road internal combustion engines that, in aggregate, equal or exceed 200 horsepower. However, NorthernStar would not be required to obtain permits under this regulation for non-road internal combustion engines used to construct the pipeline in Washington (Safford, 2006).

Air Quality Impacts and Mitigation

Construction of the proposed pipeline would have temporary adverse impacts on air quality due to fugitive dust emissions. Construction of the pipeline would occur over approximately 7 months.

During pipeline construction, NorthernStar would employ one or more of the following methods to reduce fugitive dust emissions:

- apply water or chemical dust suppressants to disturbed land;
- reduce vehicle speeds on paved and unpaved roads;
- minimize material transfer distances;
- return disturbed areas to normal vegetation as soon as possible;
- minimize travel on disturbed or stabilized land; and
- stop construction activities if high winds and/or very low humidity cause excessive dust.

Construction of the pipeline would also result in tailpipe emissions from a variety of sources, including miscellaneous trucks, bulldozers, backhoes, and side-boom tractors. Non-road construction vehicle emissions were estimated using emission factors from the EPA AP-42 compilation. The estimated construction emissions are summarized in tables 4.10.1-15 and 4.10.1-16. In addition, total NO_x, CO, and VOC emissions for the pipeline construction are compared to regional air emissions estimated from 2002 ODEQ data for Clatsop and Columbia Counties.

As discussed in section 4.10.1.2, the short-term and intermittent NO₂ and CO emissions from the construction vehicles are not expected to exceed the NAAQS for NO₂ or CO. In section 4.10.1.2, we describe specific measures NorthernStar proposes to reduce tailpipe emissions from construction equipment and commuter vehicles, as well as its proposal to implement a policy to address local complaints regarding nuisance emissions.

TABLE 4.10.1-15								
Estimated Total and Peak Hourly Construction Emissions for Pipeline (NO _x , CO, SO ₂ , and PM ₁₀)								
Emission Source	NO _x		CO		SO ₂		PM ₁₀	
	tons ^a	lb/hr	tons ^a	lb/hr	tons ^a	lb/hr	tons ^a	lb/hr
Pipeline								
Construction Equipment	277.3	120.0	343.6	148.7	42.1	14.4	31.0	13.4
Earth-Moving Fugitives	NA	NA	NA	NA	NA	NA	12.3	5.3
Commuter and Delivery Vehicles	NE	NE	NE	NE	NE	NE	NE	NE
Construction Total ^b	277.3	120.0	343.6	148.7	42.1	14.4	31.0	13.4
ODEQ Regional Estimates ^c	6,500	NA	32,600	NA	NA	NA	NA	NA
Percent of Regional Emissions	4.3	NA	1.1	NA	NA	NA	NA	NA
^a	These emission levels represent total emissions for the 3-year construction period for the terminal and the 7-month construction period for the pipeline.							
^b	The total construction emissions are summed for the entire construction period and peak hourly emissions. ^c The regional NO ₂ , CO, and VOC emission estimates include man-made emissions in Clatsop and Columbia Counties.							
NA	not applicable							
NE	no estimate							

TABLE 4.10.1-16								
Estimated Total and Peak Hourly Construction Emissions for Pipeline (PM _{2.5} , VOCs, CO ₂ , and CH ₄)								
Emission Source	PM _{2.5}		VOCs		CO ₂		CH ₄	
	tons ^a	lb/hr	tons ^a	lb/hr	tons ^a	lb/hr	tons ^a	lb/hr
Pipeline								
Construction Equipment	31.0	13.4	40.3	17.4	21,773	9,442	75	32.5
Earth-Moving Fugitives	12.3	5.3	0	0	0	0	0	0
Commuter and Delivery Vehicles	NE	NE	NE	NE	NE	NE	NE	NE
Construction Total ^b	31.0	13.4	40.3	17.4	21,773	9,442	75	32.5
ODEQ Regional Estimates ^c	NA	NA	960	NA	NA	NA	NA	NA
Percent of Regional Emissions	NA	NA	4.2	NA	NA	NA	NA	NA
^a	These emission levels represent total emissions for the 3-year construction period for the terminal and the 7-month construction period for the pipeline.							
^b	The total construction emissions are summed for the entire construction period and peak hourly emissions. ^c The regional NO ₂ , CO, and VOC emission estimates include man-made emissions in Clatsop and Columbia Counties.							
NA	not applicable							
NE	no estimate							

4.10.1.4 Greenhouse Gas Emissions

We received several comments regarding the emissions of GHGs from the project. The principle GHGs are methane, CO₂, nitrous oxide (N₂O), and various fluorinated gases which trap heat in the atmosphere and are the primary drivers of the increase in global mean temperature, known as global warming. No fluorinated gases would be emitted by the project, so we need only look at N₂O, methane and CO₂. There are no federal regulations at this time limiting the emissions of CO₂; however, emissions of N₂O are regulated through limitations of NO_x emissions under NSPS and federal permits. Methane emissions are limited by valve and pipe leak standards.

Emissions of GHGs are typically estimated as carbon equivalents, or carbon dioxide equivalents. The GHGs are ranked by their global warming potential (GWP). The GWP is a ratio relative to CO₂ which is based on the properties of the GHGs to absorb solar radiation as well as the residence time

within the atmosphere (Intergovernmental Panel on Climate Change, 2007). Thus CO₂ has a GWP of 1. Methane has a GWP of approximately 21, and N₂O has a GWP of approximately 310. NorthernStar has estimated the emissions of CO₂ and some of the methane from the project. It should be noted that we do not have estimates of the N₂O and all of the methane emissions so the total amount of GHG equivalents may be larger.

We estimate that construction of the terminal and associated pipeline would emit approximately 146,000 tons of CO₂ during the entire construction period and annual operations would emit an estimated 102,000 tons of CO₂. Although the GHG emissions appear large, the operational emissions are less than 1/100th of 1 percent of the 2006 U.S. Greenhouse Gas Inventory (EPA 2007) of 7.2 Gigatons. The GHG emissions of this natural gas project would be much less than GHG emission for an equivalent oil or coal project, as explained in Section 3.1.1.3.

We received a May 7, 2008 LNG and Natural Gas Review by the ODE (2008b), filed on May 9, 2008 through a letter from the Governor of Oregon. The report included a literature review, summary and comparison of life-cycle assessments of LNG-based natural gas, domestic natural gas, synthetic gas (syngas), and coal. A life-cycle assessment looks at all the CO₂ emitted during the entire “life” of the fuels, from extraction, transportation, processing, and end use. It should be noted that this is very different from the approach the EPA takes in regard to regulation of criteria pollutants, which typically regulate emissions at the point of release. There have been numerous pieces of draft legislation introduced in the United States Senate and House of Representatives that propose in some fashion to regulate the emission of GHG. Some of these draft bills would impose upon importers of fuels some sort of GHG reporting, while others do not and would leave it to the discretion of the EPA. There are two primary regulatory frameworks that have been proposed in the draft legislation. One regulatory framework would be a “cap and trade” system, which would cap the overall emissions while developing a market to buy and sell emission allotments of CO₂. The second approach would impose a carbon tax on fuels, thus penalizing use of the most carbon intensive fuels. This summary is not intended to be a comprehensive list of proposals, merely a brief description of the two primary methods to regulate CO₂. Should the United States government decide to regulate the emission of CO₂ and other GHG, it is not known at this time how the legislation and implementing regulations would be crafted.

Intrinsic in the ODE’s analysis is that carbon capture and storage (CCS) would be a viable technology within 20 years. CCS involves removing a portion of the CO₂ from combustion emissions and injecting it into geologic formations so that it does not enter the atmosphere. To this point, only limited trials have been attempted for capturing carbon. Carbon sequestering is not economically or technologically feasible at this time; although it has been used in the production of syngas. The ODE admits that “it is difficult to assess when CCS will become a commercial technology.”

The ODE determined that for electric generation, the life-cycle emissions of CO₂ for LNG is approximately the same as for syngas with upstream carbon sequestration, is significantly less than coal, and is greater than domestic sources of natural gas. It should be noted that without the CCS in the syngas creation process, the emissions of CO₂ from the life cycle of syngas are significantly greater than LNG-sourced natural gas. In general we do not dispute the ODE’s contention that domestically produced natural gas would have lower life-cycle emissions of CO₂ than LNG-sourced natural gas. However, natural gas from LNG would only produce between 6 to 12 percent more GHG than domestic natural gas transported by interstate pipelines if both were combusted in conventional electric power plants. The ODE added the GHG associated with fuels used to liquefy the natural gas into LNG, ship it long distances in LNG carriers, and vaporize it back into natural gas at the import terminal as part of its equation for determining the life-cycle emissions for LNG.

The ODE contends that the importation and vaporization of LNG would hinder Oregon's effort to meet 1990 levels of GHG by 2020. This determination relies upon a number of assumptions, including: that the LNG facility must also include CO₂ emissions from the transportation of the LNG (and possibly extraction and processing); that the natural gas would be used primarily in Oregon; and that the natural gas would not displace more carbon intensive fuels such as coal and fuel oil. Without federal regulatory guidance, it is difficult for us to postulate what might be required by future GHG rules. While it is certainly possible that the LNG facility may delay meeting Oregon's GHG 2020 target, it is also possible that under systems such as a cap and trade or a carbon tax regulatory framework that it may accelerate Oregon's ability to meet its GHG goals by 2020.

4.10.2 Noise

Noise would be generated by LNG marine traffic along the waterway, during construction and operation of the LNG terminal, and during construction of the pipeline. At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of the day and throughout the week. This variation is caused in part by changing weather conditions and the effects of seasonal vegetative cover. Federal agencies use two measures to relate the time-varying quality of environmental noise to its known effect on people. The $L_{eq(24)}$ is the level of steady sound with the same total (equivalent) energy as the time-varying sound of interest, averaged over a 24-hour period. A second measure, the L_{dn} is calculated by adding 10 dB on the A-weighted scale (dBA) to the nighttime sound levels between the hours of 10 PM and 7 AM to account for the greater sensitivity of people to sound during the nighttime hours. The A-weighted scale is used because human hearing is less sensitive to low and high frequencies than mid-range frequencies.

Noise Regulations

In 1974, the EPA published Information on *Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (EPA, 1974). This publication evaluates the effects of environmental noise with respect to health and safety. The document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has determined that in order to protect the public from activity interference and annoyance outdoors in residential areas, noise levels should not exceed an L_{dn} of 55 dBA. An L_{dn} of 55 dBA is equivalent to a continuous noise level of 48.6 dBA for facilities that operate at a constant level of noise. The FERC has adopted this criterion for new compression and associated facilities, and it is used here to assess the potential noise impact from operation of the LNG terminal.

No noise regulations associated with the adjacent receiving properties have been identified in relation to the waterway for LNG marine traffic.

Oregon Administrative Noise Regulation

The noise program of the ODEQ is promulgated under ORS Chapter 467 and OAR 340-035-035, Noise Control Regulations for Industry and Commerce. While the noise regulations are no longer enforced by the ODEQ, the regulations still remain in effect.

Because the Bradwood Lumber Mill has been abandoned for over 45 years without substantial commercial operations, the site of the proposed LNG terminal would be considered a "Previously Unused Industrial or Commercial Site" as defined in OAR 340-035-0015(47). According to OAR 340-035-035(1)(b)(B), no new noise source should increase ambient noise levels, L_{10} or L_{50} , by more than 10 dBA in 1 hour, or exceed a daytime noise level (7 AM to 10 PM) of L_{50} 55 dBA, L_{10} 60 dBA, or L_1 65 dBA; or a nighttime noise level (10 PM to 7 AM) of L_{50} 50 dBA, L_{10} 55 dBA, or L_1 60 dBA.

OAR 340-035-035 section 5 lists exemptions for emergency equipment, warning devices not operating continuously for more than 5 minutes, sounds that originate on construction sites, and sounds created in construction or maintenance of capital equipment.

The ODEQ noise regulations also have a provision for the designation of “quiet areas” (OAR 340-035-015(50)). However, no indication has been found that such a quiet area has been designated within the general area of the proposed LNG terminal.

Statistical noise level descriptors, such as those cited in the ODEQ regulations (L_{50} , L_{10} , L_1) are nearly impossible to predict without extremely detailed knowledge of exactly what type of equipment would be present and precisely when each piece would be in operation, for how long, and at what load. Instead conservative estimates were constructed above the L_{eq} noise level, and assumptions have been made that the predicted L_{eq} level would be approximately equal to the stated L_{50} level, and the L_{eq} level was used as a basis for determining noise impacts relative to the ODEQ standard.

Clatsop County, Oregon has a noise ordinance that would: 1) restrict blasting with 1,000 feet of a dwelling; and 2) restrict unreasonably loud noise that disturbs the peace and tranquility of any neighborhood or person between the hours of 10 PM and 7 AM. However, this ordinance does not have any quantitative thresholds for noise restrictions.

Washington Administrative Code

The rules establishing maximum permissible noise levels are contained in WAC Chapter 173-60, relating to maximum environmental noise levels. WAC Chapter 173-60 establishes three classes of environmental designations for noise abatement (EDNA), which are the areas or zones within which the maximum permissible noise levels are set. These EDNA zones are defined with respect to land use and can usually be transferred to previously-established classifications in existing zoning ordinances or comprehensive plans.

The maximum environmental noise level from an industrial area (EDNA Class C) at a residential area (EDNA Class A) is 60 dBA during the day and 50 dBA at night (10 PM to 7 AM). Noise from temporary daytime construction activities and blasting is exempt from these limits.

No local noise regulations were identified for either Wahkiakum County, Washington or the town of Cathlamet, Washington.

Threshold Summary

Based on a review of the current regulations the following noise thresholds are identified for comparison with projected noise levels:

- the 55 dBA L_{dn} for any 24-hour period;
- an average daytime L_{eq} of 60 dBA in Washington or 55 dBA in Oregon; and
- an average nighttime (10 PM to 7 AM) L_{eq} of 50 dBA in Washington and Oregon.

4.10.2.1 Waterway for LNG Marine Traffic

Existing Noise Levels

Existing noise levels are dependent on the size, frequency, and type of vessel traffic using the waterway. Ongoing dredging activities also contribute to the overall background noise. Tugs and LNG

carriers are known to produce noise at 61 and 64.3 dBA, respectively, at a distance of 300 feet (FEED Expansion, 2005). When no vessel or dredging activities are present, background noise ranges from rural residential (40 – 45 dBA) to wilderness (35 dBA).

Operational Impacts

As discussed above, the intermittent operation of LNG carriers and tugs in the waterway will contribute to an increase in the background noise level. There would be a temporary noticeable increase in noise to the receptors along the waterway as an LNG carrier and escort vessels pass; however, given the relatively low frequency of ship and tug traffic, the overall day and nighttime-weighted noise level should not change significantly from existing background conditions. The noise levels from LNG carriers and tugs during docking and unloading at the LNG terminal are addressed below under the LNG terminal (see section 4.10.2.2) and the impact on aquatic resources is discussed in sections 4.5.1.1 and 4.6.2.1.

4.10.2.2 LNG Terminal

Existing Noise Levels

A series of long- and short-term noise measurements were conducted at nearby noise-sensitive areas (NSAs) January 4-6, 2006. The nearest NSAs are listed in table 4.10.2-1 and shown on figure 4.10.2-1.

TABLE 4.10.2-1		
Nearest Noise-Sensitive Areas		
Description	Distance to Property Line	Direction
N1	Directly Adjacent	north
N2	1,000 feet	east
N3	4,224 feet	east
N4	11,880 feet	east
N5	6,067 feet	south

These sites were chosen to be generally representative of the closest noise-sensitive land uses in each general direction from the site. N1, a small cluster of homes off of Clifton Road northwest of the proposed LNG terminal site, was selected to represent the closest NSA to the northwest along the Columbia River. N2, representing a group of riverfront homes on Puget Island, was selected to represent the closest NSAs to the east across the channel on Puget Island. Location N3, near the northern tip of the island but shielded from river-related noise, was selected to be representative of inland sites on Puget Island with lower existing ambient levels, but maximum project related noise. N4, at Elochoman Slough Marina in Cathlamet, Washington, was selected to be representative of a noise-sensitive recreational land use (including picnic areas, boat slips, and RV camping sites). N5, at the Bradley State Scenic Viewpoint, was selected to be the closest recreational NSA to the south of the proposed LNG terminal site. The five identified sites were used for both noise measurements and to predict future noise levels due to proposed LNG terminal construction and operation.

Meteorological conditions during the period available for noise measurements were adequate to obtain sufficient noise measurement data. The noise measurements were sufficient to estimate daytime and nighttime equivalent sound levels (L_{eq}) and day-night noise levels (L_{dn}) for NSAs nearest to the proposed LNG terminal site.

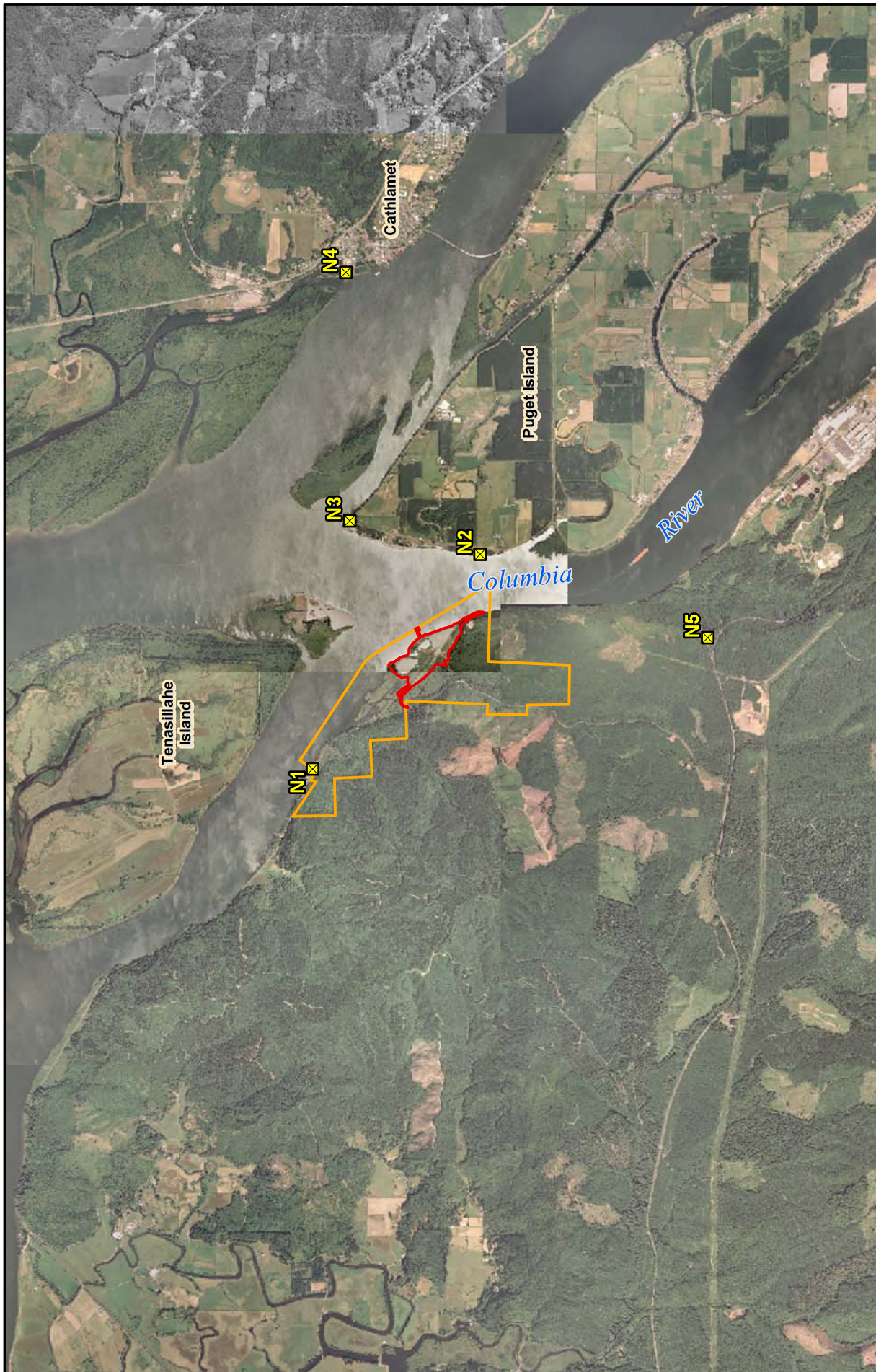
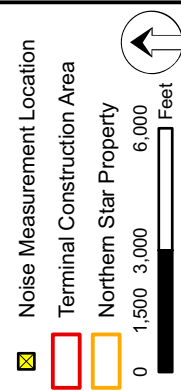


Figure 4.10.2-1
Bradwood Landing Project
 Noise Sensitive Areas / Noise Measurement Locations



Existing audible noise sources were noted during the site visit and noise measurements. In general, the selected noise measurement and analysis sites were representative of typical semi-rural conditions, with a variety of noise sources contributing to the existing ambient noise levels.

The measured daytime and nighttime ambient L_{eq} levels and the calculated L_{dn} levels are summarized in table 4.10.2-2.

TABLE 4.10.2-2			
Background Noise Levels at Property Line and Nearest NSAs			
Monitoring Location	Day L_{eq} (dBA)	Night L_{eq} (dBA)	L_{dn} (dBA)
N1 – Community of Clifton	44	35	44
N2 - Puget Island Across from the LNG Terminal	43	41	48
N3 - North End of Puget Island	44	38	46
N4 - Cathlamet Marina	51	45	53
N5 - Bradley Scenic Viewshed	52	48	55

Construction and Operational Impacts

Potential impacts from the Bradwood Landing LNG terminal could be caused by short-term increases in noise during construction and increases in noise due to operation of the project in the long term. These potential noise increases were compared with the FERC and local noise standards for permissible noise at NSAs.

Construction Noise

Construction activities associated with the proposed LNG terminal could contribute temporary noise in and around the project area over a 36-month construction period. The most prevalent of these multiple sound sources are engine-driven construction equipment. Examples of these are excavators, compactors, front-end loaders, bulldozers, graders, backhoes, trucks, cranes, forklifts, welding machines, electrical generators, dredges, supply vessels, and tugboats.

Heavy equipment (e.g., bulldozers, loaders, and dump trucks) would be the primary noise source during the excavation phase. Noise levels from construction equipment would typically range from 65 to 85 dBA at 50 feet from the source. Estimated noise levels from typical construction equipment are listed in table 4.10.2-3. Noise generated during excavation would be primarily from diesel engine exhaust.

TABLE 4.10.2-3	
Estimated Construction Equipment Noise	
Equipment Type	Noise at 50 feet (dBA)
Heavy Equipment	85
Air Compressors	84
Welders	67
Concrete Truck	71
Miscellaneous Trucks (Pick-ups, etc.)	65
Source: EPA, 1971	

Typical construction activities would occur between 7 AM and 7 PM, 5 days per week. During concentrated periods, construction may include longer hours and additional days of the week to complete

a particular construction phase more efficiently. For example, pile driving would occur between the hours of 7 AM and 10 PM for an estimated 60 days spread over up to a 4-month period. However, NorthernStar has proposed that all noise-producing construction activities would be limited to daytime hours (7 AM to 10 PM), except for dredging activities (due to limits on the time period over which dredging may occur). Dredging would be conducted for up to 24 hours per day for approximately 48 to 72 days near the beginning of the project. Dredging noise is expected to range from 51 to 66 dBA at the nearest NSAs. Due to the nature of the noise from dredging and the length of time, we anticipate significant potential impacts due to noise from dredging activities. To ensure that noise levels at NSAs near the dredging locations sites do not experience significant noise impacts, **we recommend that:**

- **Prior to LNG terminal construction, NorthernStar should file with the Secretary, for review and written approval by the Director of OEP, a finalized dredging noise mitigation plan. This plan should identify all noise mitigation which NorthernStar would implement during dredging to reduce noise at the NSAs. Specifically, during dredging operations NorthernStar should monitor noise and make all reasonable efforts to restrict noise increases from operations to no more than 10 dBA above ambient if the resulting impact is above 55 dBA L_{dn} .**

Some construction activities at the proposed LNG terminal can produce high vibration levels, such as pile driving, sub-grade soil densification, and blasting. However, vibration levels traveling in soil drop off quickly with distance. The ground vibration level for typical pile driving would generally not be perceptible beyond about 500 feet (Hendricks, 2002). Because the closest vibration sensitive areas are approximately 2,500 to 3,000 feet away, construction vibration would be considered imperceptible at all vibration sensitive areas.

Recent technical literature presents a wide variation in underwater source noise levels and acoustical propagation under different conditions. A wide variety of values for impact pile driver noise are given for various driver-type/pile-type combinations. Based on preliminary engineering for the LNG terminal, steel pipe piles with diameters of 48-inch, 54-inch, 84-inch, and 96-inch-diameter steel piles are anticipated to be used for the wharf and mooring or breasting dolphins. Driving 96-inch-diameter steel piles using an impact hammer has been shown to generate peak sound pressure levels of up to 227 dB re: 1 μ Pa at 16 feet (Hastings and Popper, 2005). However, NorthernStar proposes to implement several measures to minimize underwater sound pressure levels, including the use of vibratory pile drivers, bubble curtains, and pile caps between the hammer and piles (see section 4.5.2.1).

Operational Noise

NorthernStar conducted noise attenuation modeling to predict noise levels that would be generated by operation of the LNG terminal. Activities that could generate noise at the proposed LNG terminal during typical operations would include ship mooring and unloading, and the operation of a number of pumps, compressors, SCVs, fans, and blowers. Equipment noise data from manufacturers and previously completed noise surveys associated with similar equipment was used to estimate the operational noise. The operational equipment list and associated noise sound power levels are presented in table 4.10.2-4.

The LNG carrier was modeled as a line source, and the tugboats were modeled as an area source surrounding the LNG carrier. Both were modeled as operating for 210 minutes per day to represent approximately two LNG carriers coming and unloading per week taking approximately 24 hours each for unloading operations.

TABLE 4.10.2-4											
Operational Equipment List											
Name (Model Number)	Measurement Type	Sound Power by Center Octave Frequency (Hz)								Overall dBA	Reference Distance
		63	125	250	500	1,000	2,000	4,000	8,000		
BOG Compressor (2DL250-2S_1) ^a	Sound Power Level	77.9	82.9	86.4	82.4	81.9	79.4	75.4	68.4	86.7	1 m
Ignited Relief Valve ^a	Sound Power Level at Stack Tip	136	130	124	117	109	101	93	84	101	1 m
Unignited Relief Valve ^a	Sound Power Level at Stack Tip	48	44	39	34	31	30	33	39	41.6	1 m
SCV ^b	NA	NA	NA	NA	NA	NA	NA	NA	NA	118	1 m
LNG Booster Pump (30-PBA66801) ^c	Sound Power Level	93	94	96	98	96	95	94	89	102	1 m
Instrument Air Compressor (40-CBE95201) ^c	Sound Power Level	93	99	97	100	95	89	93	79	101	1 m
Tugs ^d	Sound Pressure Level	NA	NA	NA	NA	NA	NA	NA	NA	96.6	5 ft
LNG Carrier ^d	Sound Pressure Level	NA	NA	NA	NA	NA	NA	NA	NA	61.8	400 ft
NA not applicable											
Sources:											
^a Data provided by NorthernStar and/or Whessoe.											
^b DOT, 2004.											
^c Vista del Sol, 2004.											
^d FEED Expansion, 2005.											

The model predicted noise levels at five NSA locations utilizing Scantech Inc.'s Cadna/A software. Modeling results for each of these NSA locations are presented in table 4.10.2-5.

TABLE 4.10.2-5					
Predicted L _{dn} Noise Levels at Nearest NSAs					
NSA	Distance (feet) and Direction to Property Line	Existing Ambient L _{dn} (dBA)	Predicted Facility Contribution (dBA)	Ambient + Facility (dBA)	Predicted Increase in Ambient (dBA)
N1 - Community of Clifton	Directly Adjacent north	44	40.4	45.6	1.6
N2 - Puget Island Across from LNG Terminal	1,000 east	48	50.2	52.2	4.2
N3 - North End of Puget Island	4,224 east	46	47.9	50.1	4.1
N4 - Cathlamet Marina	11,880 east	53	<35	53	0.0
N5 - Bradley Scenic Viewshed	6,067 south	55	<35	55	0.0

The highest predicted facility noise level is 50.2 dBA L_{dn} at NSA location N2, which is below the FERC L_{dn} of 55 dBA. Noise from the LNG terminal may be perceptible during relatively quiet periods.

To minimize the noise impact on nearby NSAs from LNG terminal operations, NorthernStar would incorporate the following noise attenuation measures, as appropriate, to meet the FERC and local requirements:

- noise barriers or enclosures to block sound transmission from operating equipment;
- valves with "low-noise" trims;
- acoustical insulation for aboveground piping; and
- selection of equipment types with the least noise emissions.

Given the predicted slight exceedance of the state noise limit of L_{eq} of 50 dBA (nighttime) and recognizing that actual results may be different from those obtained from modeling, **we recommend that:**

- **NorthernStar should file a noise survey for the LNG terminal with the Secretary no later than 60 days after placing the LNG terminal in service. If the noise attributable to the operation of the LNG terminal exceeds 55 dBA L_{dn} at any nearby NSAs, NorthernStar should file a report on what changes are needed and should install additional noise controls to meet the level within 1 year of the in-service date. NorthernStar should confirm compliance with these requirements by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

4.10.2.3 Pipeline Facilities

Existing Noise Levels

The proposed Bradwood Landing pipeline would primarily cross a rural landscape of forested open space and farmland. However, the Wauna Mill is located between approximate MPs 3.0 to 4.0 and the PGE Beaver Power Plant is situated near the Columbia River crossing at MP 19.0. The only potential NSAs are residences along the route. On the Oregon portion of the corridor, three residences are confirmed within 50 feet of the proposed pipeline construction work area, based on property access (see table 4.7.3-7). There are more rural residences and low-density rural/suburban subdivisions along the Washington portion of the corridor, including six structures within 50 feet of the pipeline construction work area (see table 4.7.3-7).

HDD operations would create noise during construction of the pipeline and pressure reduction valves would create intermittent noise during operation of the pipeline. Existing sound levels for each of the HDD sites and pressure reduction valve sites are presented in tables 4.10.2-6 and 4.10.2-7. In all cases, existing sound levels were estimated. Noise levels were estimated based on low density, rural land use patterns except where major highways are near the nearest NSA. Where highways are nearby, noise levels were estimated based on traffic volumes.

Day ($L_{eq(day)}$) and night ($L_{eq(night)}$) equivalent sound levels for rural areas were estimated from measurements presented in *Community Noise* (EPA, 1971). Day-night average sound levels for areas near highways were calculated using methodology from *Noise Assessment Guidelines* (U.S. Department of Housing and Urban Development (HUD), 1984).

Construction and Operational Impacts

Potential impacts from the Bradwood Landing pipeline could be caused by short-term increases in noise during construction and increases in noise at valve sites due to operation of the project in the long term.

TABLE 4.10.2-6								
Existing Sound Levels for HDD Sites								
Location	Drill No.	Site Type	Work Days	NSA Distance (feet)	NSA Direction	Existing Noise Levels (dBA)		
						L _(day)	L _(night)	L _{dn}
Bradwood Landing LNG Terminal	1	Entry	305	3,100	east	39	32	40.4
		Exit	305	4,000	east	39	32	40.4
Wauna Mill	2	Entry	19	2,300	southeast	NA ^a	NA ^a	58.5
		Exit	19	1,000	south	NA ^a	NA ^a	58.5
Driscoll Slough	3	Entry	32	500	south	39	32	40.4 ^b
		Exit	32	900	west	39	32	40.4 ^b
Westport Slough	4	Entry	40	2,700	east	39	32	40.4
		Exit	40	300	north	39	32	40.4
Woodson Rd. and Drainage Dist. Channel	5	Entry	19	400	north	39	32	40.4
		Exit	19	700	north	39	32	40.4
Midland Canal	6	Entry	19	1,000	northwest	39	32	40.4
		Exit	19	1,800	northeast	39	32	40.4
Clatskanie River	7	Entry	19	30	southwest	39	32	40.4
		Exit	19	1,700	west	39	32	40.4
Columbia River	8	Entry	37	500	north	NA ^a	NA ^a	46.5
		Exit	37	3,500	north	39	32	40.4 ^c
Creek	9	Entry	52	450	south	39	32	40.4
		Exit	23	400	southwest	39	32	40.4
Creek	10	Entry	52	450	south	39	32	40.4
		Exit	29	200	north	39	32	40.4
Germany Creek	11	Entry	12	750	southwest	39	32	40.4
		Exit	12	1,800	east	39	32	40.4
Cowlitz River	12	Entry	23	300	south	NA ^a	NA ^a	65.0
		Exit	23	600	east	39	32	40.4
Interstate Hwy 5	13	Entry	12	100	southeast	NA ^a	NA ^a	71.6
		Exit	12	300	west	NA ^a	NA ^a	40.4
^a L _{dn} based on traffic volumes on nearby highways using HUD (1984) methodology; L _d and L _n are not estimated separately in this method.								
^b Noise levels based on "rural" land use; actual levels may be higher due to proximity to the Wauna Mill northwest of the drill site.								
^c Noise levels based on "rural" land use; actual levels may be higher due to proximity to the nearby tank farm.								

TABLE 4.10.2-7						
Existing Sound Levels for Valve Sites						
Location	Valve No.	NSA Distance (feet)	NSA Direction	L _{eq(day)} (dBA)	L _{eq(night)} (dBA)	L _{dn} (dBA)
Georgia-Pacific Wauna Mill	1	1,000	south	NA	NA	58.5
Northwest Natural	2	400	north	39	32	40.4
PGE Beaver Power Plant	3	3,100	north	39	32	40.4
Williams Northwest Pipeline	4	400	southwest	39	32	40.4

Construction Noise

Construction activities associated with the proposed pipeline could contribute temporary noise in and around the project area. Increases in noise levels during construction of the pipeline would be limited to areas close to the construction activity. The magnitude of the impact would depend on the noise level generated by various equipment types, duration of the construction activity, and distance between the noise source and the receptor. Construction equipment would include miscellaneous trucks, bulldozers, backhoes, and side-boom tractors. Noise levels from construction equipment would typically range from 65 to 85 dBA at 50 feet from the source. At the nearest NSA, which is located about 23 feet from the pipeline centerline, noise levels could range as high as 79 to 99 dBA, assuming a worst-case scenario of equipment passing within 10 feet of the residence.

Impacts due to construction noise would be short term and temporary at any one place because of the assembly line method of pipeline construction. Pipeline construction activity would be limited to daytime hours between 7 AM and 7 PM, which would further minimize noise impacts. However, 24-hour HDD operations may be necessary at some locations depending on conditions. In these instances, measures such as use of “critical” class equipment mufflers or temporary noise barriers would be used to mitigate impacts on nearby residences. Consequently we believe that noise associated with pipeline construction would have minimal impacts on residences along the construction right-of-way.

Estimated noise levels for the entry locations of the HDD operations are presented in table 4.10.2-8. Noise levels at the HDD exit locations would be very similar to normal pipeline construction noise levels.

Noise levels for entry locations were based on actual field measurements at a large diameter pipeline directional drilling operation. As noted in table 4.10.2-8, noise effects were estimated for three different levels of noise control, one with “standard” mufflers, one with “critical” class mufflers (term from Caterpillar), and one with both “critical” class mufflers plus a temporary noise barrier. All of the jurisdictions crossed by the proposed pipeline have exemptions from noise regulations for construction activities.

HDD activities would generate noise impacts on the surrounding area. Each borehole would take from several days to weeks to complete and the drilling equipment would operate 24 hours per day. There is a significant potential for high nighttime noise levels at several HDD locations resulting from these construction activities. As indicated in table 4.10.2-8, without significant mitigation, noise can exceed 55 dBA at NSAs at most of the HDD sites. A noise increase of 3 dBA is rarely noticed, whereas a noise increase of 6 dBA is noticeable and a 10 dBA increase is perceived as a doubling of ambient sound. NorthernStar has prepared an HDD noise mitigation plan identifying the noise mitigation measures to be implemented during HDD activities to reduce noise levels at nearby NSAs. The plan provides for NorthernStar to monitor noise during HDD activities and make all reasonable efforts to restrict noise increases from HDD operations to no more than 10 dBA above ambient noise levels if the resulting impact is above 55 dBA L_{dn} . To ensure that noise levels at NSAs near the HDD sites do not experience significant noise impacts, **we recommend that:**

- **Prior to pipeline construction, NorthernStar should file with the Secretary, for the review and written approval of the Director of OEP, a finalized noise mitigation plan for HDD sites Nos. 3, 5, 7, 8, 9, 10, 11, 12, 13, as identified in table 4.10.2-6 of the final EIS. This plan should identify all noise mitigation that NorthernStar would implement during drilling activity to reduce noise at any nearby NSAs. Specifically, during HDD operations NorthernStar should monitor noise and make all reasonable efforts to restrict noise increases from HDD operations to no more than 10 dBA above ambient if the resulting impact is above 55 dBA L_{dn} .**

TABLE 4.10.2-8

Estimated Sound Levels for HDD Sites

Location	Drill No.	Site Type	Work Days	NSA Distance (feet)	NSA Direction	HDD Noise (dBA)		
						Standard ^a	Critical ^b	Barrier ^c
Bradwood Landing LNG Terminal	1	Entry	305	3,100	East	49.1	37.1	28.6
		Exit	305	4,000	East	NA	NA	NA
Wauna Mill	2	Entry	19	2,300	southeast	52.4	40.4	30.6
		Exit	19	1,000	South	NA	NA	NA
Driscoll Slough	3	Entry	32	500	South	65.8	53.8	42.7
		Exit	32	900	West	NA	NA	NA
Westport Slough	4	Entry	40	2,700	East	53.8	41.8	32.0
		Exit	40	300	North	NA	NA	NA
Woodson Rd. and Drainage Dist. Channel	5	Entry	19	400	North	67.5	55.5	44.2
		Exit	19	700	North	NA	NA	NA
Midland Canal	6	Entry	19	1,000	northwest	60.9	48.9	38.3
		Exit	19	1,800	northeast	NA	NA	NA
Clatskanie River	7	Entry	19	30	southwest	73.9	61.9	49.0
		Exit	19	1,700	West	NA	NA	NA
Columbia River	8	Entry	37	500	North	67.5	55.5	44.2
		Exit	37	3,500	North	NA	NA	NA
Creek	9	Entry	52	450	South	66.6	54.6	43.4
		Exit	23	400	southwest	NA	NA	NA
Creek	10	Entry	52	450	South	66.6	54.6	43.4
		Exit	29	200	North	NA	NA	NA
Germany Creek	11	Entry	12	750	southwest	62.5	50.5	39.8
		Exit	12	1,800	East	NA	NA	NA
Cowlitz River	12	Entry	23	300	South	72.2	60.2	47.9
		Exit	23	600	East	NA	NA	NA
Interstate Hwy 5	13	Entry	12	100	southeast	73.9	61.9	49.0
		Exit	12	300	West	NA	NA	NA
^a	HDD engines fitted with standard mufflers.							
^b	HDD engines fitted with critical mufflers; increases attenuation by approximately 12 dBA.							
^c	HDD engines fitted with critical mufflers and shielded by temporary barriers.							
NA	not applicable							

Operational Noise

Operation of the proposed pipeline would generate noise at only four locations where pressure reduction valves for taps would be located aboveground. A valve supplier has indicated the maximum sound pressure level for the valve type would be approximately 115 dBA at 3 feet from the valve. Because these facilities would operate 24 hours per day, it would be necessary to meet the nighttime standards specified in the applicable noise codes. Table 4.10.2-9 provides a summary of the estimated noise associated with the valves at the nearest NSAs. Noise attenuation would be provided to meet the 55 dBA L_{dn} noise standard.

TABLE 4.10.2-9

Estimated Sound Levels for Valve Sites

Location	Valve No.	NSA Distance (feet)	NSA Direction	Standard (dBA)	7 dB ^a Attenuation (dBA)	15 dB ^a Attenuation (dBA)
Wauna Mill	1	1,000	south	62.5	55.5	47.5
Northwest Natural	2	400	north	71.9	64.9	56.9
PGE Beaver Power Plant	3	3,100	north	48.3	41.3	33.3
Williams Northwest Pipeline	4	400	southwest	71.9	64.9	56.9

^a The manufacturer refers to noise attenuation of 7 dB as "Type 1" attenuation and 15 dB as "Type 2" attenuation.

Based on the preliminary engineering and the noise estimates shown above, the Northwest Natural and Williams Northwest pipeline valves would likely require additional noise control beyond selection of particular valve types. When detailed engineering evaluations are developed, the noise estimates for the NSAs near these two valves will be reevaluated. If necessary, the valves would be provided with enclosures to ensure the noise levels are below applicable standards. NorthernStar has prepared a noise mitigation plan for the Wauna Mill, Northwest Natural, and Williams Northwest pipeline valves to reduce noise at the NSAs to meet 55 dBA L_{dn} . Due to the potential for significant permanent impacts at homes near to these valve sites, **we recommend that:**

- **NorthernStar should file noise surveys with the Secretary no later than 60 days after placing the Wauna Mill, Northwest Natural, PGE Beaver Power Plant, and Williams Northwest pipeline valves into service. If the noise attributable to the operation of the authorized pipeline valves exceeds an L_{dn} of 55 dBA at any nearby NSAs, NorthernStar should file a report on what changes are needed and shall install the additional noise controls to meet the level within 1 year of the in-service date. NorthernStar should confirm compliance with the above requirement by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.**

If NorthernStar verifies that noise impacts have been mitigated, as indicated by the recommendations, we believe that the construction and operation of the Bradwood Landing Project would not result in significant noise impacts on local residents.

4.11 RELIABILITY AND SAFETY

Three federal agencies share in the oversight of the safety and security of LNG import terminals: the FERC, the Coast Guard, and the DOT. The FERC authorizes the siting and construction of LNG import terminals and is the lead federal agency under NEPA to analyze the environmental, safety, security, and cryogenic design of proposed facilities. The Coast Guard has authority over safety of the LNG marine traffic and the marine transfer area. The Coast Guard also has authority over security of the LNG carriers and the entire LNG facility. In conjunction with this, the Coast Guard determines the suitability of waterways for LNG marine traffic by issuing an LOR. The DOT has exclusive authority to promulgate and enforce safety regulations and standards over the onshore LNG facilities beginning at the last valve immediately before the LNG storage tanks.

In February 2004, the three participating agencies entered into an Interagency Agreement to assure that they work in a coordinated manner to address the full range of issues regarding safety and security at LNG import terminals, including the terminal facilities and tanker operations, and to maximize the exchange of information related to the safety and security aspects of the LNG facilities and related marine operations. The FERC closely coordinates its pre-authorization review of the proposal with the Coast Guard and the DOT to ensure a seamless safety and security review.

The operation of the proposed Bradwood Landing LNG terminal poses a potential hazard that could affect the public safety without strict design and operational measures to control potential accidents. The primary concerns are those events that could lead to an LNG spill of sufficient magnitude to create an off-site hazard, including events occurring during the course of LNG carrier transits. However, it is also important to recognize the stringent requirements for the design, construction, operation and maintenance of the facility as well as the extensive safety systems to detect and control potential hazards.

With the exception of the October 20, 1944 fire at the LNG facility in Cleveland, Ohio, the operating history of U.S. LNG facilities has been free of LNG safety-related incidents resulting in adverse effects to the public or the environment. The 1944 Cleveland incident was attributed to the use of materials inadequately suited for cryogenic temperatures and the lack of spill impoundments at the site.²⁵ More recently, an operational accident occurred in 1979 at the Cove Point LNG facility in Lusby, Maryland, when a pump seal failed, resulting in gas vapors entering an electrical conduit and settling in a confined space. When a worker switched off a circuit breaker, the gas ignited, resulting in heavy damage to the building and a worker fatality. Lessons learned from this accident resulted in changing the national fire codes, with the participation of the FERC, to ensure that the situation would not occur again. The proposed facilities would be designed, constructed, and operated in compliance with these codes.

On January 19, 2004, a blast occurred at Sonatrach's Skikda, Algeria LNG liquefaction facility that killed 27 and injured 56 workers. No members of the public were injured. Preliminary findings of the accident investigation suggest that a cold hydrocarbon leak occurred at Liquefaction Train 40 and was introduced to the high-pressure steam boiler by the combustion air fan. An explosion developed inside the boiler firebox which subsequently triggered a larger explosion of the hydrocarbon vapors in the immediate vicinity. The resulting fire damaged the adjacent liquefaction process and liquefied petroleum gas separation equipment of Train 40, and spread to Trains 20 and 30. Although Trains 10, 20, and 30 had been modernized in 1998-1999, Train 40 had been operating with its original equipment since start-up in 1981.

Although there are major differences between the equipment involved in the accident at Skikda and that proposed by NorthernStar (i.e., high-pressure steam boilers that power refrigerant compressors

²⁵ For a description of the incident and the findings of the investigation, see "Report on the Investigation of the Fire at the Liquefaction, Storage, and Regasification Plant of the East Ohio Gas Co., Cleveland, Ohio, October 20, 1944," U.S. Bureau of Mines. February 1946.

would not be used here nor are they used at any LNG facility under the FERC's jurisdiction), the sequence of cascading events identifies potential failure modes that warrant further evaluation. As a result, we have provided a recommendation in section 4.11.2, *Cryogenic Design and Technical Review*, to address this issue.

A discussion of the principal properties and hazards associated with LNG is presented in section 4.11.1. A summary of our preliminary design and technical review of the cryogenic aspects of the LNG terminal is presented in section 4.11.2. Storage and retention systems are discussed in section 4.11.3. An analysis of the thermal radiation and flammable vapor cloud hazards resulting from a credible land-based LNG spill is presented in section 4.11.4, while the safety aspects of LNG transportation by ship is discussed and summarized in section 4.11.5. Emergency response and evacuation planning is discussed in section 4.11.6, and conclusions on marine safety is discussed in section 4.11.7. A discussion on security awareness related to terrorism is presented in section 4.11.8 and the reliability and safety issues related to the natural gas pipeline are discussed in section 4.11.9.

4.11.1 LNG Hazards

LNG's principal hazards result from its cryogenic temperature (-260° F), flammability, and vapor dispersion characteristics. As a liquid, LNG will neither burn nor explode. Although it can cause freeze burns and, depending on the length of exposure, more serious injury or death, its extremely cold state does not present a significant hazard to the public, which rarely, if ever, comes in contact with it as a liquid. As a cryogenic liquid, LNG will quickly cool materials it contacts, causing extreme thermal stress in materials not specifically designed for ultra-cold conditions. Such thermal stresses could subsequently subject the material to brittleness, fracture, or other loss of tensile strength. These hazards, however, are not substantially different from the hazards associated with the storage and transportation of liquid oxygen (-296° F) or several other cryogenic gases that have been routinely produced and transported in the United States.

LNG vaporizes rapidly when exposed to ambient heat sources such as water or soil. When released from its containment vessel and/or transfer system, LNG will generally produce 620 to 630 standard cubic feet of natural gas for each cubic foot of liquid. A large quantity of LNG spilled without ignition would form a vapor cloud that would travel with the prevailing wind until it either dispersed below the flammable limits or encountered an ignition source. If a large quantity of LNG is spilled in the presence of an ignition source, the resulting pool fire would produce high levels of radiant heat in the area surrounding the LNG pool.

A rapid phase transition (RPT) can occur when a portion of LNG spilled onto water changes from liquid to gas, virtually instantaneously. Unlike an explosion that releases energy and combustion products from a chemical reaction, an RPT is the result of heat transferred to the liquid inducing a change to the vapor state. The rapid expansion from the liquid to vapor state can cause locally large overpressures. RPTs have been observed during LNG test spills onto water. In some test cases, the events were strong enough to damage test equipment in the immediate vicinity of the LNG release point. The sizes of the overpressure events have been generally small and are estimated to be equivalent to several pounds of trinitrotoluene (TNT). Although such a small overpressure is not expected to cause significant damage to an LNG vessel, the RPT may increase the rate of LNG pool spreading and the LNG vaporization rate for a spill on water. The Government Accounting Office (GAO) released a report in February 2007 (GAO 2007 [GAO Report]) presenting a survey of experts in areas related to LNG risk, hazards, and consequence modeling. As presented in Appendix III of the GAO Report, the 19 LNG risk and hazard experts unanimously agreed that RPT "would be very unlikely to have a direct effect on the public"

Methane vapors, the primary component of natural gas, are colorless, odorless and tasteless, and are classified as a simple asphyxiant. Methane vapors may cause extreme health hazards, including death, if inhaled in significant quantities within a limited time. Although very cold methane vapors may cause freeze burns, any cloud resulting from an LNG spill would be continuously mixing with the warmer air surrounding the spill site. Dispersion modeling indicates the majority of the cloud would generally be within 25° F of the surrounding atmospheric temperature, with colder temperatures closest to the spill source. In addition, this modeling estimates that most of the cloud would be below concentrations resulting in oxygen deprivation effects, including asphyxiation, with the highest methane concentrations closest to the spill source. Therefore, asphyxiation and freezing normally represent a negligible risk to the public from LNG facilities. Also, as presented in Appendix III of the GAO Report, the 19 LNG risk and hazard experts unanimously agreed that asphyxiation would represent a negligible risk to the public.

Although LNG will not burn, methane vapors in a 5 to 15 percent mixture by volume with air are flammable. Once a flammable vapor-air mixture from an LNG spill has been ignited, the flame front will propagate back to the spill site if the vapor concentration along this path is sufficiently high to support the combustion process. Combustible materials within the flammable portion of the cloud may be within the flame and could be ignited. However, any events leading to a containment failure would most likely be accompanied by a number of ignition sources. The result would be an LNG pool fire, and subsequent radiant heat hazards, rather than the formation of a large unconfined vapor cloud.

Although, LNG is not explosive as it is normally transported and stored, natural gas vapors (primarily methane) can explode if contained within a confined space, such as a building or structure, and ignited. Occasionally, various parties have expressed the energy content of an LNG storage tank, or LNG carrier, in equivalent tons of TNT as an implied measure of explosive potential. However, such a simplistic analogy fails to consider that explosive forces are not just a function of the total energy content but also of the rate of energy release. For a detonation to occur, the rate of energy release must be nearly instantaneous, such as with a TNT charge initiated by a blasting cap. Unlike TNT or other explosives which inherently contain an oxidizer, an unconfined vapor cloud must be mixed with oxygen within the flammability range of the fuel for combustion to occur. For a large unconfined vapor cloud, the flammability range tends to exist at the mixing zone at the edges of the cloud. When ignited, flame speeds about 20 to 25 meters per second (66 to 82 ft/s) and local over pressures up to 0.2 psig have been estimated for unconfined methane-rich vapor clouds, well below the flame speeds and over pressures associated with detonation.

The potential for unconfined LNG vapor cloud detonations was investigated by the Coast Guard in the late 1970s at the Naval Weapons Center at China Lake, California. These experiments, as well as other subsequent tests, are mentioned in Appendix C of the Sandia Report. Using methane, the primary component of natural gas, several experiments were conducted to determine if unconfined vapor clouds would detonate. The tests indicated unconfined methane-air mixtures could be ignited, but no test produced unconfined detonation. There is no evidence suggesting that methane-air mixtures will detonate in unconfined open areas.

Further tests were conducted in the late 1970s to examine the level of sensitivity of an unconfined cloud to the presence of heavier hydrocarbons such as ethane and propane. As stated in section 5 of Appendix C of the Sandia Report, detonation sensitivity is affected by the level of refinement of natural gas stored as LNG. The series of tests on ambient-temperature fuel mixtures of methane-ethane and methane-propane indicated that the addition of heavier hydrocarbons influenced the tendency of an unconfined vapor cloud to detonate. Less processed product with greater amounts of heavier hydrocarbons is more sensitive to detonation. During these experiments, all successful detonations were initiated with an explosive charge in well-mixed vapor clouds at correct stoichiometric proportions. These are not representative of conditions which would be expected during a large-scale LNG spill. The

precise timing, necessary mixing, and required amount of initiating explosives render the possibility for detonation of a large unconfined vapor cloud as unrealistic. Detonation of an unconfined natural gas cloud is extremely difficult to achieve and is generally considered by scientists and researchers to be very unlikely to occur during an LNG spill.

Consequently, the primary hazards to the public from an LNG spill either on land or water would be from dispersion of the flammable vapors or from radiant heat generated by a pool fire.

4.11.2 Cryogenic Design and Technical Review

As part of its application and in response to the FERC staff's data requests, NorthernStar provided a front-end engineering design (FEED) for the proposed project. The FEED and technical review emphasizes the engineering design and safety concepts as well as the projected operational reliability of the proposed facilities. The principle areas of coverage include: materials in cryogenic environments; insulation systems; cryogenic safety; thermodynamics; heat transfer; instrumentation; cryogenic processes; and other relevant safety systems.

Study and evaluation of information for the proposed design and installation of the Bradwood Landing LNG terminal have been performed by the FERC staff. The FEED and specifications submitted for the proposed facilities to date are considered to be preliminary but would be the basis for any detailed design to follow. Although preliminary, this filed information provides an adequate basis to evaluate the safety and reliability of the proposed project. A significant amount of the design involving final selection of equipment manufacturers, process conditions, and resolution of some safety related issues would be completed in the next phase of the project development if authorization is granted by the Commission. This information would need to be filed with the FERC staff for review and approval.

As a result of the technical review of the information provided by NorthernStar in the submittal documents, a number of concerns were identified by the FERC staff relating to the reliability, operability, and safety of the proposed design. In response to the staff's questions, NorthernStar provided written responses prior to the technical conference held on September 13, 2006, and in a subsequent submittal on October 25, 2006, with revised FEED information. After review of the revised information, the FERC staff notes several areas of concern that require additional consideration and/or action on behalf of the company. Follow up on those items requiring additional action should be documented in reports to be filed with the FERC. As a result, **we recommend that:**

The following measures should apply to NorthernStar LNG Terminal design and construction details. Information pertaining to these specific recommendations should be filed with the Secretary for review and approval by the Director of OEP either: prior to initial site preparation; prior to construction of final design; prior to commissioning; or prior to commencement of service as indicated by each specific condition. Specific engineering, vulnerability, or detailed design information meeting the criteria specified in Order No. 683 (Docket No. RM06-24-000), including security information, should be submitted as critical energy infrastructure information (CEII) pursuant to 18 CFR 388.112. See *Critical Energy Infrastructure Information*, Order No. 683, 71 Fed. Reg. 58,273 (October 3, 2006). FERC Stats. & Regs. ¶ 31,228 (2006). Information pertaining to items such as: offsite emergency response; procedures for public notification and evacuation; and construction and operating reporting requirements would be subject to public disclosure. This information should be submitted a minimum of 30 days before approval to proceed is required.

- **Complete plan drawings and a list of the hazard detection equipment should be filed prior to initial site preparation. The list should include the instrument tag number,**

type and location, alarm locations, and shutdown functions of the proposed hazard detection equipment. Plan drawings should clearly show the location of all detection equipment.

- NorthernStar should provide a technical review of its proposed facility design that:
 - a. identifies all combustion/ventilation air intake equipment and the distances to any possible hydrocarbon release (LNG, flammable refrigerants, flammable liquids and flammable gases); and
 - b. demonstrates that these areas are adequately covered by hazard detection devices and indicate how these devices would isolate or shutdown any combustion equipment whose continued operation could add to or sustain an emergency.

NorthernStar should file this review prior to initial site preparation.

- Complete plan drawings and a list of the fixed and wheeled dry-chemical, fire extinguishing, and other hazard control equipment should be filed prior to initial site preparation. The list should include the equipment tag number, type, size, equipment covered, and automatic and manual remote signals initiating discharge of the units. Plan drawings should clearly show the planned location of all fixed and wheeled extinguishers.
- Facility plans showing the proposed location of, and area covered by, each monitor, hydrant, deluge system, hose, and sprinkler, as well as piping and instrumentation diagrams, of the firewater system should be filed prior to initial site preparation.
- A copy of the hazard design review and list of recommendations that are to be incorporated in the final facility design should be filed prior to initial site preparation.
- The final design of the fixed and wheeled dry-chemical, fire extinguishing hazard control equipment should identify manufacturer and model.
- The final design should include an updated fire protection evaluation carried out in accordance with the requirements of NFPA 59A, 2001 edition, chapter 9.1.2.
- The final design should include a minimum of eight permanent bench marks located equally spaced around the top of the concrete base slab for each LNG tank.
- The final design should include a discretionary vent valve for each LNG tank, operable through the distributed control system.
- The final design should include a shutoff valve at the suction and discharge of each high pressure LNG pump.
- The final design should specify that dual temperature elements and transmitters are provided for low temperature alarm and shutdown at the discharge of each vaporizer.

- The **final design** should include a check valve between the LNG vaporizer discharge shutoff valve and the discharge manual isolation valve.
- The **final design** should include a pilot relief valve or operated vent valve sized for thermal relief at the discharge of the vaporizer.
- The **final design** should include provisions for the future installation of LNG pumps for the vapor return KO drum and the boil-off compressor suction drum.
- The **final design** should specify that for LNG and natural gas service, branch piping and piping nipples less than 2 inches are to be no less than schedule 160.
- The **final design** should specify that spiral wound gaskets for LNG, natural gas service, or other hydrocarbon fluid service are to be equipped with inner and outer stainless steel retaining rings.
- The **final design** should specify that piping and equipment that may be cooled with liquid nitrogen are to be designed for liquid nitrogen temperatures, with regard to allowable movement and stresses.
- The **final design** should specify that the wharf area switchboards are connected to the backup generator.
- The **final design** should include details of the shutdown logic, including cause and effect matrices for alarms and shutdowns.
- The **final design** should include emergency shutdown of equipment and systems activated by hazard detection devices for flammable gas, fire, and cryogenic spills, when applicable.
- The **final design** should include details of the air gaps to be installed downstream of all seals or isolations installed at the interface between a flammable fluid system and an electrical conduit or wiring system. Each air gap should vent to a safe location and be equipped with a leak detection device that: should continuously monitor for the presence of a flammable fluid; should alarm the hazardous condition; and should shut down the appropriate systems.
- The **final design** should include a hazard and operability review of the completed design. A copy of the review and a list of the recommendations should be filed with the Secretary.
- The **final design** should provide up-to-date Piping & Instrument Diagrams (P&IDs) including a description of the instrumentation and control philosophy, type of instrumentation (pneumatic, electronic), use of computer technology, and control room display and operation. Drawings and all information should be clearly legible on 11- by 17-inch paper and the piping legend and symbology should be in accordance with accepted practice. All drawings should be filed in black and white. The following information should be included on the P&IDs:
 - a. equipment tag number, name, size, duty, capacity and design conditions;

- b. piping with line number, piping class specification, size and insulation;
 - c. LNG tank pipe penetration size or nozzle schedule;
 - d. piping specification breaks and insulation limits;
 - e. isolation flanges, blinds and insulating flanges;
 - f. valve type, in accordance with the piping legend symbol;
 - g. all control valves numbered;
 - h. all valve operator types and valve fail position;
 - i. instrumentation numbered;
 - j. control loops including software connections;
 - k. alarm and shutdown set points;
 - l. shutdown interlocks;
 - m. relief valves numbered, with set point;
 - n. relief valve inlet and outlet piping size;
 - o. car sealed valves and blinds;
 - p. equipment insulation;
 - q. drawing revision number and date;
 - r. all manual valves numbered, including check, vent, drain, and car sealed valves; and
 - s. alarm and shutdown set points.
- The final design should specify that all hazard detection equipment should include redundancy, fault detection, and fault alarm monitoring.
 - All valves including drain, vent, main, and car sealed valves should be tagged in the field during construction and prior to commissioning.
 - The design details and procedures to record and to prevent the tank fill rate from exceeding the maximum fill rate specified by the tank designer should be filed prior to commissioning.
 - A tabulated list of the proposed hand-held fire extinguishers should be filed prior to commissioning. The information should include a list with the equipment number, type, size, number, and location. Plan drawings should include the type, size, and number of all hand-held fire extinguishers.
 - Operation and Maintenance procedures and manuals, as well as safety procedure manuals, should be filed prior to commissioning.
 - The FERC staff should be notified of any proposed revisions to the security plan and physical security of the facility prior to commencement of service.

- Progress on construction of the LNG terminal should be reported in monthly reports filed with the Secretary. Details should include a summary of activities, projected schedule for completion, problems encountered and remedial actions taken. Problems of significant magnitude should be reported to the FERC within 24 hours.

In addition, the following measures should apply throughout the life of the facility:

- The facility should be subject to regular FERC staff technical reviews and site inspections on at least an annual basis or more frequently as circumstances indicate. Prior to each FERC staff technical review and site inspection, NorthernStar should respond to a specific data request including information relating to possible design and operating conditions that may have been imposed by other agencies or organizations. Up-to-date detailed piping and instrumentation diagrams reflecting facility modifications and provision of other pertinent information not included in the semi-annual reports described below, including facility events that have taken place since the previously submitted semi-annual report, should be submitted.
- Semi-annual operational reports should be filed with the Secretary to identify changes in facility design and operating conditions, abnormal operating experiences, activities (including ship arrivals, quantity and composition of imported LNG, vaporization quantities, boil-off/flash gas, etc.), plant modifications including future plans and progress thereof. Abnormalities should include, but not be limited to: unloading/shipping problems, potential hazardous conditions from off-site vessels, storage tank stratification or rollover, geysering, storage tank pressure excursions, cold spots on the storage tanks, storage tank vibrations and/or vibrations in associated cryogenic piping, storage tank settlement, significant equipment or instrumentation malfunctions or failures, non-scheduled maintenance or repair (and reasons therefore), relative movement of storage tank inner vessels, vapor or liquid releases, fires involving natural gas and/or from other sources, negative pressure (vacuum) within a storage tank and higher than predicted boiloff rates. Adverse weather conditions and the effect on the facility also should be reported. Reports should be submitted within 45 days after each period ending June 30 and December 31. In addition to the above items, a section entitled "Significant plant modifications proposed for the next 12 months (dates)" also should be included in the semi-annual operational reports. Such information would provide the FERC staff with early notice of anticipated future construction/maintenance projects at the LNG facility.
- In the event the temperature of any region of any secondary containment becomes less than the minimum specified operating temperature for the material, the Commission should be notified within 24 hours and procedures for corrective action should be specified.
- Significant non-scheduled events, including safety-related incidents (i.e., LNG or natural gas releases, fires, explosions, mechanical failures, unusual over pressurization, and major injuries) and security related incidents (i.e., attempts to enter site, suspicious activities) should be reported to the FERC staff. In the event an abnormality is of significant magnitude to threaten public or employee safety, cause significant property damage, or interrupt service, notification shall be made immediately, without unduly interfering with any necessary or appropriate

emergency repair, alarm, or other emergency procedure. In all instances, notification should be made to the Commission staff within 24 hours. This notification practice should be incorporated into the LNG facility's emergency plan. Examples of reportable LNG-related incidents include:

- a. fire;
- b. explosion;
- c. estimated property damage of \$50,000 or more;
- d. death or personal injury necessitating in-patient hospitalization;
- e. free flow of LNG that results in pooling;
- f. unintended movement or abnormal loading by environmental causes, such as an earthquake, landslide, or flood, that impairs the serviceability, structural integrity, or reliability of an LNG facility that contains, controls, or processes gas or LNG;
- g. any crack or other material defect that impairs the structural integrity or reliability of an LNG facility that contains, controls, or processes gas or LNG;
- h. any malfunction or operating error that causes the pressure of a pipeline or LNG facility that contains or processes gas or LNG to rise above its maximum allowable operating pressure (or working pressure for LNG facilities) plus the build-up allowed for operation of pressure limiting or control devices;
- i. a leak in an LNG facility that contains or processes gas or LNG that constitutes an emergency;
- j. inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of an LNG storage tank;
- k. any condition that could lead to a hazard and cause a 20 percent reduction in operating pressure or shutdown of operation of a pipeline or an LNG facility;
- l. safety-related incidents to LNG vessels occurring at or en route to and from the LNG facility; or
- m. an event that is significant in the judgment of the operator and/or management even though it did not meet the above criteria or the guidelines set forth in an LNG facility's incident management plan.

In the event of an incident, the Director of OEP has delegated authority to take whatever steps are necessary to ensure operational reliability and to protect human life, health, property or the environment, including authority to direct the LNG facility to cease operations. Following the initial company notification, the Commission staff would determine the need for an on-site inspection by the Commission staff, and the timing of an initial incident report (normally within 10 days) and follow-up reports.

4.11.3 Storage and Retention Systems

LNG storage tanks come in a variety of categories. The following are descriptions of the tank designs most commonly used worldwide:

- single containment cylindrical metal tanks (predominantly used in the United States);
- spherical storage tanks (predominantly used in LNG carriers);
- double containment cylindrical metal inner tank and metal or concrete outer tank (commonly thought of as an LNG tank with a high wall dike);
- full containment cylindrical metal inner tank and metal or concrete outer tank (several authorized by the Commission; several applications currently proposed to the Commission, including this project);
- pre-stressed cylindrical concrete tank with an internal metal membrane (membrane tank) (none in the United States); and
- cryogenic cylindrical concrete tank, internal cryogenic tank, and pre-stressed concrete outer tank (one operational in the United States; the remainder worldwide).

These tank categories are described in Annex H of the European Standard for LNG facilities (EN 1473) and are summarized below for the LNG storage tanks commonly found in proposals before the Commission.

H.1 Single containment tank

A single primary container and generally an outer shell designed and constructed so that only the primary container is required to meet the low temperature ductility requirements for storage of the product.

The outer shell (if any) of a single containment storage tank is primarily for the retention and protection of insulation and to contain the purge gas pressure, but is not designed to contain refrigerated liquid in the event of leakage from the primary container.

An aboveground single containment tank should be surrounded by a bund (dike) wall to contain any leakage. Examples of single containment are depicted on figure H.1.

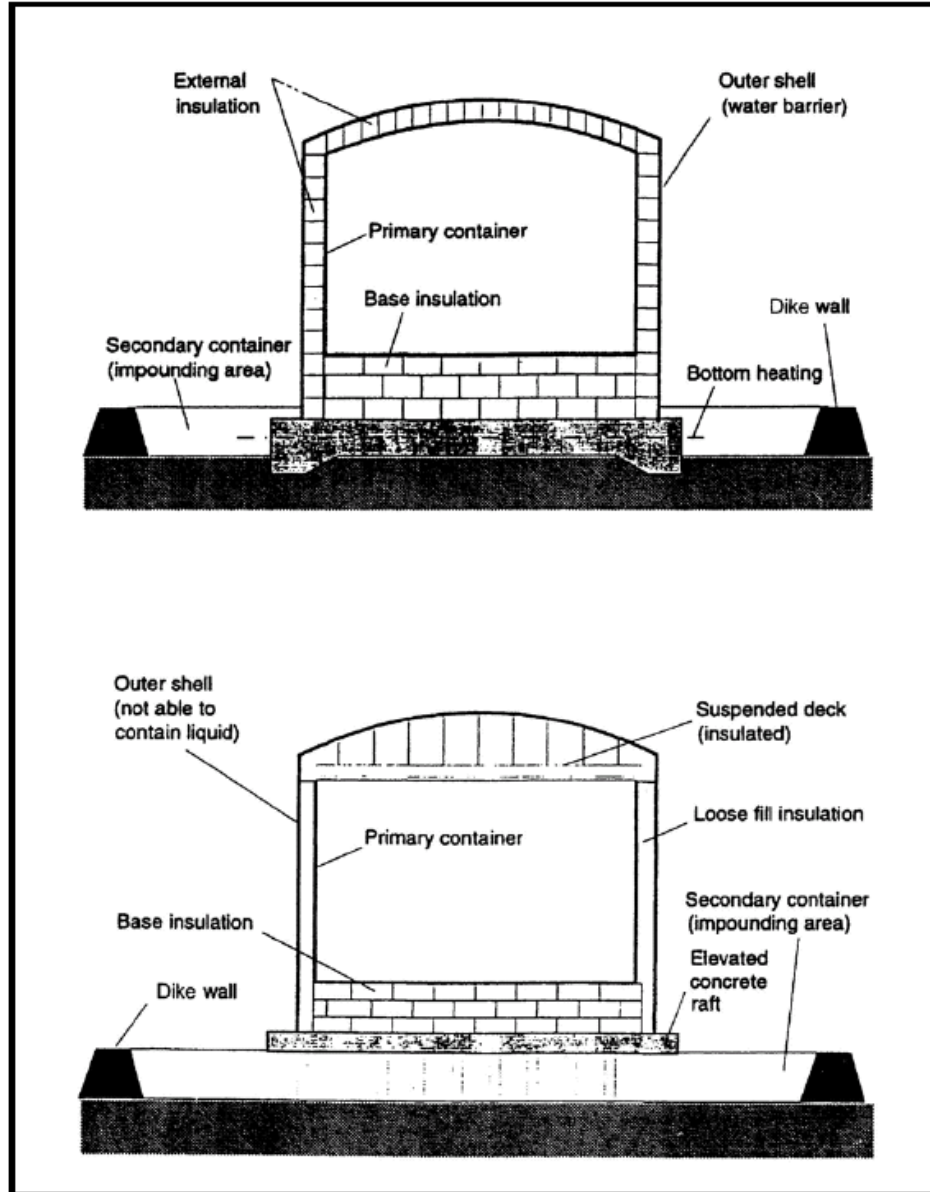


Figure H.1
Examples of Single Containment Tanks

H.3 Double containment tank

A double containment tank is designed and constructed so that both the inner self-supporting primary container and the secondary container are capable of independently containing the refrigerated liquid stored. To minimize the pool of escaping liquid, the secondary container should be located at a distance not exceeding 6 meters from the primary container.

The primary container contains the refrigerated liquid under normal operating conditions. The secondary container is intended to contain any leakage of the refrigerated liquid, but it is not intended to contain any vapor resulting from this leakage.

Examples of double containment tanks are shown on figure H.3. Figure H.3 does not imply that the secondary container is necessarily as high as the primary container.

H.4 Full containment tank

A full containment tank is designed and constructed so that both the self supporting primary container and the secondary container are capable of independently containing the refrigerated liquid stored and one of them can contain its vapor. The secondary container can be 3 to 6 feet (1 to 2 meters) in distance from the primary container.

The primary container contains the refrigerated liquid under normal operating conditions. The outer roof is supported by the secondary container. The secondary container should be capable both of containing the refrigerated liquid and of controlled venting of the vapor resulting from product leakage after a credible event. Examples of full containment tanks are given on figure H.4.

Single-, double-, and full-containment LNG storage tanks have been authorized by the FERC for use at new LNG import facilities or expansions of existing terminals. To date, only single- and double-containment tanks have been constructed and operated. Several full-containment tanks have started construction in the United States, while approximately 50 have been constructed worldwide. During the review of earlier proposals, a number of issues surfaced concerning the applicability of existing codes and regulations for full-containment tanks. Specifically, the term “full containment” does not appear in the Federal Safety Standards in 49 CFR 193. As a result, some project proponents have made the assumption that to design and construct a full-containment tank in accordance with EN 1473 will satisfy the U.S. codes and standards.

For example, it has been suggested that thermal exclusion zones are not required for a full-containment tank because EN 1473 does not consider a tank fire scenario for full-containment tanks with a pre-stressed concrete wall and concrete roof. The staffs of the FERC and the DOT do not agree because Part 193 does not exclude full-containment tanks from thermal exclusion zone requirements. As a result, a thermal exclusion zone analysis is required for an LNG storage tank fire at the top of the secondary container (see section 4.11.4 *Siting Requirements-Thermal and Dispersion Exclusion Zones*).

Further, EN 1473 does not specify a minimum distance to the property line for full-containment tanks because no tank fire scenario is considered. However, NFPA 59A, 2001 edition, requires a separation of 0.7 times the tank diameter from the property line. NorthernStar’s proposed tank separation distance to the property line meets this separation requirement.

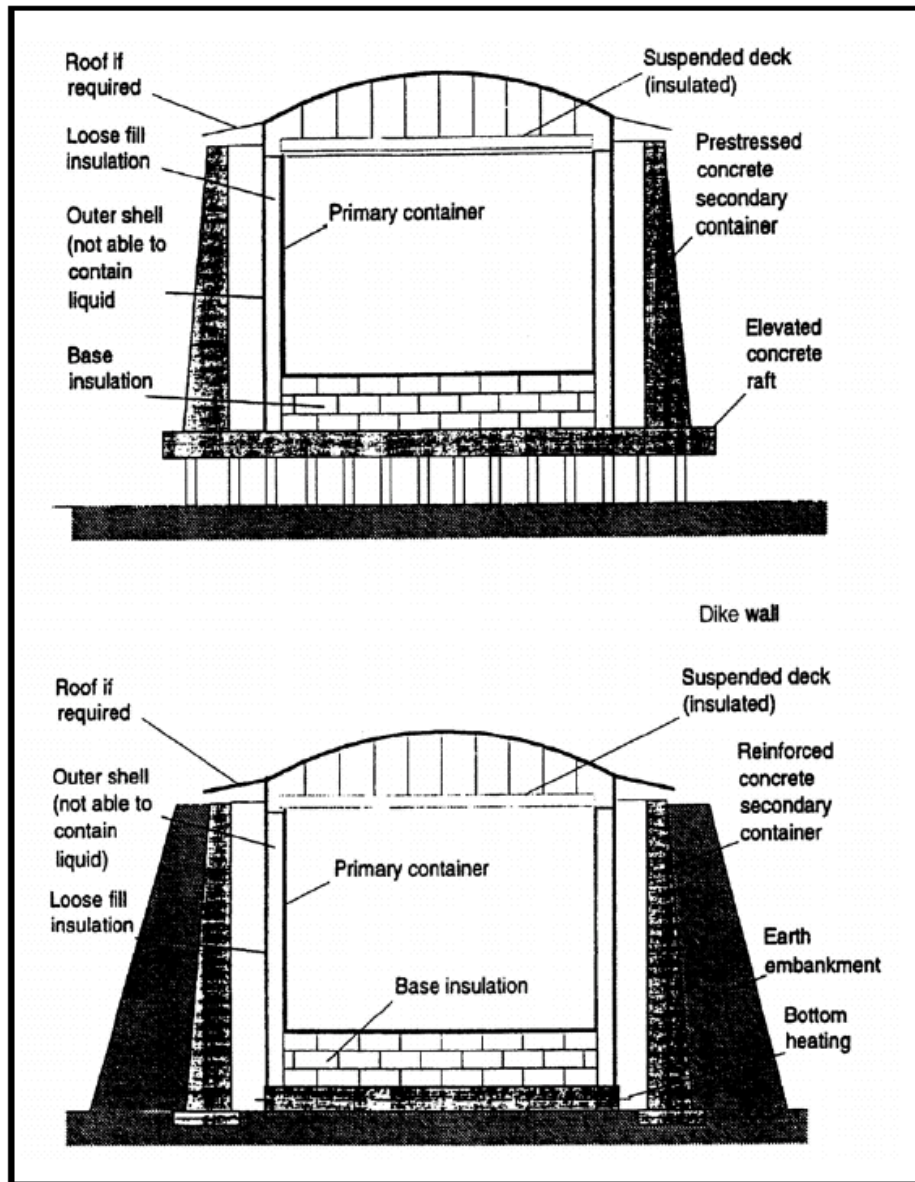


Figure H.3
Examples of Double Containment Tanks

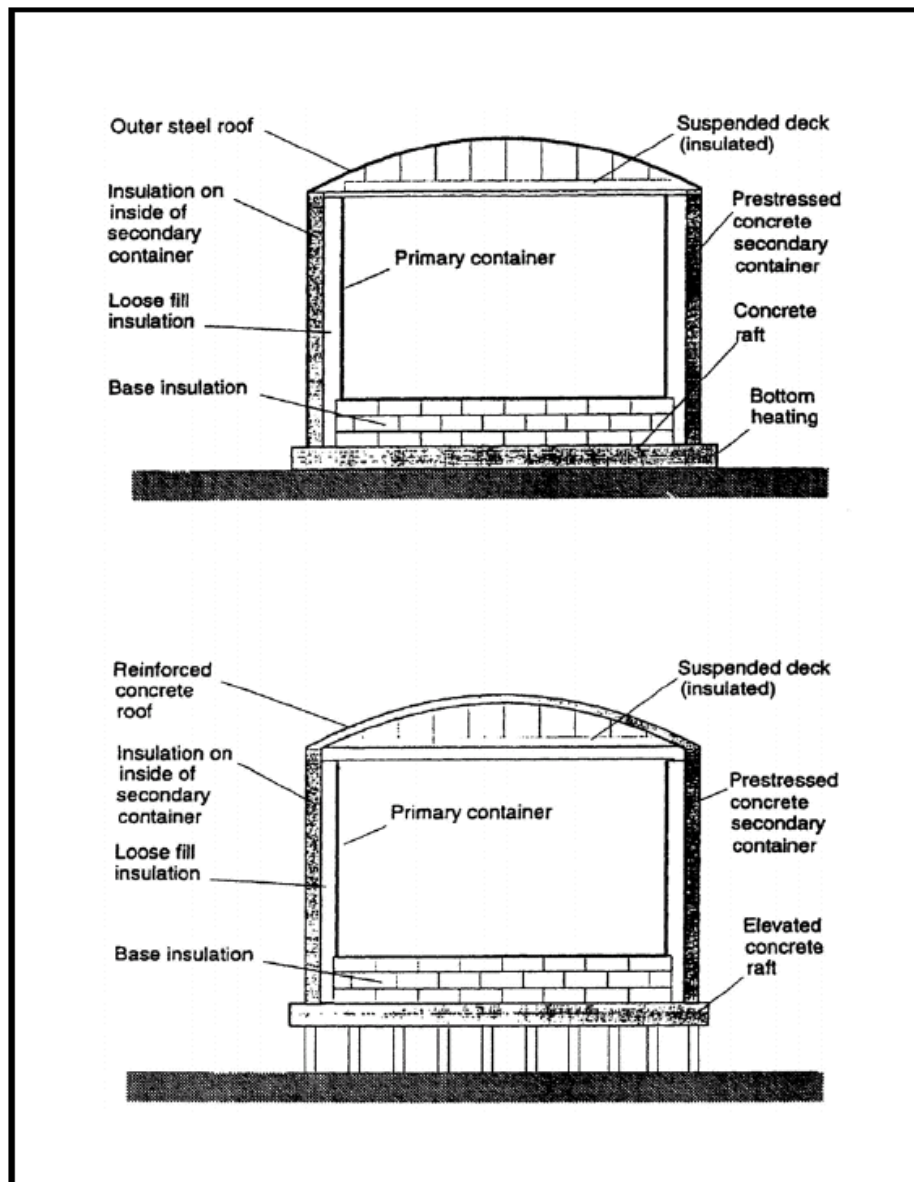


Figure H.4
Examples of Full Containment Tanks

Another issue regarding the full-containment design is that the tank outer wall (secondary containment) serves as the impoundment, a concept allowed under Parts 193.2161 and 193.2167, and under the “exception” on figure 2.2.2.6 of NFPA 59A, 2001 edition. A specific concern is the dual function of the concrete secondary container - it serves both the operational function of holding the insulation and gas pressure, and a safety function of containing liquid in the event of an inner tank failure. Conversely, in single- and double-containment tanks, independent systems provide operational and safety functions. While recognition must be given to the benefits of a concrete secondary container with respect to external events, such as projectiles or small aircraft, its ability to provide the dual functions while retaining its integrity has not been convincingly supported for all scenarios. This becomes increasingly important as proposed site acreage is reduced and buffer zones between adjacent properties are minimized. As such, the FERC staff considers it prudent design practice to provide some form of barrier to prevent liquid from flowing to an unintended area (i.e., outside the plant property) in the event that the storage tank primary and secondary containers fail.

Concerns have also been expressed that the barrier could be considered a containment and prohibit certain equipment being located within the barrier and/or may conflict with other parts of the various codes with respect to hazardous and electrical code classifications. Other concerns are that the barrier could be considered an impounding area that would require new thermal and vapor cloud calculations. The purpose of the barrier is to prevent liquid from flowing off the plant property, and it is not the intent to define a containment or impounding area for thermal radiation or flammable vapor exclusion zone calculations or other code requirements.

NorthernStar proposes to install a tertiary earthen berm around the LNG facility. The structure would be constructed to an elevation of 5 feet above the finished grade level and would enclose the area around the tanks and the process area. The structure's volumetric capacity would contain a single LNG tank's maximum liquid capacity. This berm would confine LNG on the project site in the event of any hypothetical catastrophic event.

4.11.4 Siting Requirements – Thermal and Dispersion Exclusion Zones

Regulatory Requirements

The LNG facilities proposed in this project must comply with the siting requirements of 49 CFR 193, Subpart B. On March 30, 2000, the DOT revised 49 CFR 193 to incorporate the 1996 edition of NFPA 59A into the LNG regulations. On April 9, 2004, the DOT further revised 49 CFR 193 to incorporate the 2001 edition of NFPA 59A. The following sections specifically address siting requirements:

- **Part 193.2001, Scope of part**, excludes any matter other than siting provisions pertaining to marine cargo transfer systems between the marine vessel and the last manifold or valve immediately before a storage tank.
- **Part 193.2051, Scope**, states that each LNG facility designed, replaced, relocated or significantly altered after March 31, 2000, must be provided with siting requirements in accordance with subpart B and NFPA 59A, 2001 edition. In the event of a conflict with NFPA 59A, then Part 193 prevails.
- **Part 193.2057, Thermal radiation protection**, requires that each LNG container and LNG transfer system have thermal exclusion zones based on three radiation flux levels in accordance with section 2.2.3.2 of NFPA 59A, 2001 edition.

- **Part 193.2059, Flammable vapor-gas dispersion protection**, requires that each LNG container and LNG transfer system have a dispersion exclusion zone in accordance with sections 2.2.3.3 and 2.2.3.4 of NFPA 59A, 2001 edition.
- **Part 193.2155(b), Structural requirements**, requires that an LNG storage tank must be at least 1 mile from the ends of an airport runway and 0.25 mile from the nearest point on a runway.

For the following LNG facilities that are proposed in this project, we have identified the applicable siting requirements from Part 193 and NFPA 59A, 2001 edition:

- Two 1,006,000-barrel (160,000 m³) full containment LNG storage tanks - Parts 193.2057 and 2059 require the establishment of thermal and flammable vapor exclusion zones for LNG tanks. NFPA 59A, 2001 edition, section 2.2.3.2 specifies four thermal exclusion zones based on the design spill and the impounding area. NFPA 59A, 2001 edition, sections 2.2.3.3 and 2.2.3.4 specify a flammable vapor exclusion zone for the design spill which is determined with section 2.2.3.5.
- One LNG carrier unloading berth and a marine cargo transfer system consisting of a total of four marine unloading arms, three 16-inch-diameter liquid transfer arms, and one 16-inch-diameter vapor return arm. A 32-inch-diameter transfer line would carry the LNG to the onshore storage tanks - Parts 193.2001, 2057, and 2059 require thermal and flammable vapor exclusion zones for the transfer system. NFPA 59A, 2001 edition, does not address LNG transfer systems.
- Six 2,353 gpm in-tank pumps (three per tank with a spare pump tube); and five 2,398 gpm sendout pumps - Parts 193.2057 and 2059 require thermal and flammable vapor exclusion zones. NFPA 59A, 2001 edition, section 2.2.3.2 specifies the thermal exclusion zone and section 2.2.3.3 and 2.2.3.4 specify the flammable vapor exclusion zone based on the design spill in a process area.
- Seven SCVs - Same requirements as for LNG pumps.

The incorporation of the NFPA 59A requirements into Part 193 has resulted in some confusion and possible misinterpretation in applying the siting requirements. Parts 193.2057 and 2059 require exclusion zones for LNG transfer systems, which are defined to include transfer piping. However, NFPA 59A only requires exclusion zones for “transfer areas” which are defined as the part of the plant where liquids are introduced or removed from the facility such as truck loading or ship unloading areas. The definition of transfer area in NFPA 59A specifically excludes permanent plant piping such as cargo transfer lines. Additionally, NFPA 59A section 2.2.3.1 specifically excludes transfer area at the water edge of marine terminals. When the DOT originally incorporated NFPA 59A into its regulations, it removed the requirement for impounding systems around transfer piping (old Part 193.2149). In the preamble to the final rule, the DOT determined that the most likely sources of leaks within an LNG plant are LNG storage tanks, cargo transfer areas, and vaporizers and process equipment, which are all addressed in NFPA 59A section 2.2.1.2. The result is that while Part 193 retains exclusion zones for LNG transfer systems, neither Part 193 nor NFPA 59A requires the impoundment from which to base the calculations. We do not believe that this was the intent, nor do we believe that omitting containment for transfer piping is a sound engineering practice. The FERC staff will continue to require containment for all LNG transfer piping within a plant site.

The incorporation of NFPA 59A also changed the way in which design spills and impoundment capacities may be determined. Under section 2.2.2.2, the capacity of impounding areas for vaporization, process, or LNG transfer areas must equal the greatest volume during a 10-minute period from any single accidental leakage source or during a shorter time period based upon demonstrable surveillance and shutdown provisions acceptable to the authority having jurisdiction. Similar criteria appear in section 2.2.3.5 for determining the design spill used in thermal and flammable vapor exclusion zone calculations. Prior to the incorporation of NFPA 59A the design spill in Part 193 assumed the rupture of a single transfer pipe with the greatest overall flow capacity, for not less than 10 minutes (old Part 193.2059(d)). As a result, the spill rate for vaporization, process, or LNG transfer areas may be assumed to be a "leakage source" rather than a full pipe rupture; however, the spill duration must be 10 minutes unless the authority having jurisdiction (i.e., DOT's PHMSA), determines that a shorter time is acceptable. Again, given the confusion in applying the two requirements, the FERC staff will continue to utilize the 10-minute spill criterion at the maximum flow possible for containment sizing. This will ensure that impoundments are sized for a catastrophic failure, while recognizing that less conservative spill scenarios may be appropriate to calculate exclusion zones. In giving recognition to the integrity of all-welded transfer piping, the determination of the single accidental leakage source should be based on an evaluation of all small diameter attachments to the transfer piping for instrumentation, pressure relief, recirculation, etc., and any flanges that may be used at valves or other equipment, in order to determine the largest spill rate. This approach is the result of discussion with DOT's PHMSA concerning the basis for design spills and application to exclusion zone determinations for proposals before the Commission.

Impoundment Systems and Design Spills

NorthernStar proposes two full-containment LNG storage tanks in which the outer tank wall serves as the impoundment system. The outer tank would have an impounding volumetric capacity of 50,562,155 gallons, which exceeds the 110 percent requirement by 1,121,891 gallons when accounting for the volume of perlite in the annular space.

The tank and vaporizer area would include the LNG tanks, a portion of the unloading line and recirculation line and the sendout area. An impoundment basin would be located in the tank area and spills from the tank, vaporizer, and unloading line would be routed to the impoundment basin by a series of collection troughs. The largest potential LNG spill volume would be from the unloading line during an unloading operation. A spill from this line over a 10-minute period would result in a spill volume of 529,091 gallons at the maximum unloading rate of 52,834 gpm (12,000 cubic meters per hour (m^3/hr)) accounting for LNG in the piping. This volume was used in the sizing of the tank area impoundment basin. The basin dimensions were designed to be 60 feet by 60 feet by 20 feet which gives an available sump capacity of 538,632 gallons. This spill would be completely contained by the impoundment located in the tank area.

The jetty area would include the larger portion of the unloading and recirculation lines. An impoundment basin would be located in the onshore side of the unloading lines, and spills from the unloading line would be routed to the impoundment basin by a series of collection troughs. The largest potential LNG spill volume would be from the unloading line during an unloading operation. A spill from this line over a 10-minute period would result in a spill volume of 529,091 gallons at the maximum unloading rate of 52,834 gpm (12,000 m^3/hr). This volume was used in the sizing of the jetty area impoundment basin. The basin dimensions were designed to be 60 feet by 60 feet by 20 feet which gives an available sump capacity of 538,632 gallons. This spill would be completely contained by the impoundment located in the jetty area.

Although both the tank area and jetty area sump capacities would be acceptable to contain the spill, the FERC staff has concerns as to whether the collection troughs feeding the sumps, which range from 4-feet wide to 7-feet wide by 1-foot 8-inches high, are adequately sized to handle such a spill.

NorthernStar filed comments on the draft EIS stating that it disagreed that this spill would be the proper design basis for sizing its troughs. NorthernStar attached correspondence between the FERC and DOT which provided clarification on appropriate sizing and design spills.²⁶ NorthernStar incorrectly continues to use the criteria for a “design spill” as a “sizing spill.” As stated in the third paragraph of the FERC’s April 19, 2005 letter, “FERC staff presently uses the greatest overall flow volume for sizing impoundments.” The greatest overall flow volume used for sizing impoundments, and the associated troughs, would be the unloading line rate. As stated above and also in the draft EIS, “the FERC staff will continue to utilize the 10-minute spill criterion at the maximum flow possible for containment sizing.” As a result, **we recommend that:**

- **Prior to initial site preparation, NorthernStar should file with the Secretary for review and written approval by the Director of OEP calculations or a re-designed configuration showing how the troughs feeding the impoundment sumps would adequately handle a spill from the unloading line at the maximum unloading line rate.**

The calculation of thermal and flammable vapor exclusion zones for the proposed LNG facility are based on the dimensions of the proposed spill containment systems and the design spills according to 49 CFR 193 and NFPA 59A, 2001 edition. In accordance with section 2.2.3.5 of NFPA 59A, 2001 edition, the design spill for an LNG storage tank with no penetrations below the liquid level is defined as the largest flow from any single line that could be pumped into the impounding area with the tank withdrawal pumps considered to be operating at full rated capacity over a 10-minute period. In its analysis, NorthernStar modeled a spill of the full flow from a guillotine rupture of the common discharge header of the LNG in-tank pumps. However, NorthernStar included a future third tank in the calculations even though only two tanks were proposed in this application. For the proposed design, the design spill would be a guillotine rupture of the discharge header for the in-tank pumps. Since each pump is rated at 2,353 gpm and there are three pumps per tank, the resulting 10-minute design spill would be 70,590 gallons. This spill would be completely contained by the impoundment located in the tank area.

NFPA 59A, 2001 edition, section 2.2.3.5 also defines design spills for impounding areas serving only vaporization, process, or LNG transfer areas as the flow from any single accidental leakage source for a 10-minute duration. After a review of the piping and instrumentation diagrams for small diameter attachments, the FERC staff determined the design spill for the jetty area sump and tank area sump to be the rupture of a 6-inch-diameter purge line or a 6-inch-diameter recycle line attached to the unloading line. This 10-minute design spill would generate a volume of 140,320 gallons and would be contained in either the jetty area sump or the tank area sump.

The FERC staff also examined spill scenarios from the vaporizer piping, high pressure sendout pump piping, and instrument connections and determined that the full guillotine rupture and 6-inch-diameter attachment design spills were the controlling spills. Table 4.11.4-1 presents the impounding areas and spill size volumes used to determine adequate impounding capacity, as well as the design spills used in the thermal radiation and flammable gas dispersion modeling.

²⁶ The correspondence letters between the FERC and DOT can be found on the FERC’s eLibrary. Document numbers 20050615-0176 and 20050615-0177.

TABLE 4.11.4-1			
Impoundment Areas			
Source	Spill Size (gallons)	Impoundment System	Impoundment Size (gallons)
Impoundment Sizing Spills:			
LNG Storage Tank	45,805,758	Outer Tank Concrete Wall	52,118,481
Unloading Line	529,091	Jetty Area Sump or Tank Area Sump	538,632
Design Spills:			
Tank - Pump Discharge Header	70,590	Tank Area Sump	538,632
Unloading Line - 6-inch connection	140,320	Jetty Area Sump	538,632

We received a comment on the apparent discrepancy between sizes of design spills analyzed for this project and those used in previous proposals. Determination of the design spill is based on a project specific review of the submitted engineering material in accordance with the criteria established in 49 CFR 193. Prior to 2000, the design spill specified by Part 193 for all plant areas resulted from the rupture of a single transfer pipe with the greatest overall flow capacity, discharging at maximum potential capacity. As explained above, the incorporation of NFPA 59A in 2000 altered the design spill definition in 49 CFR 193.

While the design spill for LNG storage tanks is plainly described by NFPA 59A, the design spill in vaporization, process, or LNG transfer areas is specified as a “single accidental leakage source.” However, neither Part 193 nor NFPA 59A provides a definition for this term. As the commentor points out, a wide range of spill sources has been used by applicants in their proposals before the Commission. This range has been from guillotine ruptures of unloading lines to the failure of a 1-inch-diameter instrument connection.

In order to determine appropriate procedures for the selection of the “single accidental leakage source,” FERC staff consulted with the DOT in a letter dated April 19, 2005. As clarified in DOT’s response dated May 5, 2005, the single accidental leakage source would be considered a rupture of a connection to the transfer piping, while the greatest overall flow volume in the area should be used for sizing impoundments. The determination of a single accidental leakage source has been based on facility-specific review of piping and instrumentation diagrams to identify small diameter attachments to the transfer piping for instrumentation, pressure relief, recirculation, etc, and any flanges that may be used at valves or other equipment, in order to determine the largest spill rate. This approach ensures that impoundments are sized for a catastrophic failure that could result from an external event or intentional act, while recognizing that a more likely rupture would be used to calculate flammable vapor exclusion zones. In addition, any event sufficient to create a full breach of large diameter cryogenic piping would likely result in a number of ignition sources which would lead to an LNG pool fire and subsequent radiant heat hazards. Given that impoundments are required to be sized to handle catastrophic failures, radiant heat calculations are dependent on the surface area dimensions of the impoundment rather than on the size of the design spill.

Thermal Exclusion Zone

If a large quantity of LNG is spilled in the presence of an ignition source, the resulting LNG pool fire could cause high levels of radiant heat in the area surrounding the impoundment. Exclusion distances for various flux levels were calculated according to 49 CFR 193.2057 and section 2.2.3.2 of NFPA 59A, 2001 edition, using the "LNGFIRE III" computer program model developed by the Gas Research Institute. NFPA 59A, 2001 edition, establishes certain atmospheric conditions (0 mph wind speed, 70 °F, and 50 percent relative humidity), which are to be used in calculating the distances. However, Part

193.2057 supersedes these requirements and stipulates that wind speed, ambient temperature, and relative humidity which produce the maximum exclusion distances must be used, except for conditions that occur less than 5 percent of the time based on recorded data for the area. For its analysis, NorthernStar selected the following ambient conditions to produce the maximum distances: wind speed of 20 mph, ambient temperature of 37 °F, and 59 percent relative humidity. The FERC staff agrees with the selection of these conditions and these conditions yield longer distances than the 0 mph wind speed, 70 °F ambient temperature, and 50 percent relative humidity specified in NFPA 59A, 2001 edition.

Under 49 CFR 193.2057, the LNG storage tank impoundment must have a thermal exclusion zone in accordance with NFPA 59A, 2001 edition. The referenced section 2.2.3.2 of NFPA 59A, 2001 edition, requires thermal radiation distances ranging from 1,600 to 10,000 British thermal units per square foot per hour (Btu/ft²-hr) to be calculated for a volume of LNG determined in accordance with section 2.2.2.1.

Thermal radiation distances calculated for 1,600 to 10,000 Btu/ft²-hr incident flux levels for an LNG storage tank impoundment fire were based on the outer tank's concrete wall diameter (254 feet) as the pool diameter and the flame height equal to the top of the concrete wall (135.5 feet). The target height was set at ground level (0 feet). The resulting distances would be 377 feet for the 10,000 Btu/ft²-hr zone; 714 feet for the 3,000 Btu/ft²-hr zone; and 912 feet for the 1,600 Btu/ft²-hr zone (see figure 4.11.4-1). However, because the exclusion zones would extend over the Columbia River, a recommendation has been added in section 4.11.6, *Emergency Response and Evacuation Plan*, to ensure that recreational boaters would be warned in the unlikely event that the potential for a fire exists in any of these impoundments.

As required by section 2.2.3.6 of NFPA 59A, 2001 edition, heat flux from a fire over the impounding area would not cause damage to any LNG marine carrier, which would prevent its movement. However, the 10,000 Btu/ft²-hr zone would extend over the proposed relocation of rail track routing within the facility's property line as discussed in section 2.1.3.6. A description of historical, current, and anticipated rail traffic which includes the type of rail traffic (cargo, passenger, etc.), type of cargo, and frequency of all rail traffic that may utilize the railroad tracks adjacent to the facility is provided in section 4.8.2.7. There is currently no traffic on the railroad, and the PWRR has no plans to operate trains west of Wauna. In 2006, a segment of track was washed out west of Bradwood, approximately half-way to Astoria. In response to our recommendation in the DEIS, NorthernStar filed detailed procedures for coordinating with the railroad company to ensure safe rail transit through the Bradwood Landing LNG facility property, which are described in section 4.8.2.7.

In addition, the thermal radiation distances were determined for the 1,600-Btu/ft²-hr incident flux level centered on the tank area sump and jetty area sump. The 1,600 Btu/ft²-hr zone would extend 318 feet from the center of the tank area sump and from the center of the jetty area sump (see figure 4.11.4-1). This zone would not extend past the property line of the site.

The LNG terminal would occupy 40 acres of land within a 411-acre site controlled by NorthernStar, which is largely surrounded by forest. The potential for a forest fire in the area around the LNG terminal would be minimized by an existing forest free buffer zone around the LNG terminal. The forest free buffer zone would be between the 40 acre LNG terminal boundary and the outer boundary of the 411-acre site and is comprised of sparse vegetation which minimizes the risk for a forest fire.

The thermal exclusion zones would remain on the LNG terminal site and would be in compliance with 49 CFR 193.2057. Table 4.11.4-2 presents the maximum distances for incident flux levels ranging from 1,600 to 10,000 Btu/ft²-hr, as calculated by the FERC staff.

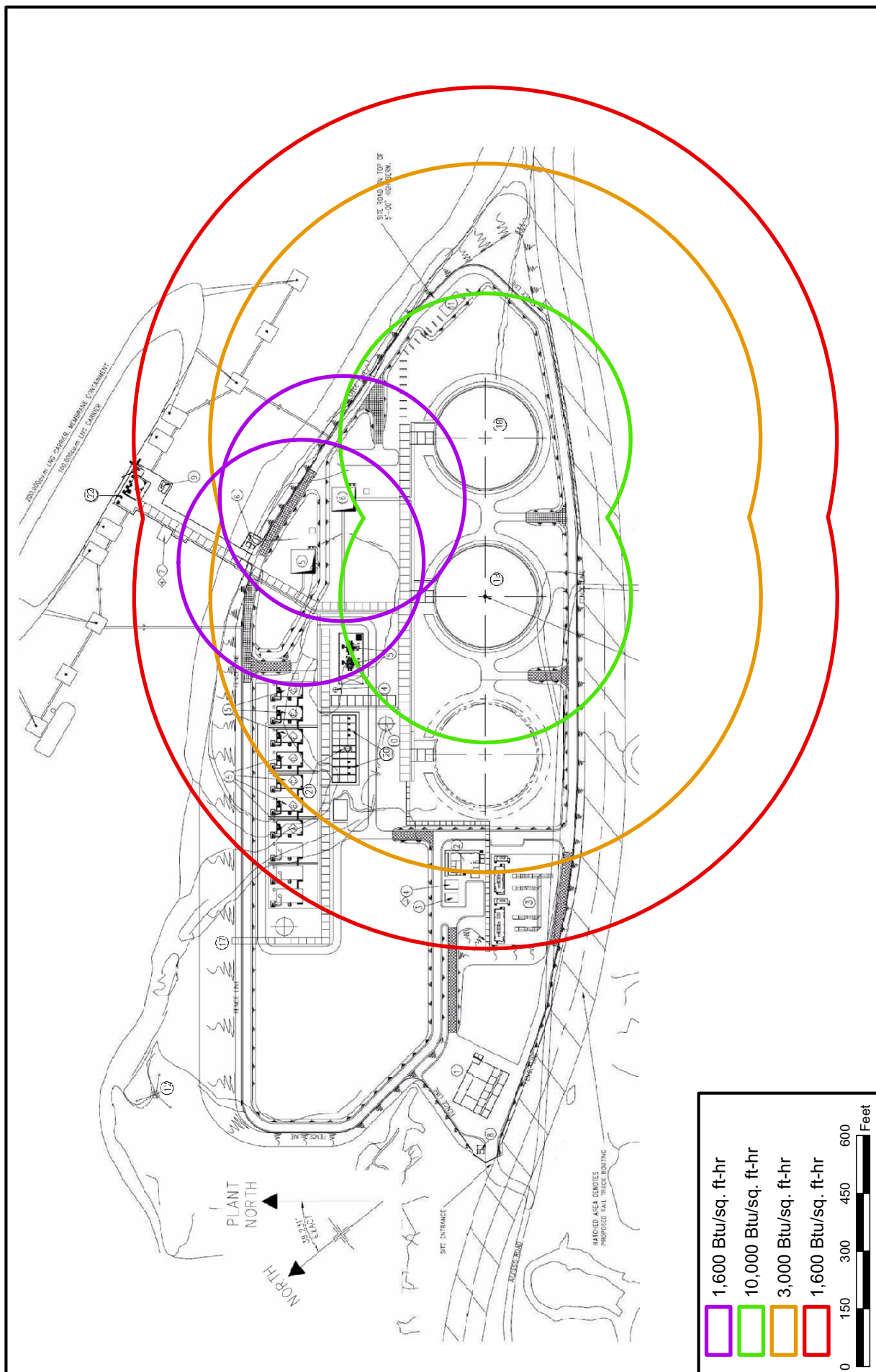
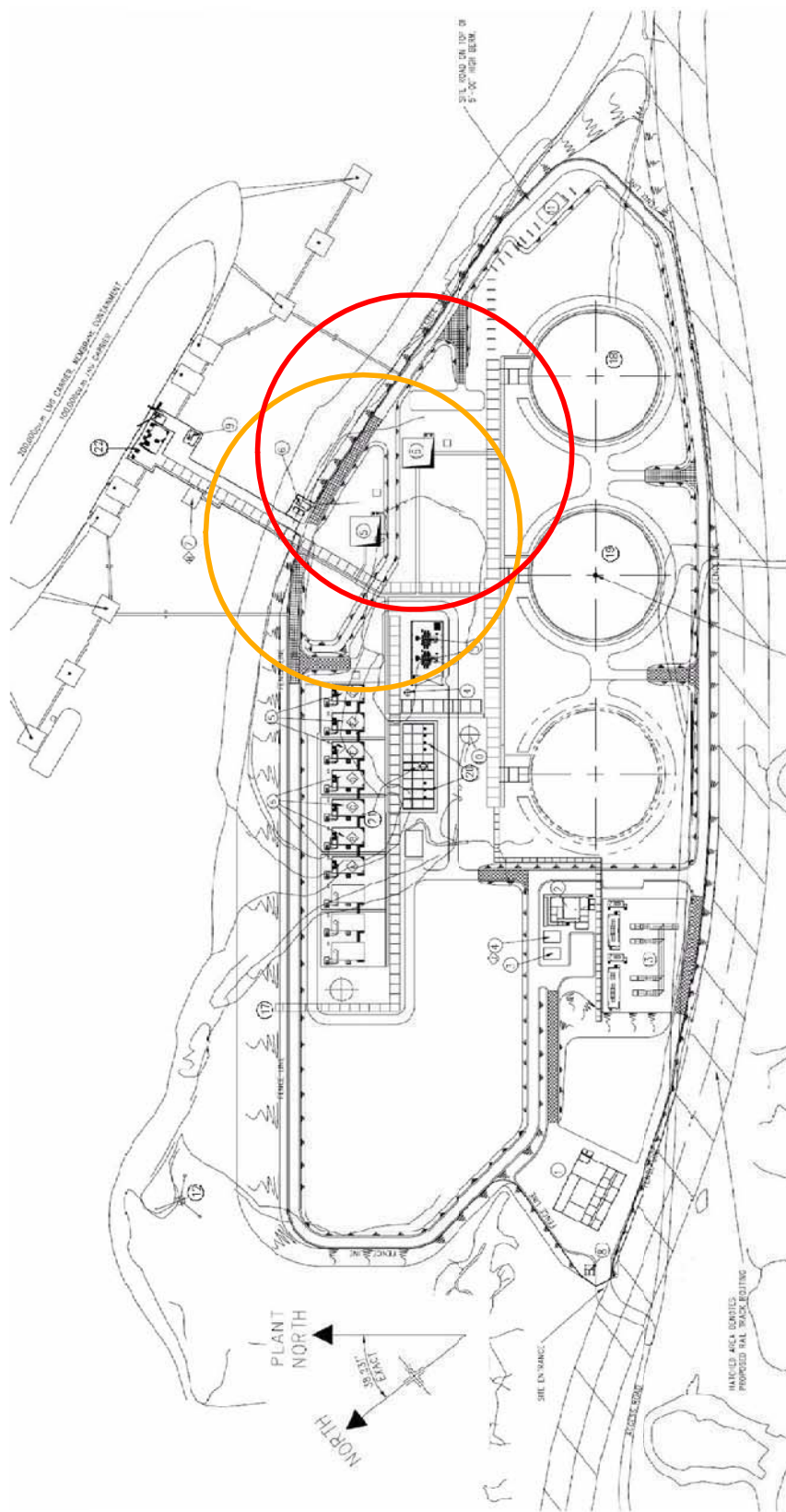


TABLE 4.11.4-2			
Thermal Exclusion Zones			
Source	Exclusion Area NFPA 59A, 2001 edition, section 2-2.3.2(a)	Incident Flux (Btu/ft ² -hr) a	Exclusion Zone (feet)
LNG Storage Tank Impoundment	Outdoor assembly area occupied by 50 or more people.	1,600	912
LNG Storage Tank Impoundment	Off-site structures used for occupancies or residences.	3,000	714
LNG Storage Tank Impoundment	Property line that can be built upon.	10,000	377
Jetty Area Sump and Tank Area Sump	Property line that can be built upon.	1,600	318
^a The 1,600 Btu/ft ² -hr flux level is associated with an exposed person experiencing burns within about 30 seconds. At 3,000 Btu/ft ² -hr, an exposed person would experience burns within 10 seconds; however, a wooden structure would not be expected to burn and affords protection to sheltered persons. At 10,000 Btu/ft ² -hr, clothing and wood can ignite spontaneously.			

Vapor Dispersion Zone

A large quantity of LNG spilled without ignition would form a flammable vapor cloud that would travel with the prevailing wind until it either dispersed below the flammable limits or encountered an ignition source. Sections 2.2.3.3 and 2.2.3.4 of NFPA 59A, 2001 edition, and Part 193.2059 require that provisions be made to minimize the possibility of flammable vapors reaching a property line that can be built upon and that would result in a distinct hazard. Part 193.2059 requires that dispersion distances be calculated for a 2.5 percent average gas concentration (one-half the lower flammability limit (LFL) of LNG vapor) under meteorological conditions which result in the longest downwind distances at least 90 percent of the time. Alternatively, maximum downwind distances may be estimated for stability Class F, a wind speed of 4.5 mph, 50 percent relative humidity, and the average regional temperature. The section allows the use of the DEGADIS (Dense Gas Dispersion Model), or the FEM3A model, to compute dispersion distances. Design spills into impounding areas serving LNG containers, transfer systems, and piping are to be determined in accordance with section 2.2.3.5 of NFPA 59A, 2001 edition. In accordance with section 2.2.3.3 of NFPA 59A, 2001 edition, an average concentration of methane in air of one-half of the LFL cannot cross the property line from a design spill into each tank impoundment. In this case, compliance with section 2.2.3.3 would also meet the requirements of section 2.2.3.4 of NFPA 59A, 2001 edition.

In performing the vapor dispersion analysis required by 49 CFR 193.2059, NorthernStar selected a wind speed of 4.5 mph, an atmospheric temperature of 52 °F, a relative humidity of 50 percent, and atmospheric stability Class F. The FERC staff agrees with the selection of these conditions. As discussed previously in section 4.11.4, the design spill for the jetty area sump and tank area sump would be the rupture of a 6-inch-diameter purge line or the rupture of a 6-inch-diameter recycle line attached to the unloading line. This 10-minute design spill would generate a volume of 140,320 gallons and would be contained in either the jetty area sump or the tank area sump. In its application, NorthernStar used SOURCE5 to determine the source strength and equivalent radius of the design spill. NorthernStar provided thermal properties of the proposed sumps which are as follows: thermal conductivity of 0.32 W/M K; density of 801 kg/m³; and a heat capacity of 790 J/kg K. The output source strength and equivalent radius from SOURCE5 were inputted into DEGADIS using the atmospheric properties described above. This spill would result in a distance of 325 feet to the 2.5 percent average gas concentration isopleths (see figure 4.11.4-2). The distance of 243 feet reported in the draft EIS was a typographical error and is incorrect.



- 1/2 Lower Flammable Limit,
Tank Area Sump
- 1/2 Lower Flammable Limit,
Jetty Area Sump



Figure 4.11.4-2
Bradwood Landing Project
 Vapor Dispersion Zones

Although the flammable vapor dispersion exclusion zones associated with these design spills would extend off-site into the navigation channel, there are no prohibited land uses within them. Subsequently, the proposed terminal location would satisfy the vapor exclusion zone requirements of 49 CFR 193.2059. However, because the exclusion zone would extend over the Columbia River, a recommendation has been added in section 4.11.6, *Emergency Response and Evacuation Plan*, to ensure that recreational boaters would be warned in the unlikely event that LNG vapor may disperse over the waterway.

We received a comment that a 4.5 mph (2.0 m/s) wind speed is not conservative with the use of DEGADIS and that the vapor dispersion methodology cannot account for obstructions to the vapor flow or any holdup of LNG vapor by either the dock area or tank area sumps. The vapor dispersion and source calculations were done in accordance with the regulations under 49 CFR 193 and are consistent with methodologies in the May 28, 1982 and June 29, 1983 Formal Interpretations by the DOT regarding vapor dispersion distances and vapor holdup/scooping. For the DEGADIS model, longer downwind vapor dispersion distances are produced at lower wind speeds. Using wind speeds higher than 4.5 mph (2 m/s) would reduce the downwind dispersion distances in DEGADIS, resulting in a less conservative result. In addition, higher wind speeds generally correspond to more atmospheric instability, which will further reduce the downwind dispersion distance.

While DEGADIS cannot depict terrain and actual geometries, calculations that take into account the obstruction of flow, such as from storage tanks and the earthen berm, would result in shorter dispersion distances due to enhanced turbulent mixing in the wake of such structures. The source strength methodology does not account for “wind scooping” and vapor expansion effects that may produce higher initial source strengths and longer dispersion distances. To investigate the possible effects to the calculations, FERC staff adjusted the vapor production model to eliminate all vapor retention and used the resulting source production curve as input to DEGADIS. Although the downwind distance to the one-half LFL would be larger using this method, it would still not extend beyond the facility property line onto any adjacent land.

4.11.5 LNG Carrier Safety

Since 1959, LNG has been transported by ship without a major release of cargo or a major accident involving an LNG carrier. Over the last 45 years, LNG carriers have made over 44,000 voyages worldwide. Starting in 1971, LNG began arriving at the Distrigas facility in Everett, Massachusetts. To date, more than 680 cargoes, with volumes ranging from 60,000 to 138,000 m³, have been delivered into the Port of Boston without incident. During 2005, a total of 275 cargoes of LNG were imported into the United States. During 2006, 226 cargoes of LNG were imported into the United States. For 36 years, LNG shipping operations have been safely conducted in the United States.

4.11.5.1 History

During the more than 44,000 voyages that have been completed since the inception of LNG maritime transportation, there has not been a serious accident at sea or in a port which resulted in a spill due to rupturing of the cargo tanks. However, insurance records, industry sources, and public websites identify a number of incidents involving LNG carriers, including minor collisions with other vessels of all sizes, groundings, minor LNG releases during cargo unloading operations, and mechanical/equipment failures typical of large vessels. Some of the more significant LNG carrier incidents are described below:

Pollenger had an LNG spill onto the steel cover of cargo tank number one during unloading at Everett, Massachusetts in April 1979. The spill caused cracking of the steel plate.

El Paso Paul Kayser grounded on a rock in June 1979 in the Straits of Gibraltar during a loaded voyage from Algeria to the United States. Extensive bottom damage to the ballast tanks resulted; however, the cargo tanks were not damaged, and no cargo was released. The complete cargo of LNG was subsequently transferred to another LNG carrier and delivered to its United States destination.

LNG Taurus grounded in December 1980 near the entrance to Taboata Harbor, Japan. The grounding resulted in extensive bottom damage, but the cargo tanks were not affected. The ship was refloated and the cargo unloaded.

Isabella had LNG spill onto its deck due to a cargo tank overflow in June 1985, causing severe cracking of the steelwork. The spill had been attributed to a cargo valve failure during discharging of cargo.

Tellier was blown by severe winds from its docking berth at Skikda, Algeria in February 1989 causing damage to the loading arms and the ship and shore piping. The cargo loading had been secured just before the wind struck, but the loading arms had not been drained. Consequently, the LNG remaining in the loading arms spilled onto the deck causing fracture of some plating.

Mostefa Ben Boulaid had LNG spill onto its deck during loading operations in Algeria in 2002. The spill, which is believed to have been caused by overflow rather than a mechanical failure, caused significant brittle fracturing of the steelwork. The ship was required to discharge its cargo, after which it proceeded to dock for repair.

Khannur had a cargo tank overfill into the ship's vapor handling system on September 10, 2001, during unloading at Everett, Massachusetts. Approximately 100 gallons of LNG were vented and sprayed onto the protective decking over the cargo tank dome, resulting in several cracks. After re-inspection by the Coast Guard, the Khannur was allowed to discharge its LNG cargo.

Norman Lady was struck by the USS Oklahoma City nuclear submarine while the submarine was rising to periscope depth near the Strait of Gibraltar in November 2002. The 87,000-m³ LNG carrier, which had just unloaded its cargo at Barcelona, Spain, sustained only minor damage to the outer layer of its double hull but no damage to its cargo tanks.

Tenaga Lima grounded on rocks while proceeding to open sea east of Mopko, South Korea due to strong current in November 2004. The shell plating was torn open and fractured over an approximate area of 20 feet by 80 feet, and internal breaches allowed water to enter the insulation space between the primary and secondary membranes. The ship was refloated, repaired, and returned to service.

Golar Freeze moved away from its docking berth during unloading on March 14, 2006, in Savannah, Georgia. The powered emergency release couplings on the unloading arms activated as designed, and transfer operations were shut down.

Catalunya Spirit lost propulsion and became adrift 35 miles east of Chatham, Massachusetts on February 11, 2008. Four tugs towed the vessel to a safe anchorage for repairs. The Catalunya Spirit was repaired and taken to port to discharge its cargo.

4.11.5.2 LNG Carrier Construction

In 1980, at the initial peak of LNG import activity in the United States, the Coast Guard published the report *Liquefied Natural Gas and Liquefied Petroleum Gas – Views and Practices – Policy and Safety*. The report summarized the Coast Guard's extensive research into the safety hazards of LNG

and its view that “...the nature of both LNG and liquid petroleum gas (LPG) presents an acceptable risk for transportation in maritime commerce.” This is due to the fact that LNG carriers are well constructed, robust vessels designed to withstand low-energy-type incidents that are prevalent in harbors and during docking operations. Moreover, safety measures, both equipment and training, are planned and designed into these LNG carriers to prevent or control all types of potential incidents. The Sandia National laboratory reached a similar conclusion in 2005 in its report.

The world’s LNG carrier fleet currently exceeds 218 carriers. Currently, all of the ships in the LNG fleet operate under a foreign flag with foreign crews. The LNG carriers used to import LNG to the United States would be constructed and operated in accordance with the IMO’s *Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk*, the SOLAS, and 46 CFR Part 154, which contain the U.S. safety standards for vessels carrying bulk liquefied natural gas. Foreign flag LNG carriers are required to possess a valid IMO Certificate of Fitness and a Coast Guard COC.

As required by the IMO conventions and design standards, hold spaces and insulation areas on an LNG carrier are equipped with gas detection and low temperature alarms. These devices monitor for leaks of LNG into the insulation between primary and secondary LNG cargo tank barriers. In addition, hazard detection systems are also provided to monitor the hull structure adjacent to the cargo tank, compressor rooms, motor rooms, cargo control rooms, enclosed spaces in the cargo area, specific ventilation hoods and gas ducts, and air locks.

LNG carriers are equipped with a firewater system with the ability to supply at least two jets of water to any part of the deck in the cargo area and parts of the cargo containment and tank covers above-deck. A water spray system is also available for cooling, fire prevention, and crew protection in specific areas. Furthermore, certain areas of LNG carriers are fitted with dry chemical powder-type extinguishing systems and CO₂ smothering systems for fighting fires.

In 1993, amendments to the IMO’s *Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* require all tankers to have monitoring equipment with an alarm facility which is activated by detection of over-pressure or under-pressure conditions within a cargo tank. In addition, the cargo tanks are heavily instrumented, with gas detection equipment in the hold and inter-barrier spaces, temperature sensors, and pressure gauges. See section 2.1.1.7 for further discussion.

As a result of the terrorist attacks that occurred on September 11, 2001, the IMO agreed to new amendments to the 1974 SOLAS addressing port facility and ship security. The *International Ship and Port Facility Security (ISPS) Code* was adopted in 2003 by the IMO. This code requires both ships and ports to conduct vulnerability assessments and to develop security plans. The purpose of the code is to prevent and suppress terrorism against ships; improve security aboard ships and ashore; and reduce the risk of passengers, crew, and port personnel on board ships and in port areas, for vessels and cargoes. All LNG carriers as well as other cargo vessels 300 gross tons and larger, and ports servicing those regulated vessels, must adhere to these IMO and SOLAS standards. Some of the IMO requirements are as follows:

For ships:

- Ships must develop security plans and have a Vessel Security Officer (VSO);
- Ships must be provided with a ship security alert system. These alarms transmit ship-to-shore security alerts to a competent authority designated by the Administration, which may include the company, identifying the ship, its location, and indication that the security of the ship is under threat or has been compromised;

- Ships must have a comprehensive security plan for international port facilities, focusing on areas having direct contact with ships; and
- Ships may have certain equipment onboard to help maintain or enhance the physical security of the ship.

For port facilities:

- Ports must develop a port facility security plan and have a Facility Security Officer (FSO); and
- Certain security equipment may be required to maintain or enhance the physical security of the facility.

For both ships and ports:

- Access must be monitored and controlled;
- Activities of people and cargo must be monitored;
- Security of communications and that they are readily available must be ensured; and
- A Declaration of Security must be completed and signed by the FSO and VSO.

4.11.5.3 Hazards

The history of LNG shipping has been free of major incidents, and none have resulted in significant quantities of cargo being released (see section 4.11.5.1). No incidents have occurred at existing LNG terminals during the 50 years of operation that resulted in any significant quantities of cargoes being released. However, the possibility of an LNG spill from a ship over the duration of the proposed project must be considered. If an LNG spill were to occur, the primary hazard to the public would be the impact of radiant heat from a pool fire. If an LNG release were to occur without ignition, an ignitable gas cloud could form and present a hazard. This section presents the results of analyses specific to LNG carriers to determine distances for these hazards, and describes how the hazard distances would be managed if the Project is approved.

Historically, the events most likely to cause a significant release of LNG were a ship casualty such as:

- a grounding sufficiently severe to puncture an LNG cargo tank;
- a vessel colliding with an LNG carrier in transit;
- an LNG carrier alliding²⁷ with the terminal or a structure in the waterway; or
- a vessel alliding with an LNG carrier while moored at the terminal.

However, the attacks on September 11, 2001, have made the public keenly aware of an additional risk that must be considered in the evaluation of marine safety and security:

- a deliberate attack on an LNG carrier by a terrorist group.

To result in a spill of LNG, any of the above events would need to occur with sufficient impact to breach an LNG carrier's double hull and cargo tanks. All LNG carriers used to deliver LNG to the proposed project would have double-hull construction, with the inner and outer hulls separated by about

²⁷ "Alliding" is the action of dashing against or striking upon a stationary object (for example, the running of one ship upon another ship that is docked) – distinguished from "collision," which is used to refer to two moving ships striking one another.

10 feet. Furthermore, the cargo tanks are normally separated from the inner hull by a layer of insulation approximately 1-foot thick.

As a result, many grounding incidents severe enough to cause a cargo spill on a single-bottom oil tanker would be unable to penetrate both inner and outer hulls of an LNG carrier. An earlier Federal Power Commission (FPC) (predecessor to the FERC) study estimated that the double-bottom of an LNG carrier would be sufficient to prevent cargo tank penetration in about 85 percent of the cases that penetrated a single-bottom oil tanker. Previous incidents with LNG carriers have primarily involved grounding, and none of these have resulted in the breach of the double hull and subsequent release of LNG cargo.

The probability of an LNG carrier sustaining cargo tank damage in a collision would depend on several factors – the displacement and construction of both the struck and striking vessels, the velocity of the striking vessel and its angle of impact with the struck vessel, and the location of the point of impact. The previous FPC study estimated that the additional protection afforded by the double hull would be effective in low-energy collisions; overall, it would prevent cargo tank penetration in about 25 percent of the cases that penetrated a single-hull oil tanker.

In 1995, to assist the Coast Guard in San Juan, Puerto Rico, EcoEléctrica L.P. prepared an analysis of the damage that could result from an oil tanker striking an LNG carrier at berth (FERC, 1996). The analysis assumed a 125,000 m³ LNG carrier and an 82,000-dead-weight-ton tanker carrying number 6 fuel oil without tug assistance. The analysis determined the minimum striking speed to penetrate the cargo tanks of an LNG carrier for a range of potential collision angles. The resulting minimum striking speeds are presented in table 4.11.5-1 for the two principal cargo systems.

TABLE 4.11.5-1		
Minimum Striking Speed to Penetrate LNG Cargo Tanks		
Angle of Impact	Minimum Striking Speed (knots)	
	Spherical Tanks	Membrane Tanks
Greater than 60 degrees	4.5	3.0
45 degrees	6.3	4.0
30 degrees	9.0	6.0
15 degrees	18.0	12.0

For membrane tanks, the critical beam-on striking speed is 3.0 knots; for spherical tanks, the critical beam-on speed is 4.5 knots. For both containment types, lower angles of impact result in much greater minimum striking speeds to penetrate LNG cargo tanks. In the July/August 2002 issue of *LNG Journal*, the Society of International Gas Tanker & Terminal Operators General Manager provides a table that indicates the critical speed necessary for a 20,000-ton vessel to puncture the outer hull of an LNG carrier is 7.3 knots. For a 93,000-ton ship, the impact speed is 3.2 knots. In neither case does such an impact result in damage to the LNG cargo containment system, nor does it result in release of LNG.

The Sandia Report included an LNG cargo tank breach analysis using modern finite element modeling and explosive shock physics modeling to estimate a range of breach sizes for both credible accidental and intentional LNG spill events. The analysis of accidental events found that groundings, collisions with small vessels, and low-speed (less than 7 knots) collisions with large vessels striking at 90 degrees could cause minor ship damage but would not result in a cargo spill. This is due to the protection provided by the double-hull structure, the insulation layer, and the primary cargo tank of an LNG carrier.

High-speed (12 knots) collisions with large vessels striking at 90 degrees were found to potentially cause cargo tank breach areas of 0.5 to 1.5 m².

In the event of a collision or allision of sufficient magnitude to rupture an LNG cargo tank, it is likely that sparks or flames would ignite the flammable vapors at the spill site. In a grounding of sufficient magnitude to rupture an LNG cargo tank, the damage would occur underwater, and the potential for ignition would be less than for collisions or allisions. In this case, an LNG spill would rapidly vaporize on water and form a potentially flammable cloud. If not ignited, the flammable vapor cloud would drift downwind until the effects of dispersion would dilute the vapors below the LFL for methane. The maximum range of potentially flammable vapors, or the distance to the LFL, is a function of the volume of LNG spilled, the rate of the spill, and the prevailing meteorological conditions. If the flammable vapor cloud encountered an ignition source, the cloud would burn back to the spill site.

The final EIS for the Calcasieu LNG Project (FERC, 1976) analyzed the maximum range of a flammable vapor cloud and hazardous radiation levels from an instantaneous one-tank spill. As was consistent with risk analyses at that time and for nearly 25 years thereafter, the instantaneous spillage of one cargo tank was considered to be the “worst-case” scenario. Physical constraints on maximum vessel speeds and maximum depths of penetration required to rupture one LNG cargo tank render the possibility of an instantaneous release of more than one cargo tank to be implausible. This is not to imply that the loss of multiple cargo tanks could never occur, but that the extent of the hazard would not exceed that of the instantaneous spillage of one tank.

For an instantaneous one-tank spill with ignition, the final EIS for the Calcasieu LNG Project estimated that a hazardous thermal radiation level of 5,300 Btu/ft²-hr would extend 3,595 feet from the center of the spill. For an instantaneous one-tank spill without ignition, the final EIS for the Yukon Pacific LNG Project (FERC, 1995) estimated that potentially flammable vapors could travel up to 3.3 miles, with a 10-mph wind and typical atmospheric stability.

In October 2001, the use of a one-tank instantaneous release as the worst-case scenario was reexamined by Quest Consultants, Inc (Quest) as part of an effort by the DOE to determine the hazards associated with reopening the Distrigas LNG import terminal following the terrorist attacks of September 11, 2001. It was determined that time-release spills through 1-meter and 5-meter diameter holes would more accurately simulate credible worst-case damage scenarios. The maximum flammable vapor cloud and radiation hazards were calculated for the two spill scenarios. For a spill on water with ignition, the maximum distance to a radiant flux level of 1,500 Btu/ft²-hr was estimated to be 1,770 feet. For a spill on water without ignition, a flammable vapor cloud of 2.5 miles was estimated. In November 2003, in response to comments concerning its October 2001 study, Quest clarified that its study applied only to LNG spills resulting from a collision with a large ship in Boston’s Outer Harbor, where waves would restrict the spreading of LNG on water.

Since the Quest study, there has been an emergence of studies by various parties to define the worst-case scenario that would result from a deliberate terrorist attack on an LNG carrier and the subsequent release of cargo. Distances have been estimated to range from 1,770 to 4,200 feet for a thermal radiation level of 1,500 Btu/ft²-hr. Part of the reason for the apparent discrepancies is the lack of large-scale historical incidents, and the need to extrapolate small-scale field test data to a worst-case event. This inevitably leads to differing conservative assumptions among the various parties. For example, some models calculate a time-release cargo discharge through 1-meter or 5-meter diameter holes, while others assume that the cargo tank empties instantaneously.

As a result, the FERC commissioned a study by ABSG to search and review the literature on experimental LNG spills and on consequence methodologies that are applicable to modeling incidents of

LNG spills on water. Further, the goal of the study was to identify appropriate methods for estimating flammable vapor and thermal radiation hazard distances for potential LNG carrier cargo releases during transit and while at berth. The resulting study, *Consequence Assessment Methods for Incidents Involving Releases from Liquefied Natural Gas Carriers*, was released for public comment on May 14, 2004. On June 18, 2004, the FERC staff's responses to comments on the consequence assessment methods were issued. In addition, the model was updated to include a lower limit on the characteristic wind speed. As discussed in greater detail in the staff's responses, various components of the consequence assessment methodologies were revised based on comments received. The revised methodology provides procedures for calculating: (1) the rate of release of LNG from a cargo tank penetration for various-sized holes; (2) the spreading of an unconfined LNG pool on water for both continuous spills and rapid (nearly instantaneous) releases; (3) the rate of vapor generation from an unconfined spill on water; (4) thermal radiation distances for LNG pool fires on water; and (5) flammable vapor dispersion distances.

A detailed evaluation of the consequences of a terrorist attack on a modern membrane LNG carrier was prepared by Lloyds Register North America for the Weaver's Cove LNG Project. The study evaluated the consequences of attacks on an LNG carrier by missiles and explosives. Finite element analysis was used to evaluate the effect of various-sized charges on both the outer and inner hulls. A 1-meter diameter hole of the inner hull at the waterline was found to be the worst-case scenario for hazard consequence assessments. This finding is consistent with the attack on the double-hull oil tanker *Limberg* which caused greater than a 5-meter diameter hole on the outer hull, but only minor damage to the inner hull. A failure modes and effects analysis was used to understand internal LNG release characteristics, and a residual strength analysis was used to investigate damage scenarios for a loaded LNG tanker.

As discussed above, the Sandia Report included an LNG cargo tank breach analysis, using modern finite element modeling and explosive shock physics modeling to estimate a range of breach sizes for credible accidental and intentional LNG spill events. For intentional scenarios, the size of the cargo tank hole depends on the location of the ship and source of threat. Intentional breach areas were estimated to range from 2 to 12 m². In most cases, an intentional breaching scenario would not result in a nominal hole of more than 5 to 7 m², which is a more appropriate range to use in calculating potential hazards from spills. These hole sizes are equivalent to circular hole diameters of 2.5 and 3 meters.

The Sandia Report also included guidance on risk management for intentional spills, based on the findings that the most significant impacts to public safety and property exist within approximately 500 meters (1,640 feet) of a spill due to thermal hazards from a fire, with lower public health and safety impacts beyond 1,600 meters (approximately 1 mile). Large unignited LNG vapor releases were found to be unlikely, but could extend from nominally 2,500 meters (8,200 feet) to a conservative maximum distance of 3,500 meters (11,500 feet) for an intentional spill.

Cascading damage due to brittle fracture from exposure to cryogenic liquid or fire-induced damage to foam insulation was evaluated in the Sandia Report and, while possible under certain conditions, is not likely to involve more than two or three cargo tanks. Cascading events are not expected to increase the overall fire hazard by more than 20 to 30 percent (1,920 to 2,080 meters (6,300 to 6,825 feet)) but would increase the expected fire duration. RPTs are possible for large spills, but the effects would be localized near the spill source and should not cause extensive structural damage.

In February 2007, the U.S. General Accounting Office (GAO) published a report (GAO, 2007) that assessed recent studies, including the Sandia study, that have been conducted on the consequences of an LNG spill resulting from a terrorist attack on an LNG carrier. The GAO's panel of experts agreed that the most likely public safety impact of an LNG spill would be the radiant heat from a pool fire. Although the GAO report characterizes disagreements among the panel of experts, the majority felt the Sandia calculations were either accurate or overly conservative. The Sandia Report concluded that damage due

to brittle fracture from exposure to cryogenic liquid or fire-induced damage was possible under certain conditions and would increase the duration of the event. The majority of the GAO expert panel agreed with Sandia that cascading events are not expected to significantly increase the overall fire hazard. The disagreement cited in the GAO report concerned the need for future research and clarifying uncertainties, rather than the Sandia's conclusions on cascading failures.

As part of the waterway suitability review process, the Coast Guard uses criteria developed by Sandia to define the outer limits of the hazard zones for assessing potential risks associated with the proposal. The Sandia analysis was based on LNG vessels of 148,000 m³. Therefore, the proposed Zones of Concern are based on the assumption that LNG vessels traveling to the Bradwood LNG terminal would have capacities of no greater than 148,000 m³. Should NorthernStar wish to receive larger LNG vessels in the future, the Sandia Report would have to be revisited to determine any changes to the Zones of Concern, the WSA/WSR would have to be reviewed to determine if the safety and security measurements are adequate to accommodate the larger LNG vessels, and supplemental review would be required. The Zones of Concern used in the waterway review were:

- Zone 1 – impacts on structures and organisms are expected to be significant within 500 meters (1,640 feet). The outer perimeter of Zone 1 is the distance to thermal hazards of 37.5 kW/m² from a pool fire.
- Zone 2 – impacts would be significant but reduced, and damage from radiant heat levels are expected to transition from severe to minimal between 500 and 1,600 meters (1,640 and 5,250 feet). The outer perimeter of Zone 2 is the distance to thermal hazards of 5 kW/m² from a pool fire.
- Zone 3 – impacts on people and property from a pool fire or an unignited LNG spill that does not ignite are expected to be minimal between 1,600 meters (5,250 feet) and a conservative maximum distance of 3,500 meters (11,500 feet). The outer perimeter of Zone 3 should be considered the vapor cloud dispersion distance to the LFL from a worst case unignited release. Impacts to people and property could be significant if the vapor cloud reaches an ignition source and burns back to the source.

The severity of impacts within Zones 1 through 3 would depend on the location of the incident relative to a specific area, the scope of the incident, and whether the released LNG ignited or dispersed. This could be a significant impact, being most severe in Zone 1 and decreasing outward through Zones 2 and 3. However, because of the implementation of safety and security measures during marine transit, the likelihood of a marine LNG spill is remote and an unlikely event.

Based on the breach sizes identified in the Sandia Report, the methodology described in the ABSG study, and revised in the FERC staff's responses to comments, was also used to calculate the thermal radiation and flammable vapor dispersion distances. In the case of the penetration of the largest cargo tank of a 140,000-m³ LNG carrier, a potential spill of 23,000 m³ is estimated for the volume of LNG above the waterline. The estimated pool spread results and thermal radiation hazard distances are identified in table 4.11.5-2 below. Thermal radiation calculations are based on an ambient temperature of 52 °F, a relative humidity of 50 percent, and an 18-mph wind speed.

TABLE 4.11.5-2					
LNG Spills on Water (using ABSG Methodology)					
LNG Release and Spread					
Hole Area	0.8 m ²	1.5 m ²	5 m ²	7 m ²	12 m ²
Hole Diameter	1.0 m	1.4 m	2.5 m	3.0 m	3.9 m
Spill Time	94.0 minutes	48.0 minutes	15.0 minutes	10.4 minutes	6.2 minutes
Pool Fire Calculations					
Maximum Pool Radius	341 feet	476 feet	817 feet	938 feet	1,102 feet
Fire Duration	94.1 minutes	48.1 minutes	15.2 minutes	10.7 minutes	6.5 minutes
Distance to:					
1,600 Btu/ft ² -hr	2,154 feet	2,777 feet	4,163 feet	4,630 feet	5,225 feet
3,000 Btu/ft ² -hr	1,675 feet	2,150 feet	3,205 feet	3,560 feet	4,013 feet
10,000 Btu/ft ² -hr	1,013 feet	1,289 feet	1,902 feet	2,108 feet	2,371 feet

Flammable vapor dispersion calculations were based on an atmospheric temperature of 52 °F, 50 percent relative humidity, a 4.5-mile per hour wind speed and atmospheric stability Class F. Based on a 1-meter diameter hole, an unignited release would result in an estimated pool radius of 421 feet. The unignited vapor cloud would extend to 10,237 feet to the LFL and 13,618 feet to one-half the LFL. It is important to identify certain key assumptions of conditions that must exist in order to achieve these vapor cloud distances. First it would be necessary for an event to create a 1-meter diameter hole by penetrating the outer hull, the inner hull, and cargo containment without ignition. Far more credible is that the event creating a 1-meter diameter hole would also result in a number of ignition sources which would lead to an LNG pool fire and subsequent thermal radiation hazards. It is also unlikely that a flammable vapor cloud could achieve these distances over land surfaces without encountering an ignition source, and subsequently burning back to the source.

The results of these calculations are in agreement with the Zones of Concern used by the Coast Guard in assessing the waterway suitability and are in agreement with the Sandia report. These intentional breach scenarios provide guidance to the Coast Guard in developing the operating restrictions for LNG carrier movements in the waterway, as well as in establishing potential impact areas for emergency response and evacuation planning. By focusing on the “worst-case” scenario for LNG transportation, there is a tendency to dismiss the potential hazards for other fuels and products commonly transported on our waterways. Some of the previously identified studies that calculate long hazard distances for LNG cargo fires also estimate similarly long distances for gasoline, propane, and jet fuel cargo fires. Also, it should not be assumed that the hazard distances identified are the assured outcome of an LNG carrier accident or attack, given the conservatism in the models and the level of damage required to yield such large scale releases. Further, these “worst-case” intentional breach scenarios should not be misconstrued as defining an exclusionary zone. Rather the average most probable “worst-case” scenarios provide guidance in developing the operating restrictions for LNG carrier movements in the Columbia River navigation channel, as well as in establishing potential impact areas for emergency response and evacuation planning.

For the project, NorthernStar proposes to receive LNG carriers with capacities up to 200,000 m³. However, based on existing uncertainties for larger ships, the Coast Guard COTP Portland would require that NorthernStar must either complete a site-specific analysis for the largest sized LNG vessel or limit arrivals to vessels with a cargo capacity no greater than 148,000 m³ until additional analysis addressing vessels with higher cargo capacities is completed.

4.11.5.4 LNG Carrier Transit to the Bradwood Landing LNG Project

Imported LNG could be obtained from exporting terminals throughout the world and delivered by LNG carriers to the proposed project. Exporting countries include Algeria, Australia, Brunei, Indonesia, Malaysia, Nigeria, Oman, Qatar, Trinidad, and United Arab Emirates. In 2007, LNG imports to the United States included: 59 percent from Trinidad, 15 percent from Egypt, 12 percent from Nigeria, 10 percent from Algeria, 2 percent from Qatar, and 2 percent from Equatorial Guinea.

Carrier Routes

The Columbia River navigation channel extends from CRM -2 (within the Pacific Ocean) to CRM 106.5 at Vancouver, Washington. From the territorial sea, LNG carriers would enter the Columbia River navigation channel within U.S. territorial waters at CRM -2 and would transit about 38 miles up the Columbia River to the proposed Bradwood Landing LNG terminal. LNG carriers would normally enter the mouth of the Columbia River about 3 hours before high tide. Two tugs would be required to escort the LNG carriers upriver, at least one of which must be a tractor tug, which would be made up as soon as it is safe to do so. The primary tug would be tethered at the direction of the pilot. A third tug would be required to assist with turning and mooring. All three tugs, which would be provided by NorthernStar, would be at least 60 Ton Astern Bollard Pull or larger and equipped with Class 1 fire fighting equipment.

The channel between CRM -2 and CRM 3 is 2,640 feet wide and is presently authorized and maintained to a depth of 55 feet within the northerly 2,000 feet, while the remaining 640 feet is maintained to a depth of 48 feet. From CRM 3 to the proposed Bradwood Landing LNG terminal site at CRM 38, the channel is at least 600 feet wide and 40 to 43 feet in depth. The COE's Columbia River Channel Improvement Project, which includes deepening of the navigation channel to 43 feet, will be completed before the LNG terminal would go into operation.

There are a number of major ports along the lower Columbia River, including Astoria, St. Helens, and Portland on the Oregon side of the river and the ports of Longview, Kalama, and Vancouver on the Washington side. With the exception of Astoria, all of these ports are upstream from the project site at CRM 38. The only bridge in the lower river below Longview, Washington (CRM 66) is at Astoria (CRM 13.5). The Astoria-Megler Bridge has a vertical clearance of 205 feet and a horizontal clearance of 1,070 feet. There are two anchorages located on either side of the channel adjacent to Astoria, referred to as the Astoria North Anchorage and the Astoria South Anchorage. Anchorages are used for temporarily holding ships while they are waiting to proceed upstream or downstream. However, these anchorages would not be used for LNG carriers.

All ships are required to have a Columbia River Bar Pilot between the sea buoy and Astoria, and a Columbia River Pilot upstream of Astoria. The pilots, supervised by the Oregon Board of Pilot Commissioners, are responsible for scheduling, monitoring of weather conditions, and establishing working conditions. The pilots maintain bridge-to-bridge communication and coordinate vessel passing operations through a vessel information system allowing pilots to ascertain probable passing points with other ships in the river.

The LNG carriers would dock at a specially constructed ship berth and maneuvering basin east of the LNG terminal site. The berth would be over 1,000 feet from the main navigation channel, providing a safe distance from the main channel for passing vessels. All maneuvering and docking of the LNG carriers at the berth would be carried out under tug assistance and pilot supervision. Docking, LNG offloading, and undocking would take about 24 hours.

WST conducted a vessel maneuvering simulation study for the stretch of the Columbia River from Pillar Rock Reach to Driscoll Reach and for the ship berth and maneuvering area at the Bradwood Landing terminal (WST, 2005). The study included the transit of a 140,000 m³ as well as a future 200,000 m³ LNG carrier through the Columbia River navigation channel at its current depth and width. The study indicated that LNG carriers could safely maneuver the approach to the LNG terminal and ship berth with the assistance of three tugs.

In addition to the WST study, in April 2006, four Columbia River Pilots conducted simulator analyses of LNG carriers transiting the Columbia River navigation channel at the Pacific Maritime Institute in Seattle, Washington. They concluded that the LNG carriers handled similar to other large vessels. They were able to navigate the channel in all conditions normally encountered on the Columbia River and looked at many situations involving other vessels. The ships could be handled satisfactorily when meeting other vessel traffic in the straight legs but would require extra room on the turns, where meeting other traffic should be avoided. The pilots determined that restrictions on night transits would not be necessary, although an initial period of daytime only transits would be prudent until the pilots obtain experience with the LNG carriers.

Hazard Zones Associated with the Proposed Routes

LNG carriers would traverse primarily offshore waters with the exception of approximately 38 miles of the Columbia River navigation channel to the LNG terminal. The LNG carrier would transit the channel at a speed of 8 to 12 knots, resulting in areas within the Zones of Concern being exposed to a potential transient thermal hazard for up to 15 minutes (see figure 2.1.2-1).

Communities located within the Zones of Concern (see figure 2.1.2-1) along the Washington side of the waterway include portions of Pillar Rock, Rockland, and Bayview that are overlapped by Zone 1; Altoona, Brookfield, and Skamokawa in Zone 2; and portions of Pigeon Bluff and Cathlamet in Zone 3. The western one-third of Puget Island is within the Zones of Concern, with about 22 structures overlapped by Zone 1, about 52 structures within Zone 2, and additional homes and farm areas in Zone 3. On the Oregon side of the waterway, in Clatsop County, waterfront portions of the communities of Hammond, Warrenton, and Astoria are overlapped by Zone 1; other portions of Warrenton and Astoria are in Zone 2; and parts of Warrenton, Astoria, and Clifton are in Zone 3. The potential impacts that LNG marine traffic along the waterway may have on existing residences, populations, housing, property values, and public services and infrastructure at these communities are discussed further in sections 4.7.1.2, 4.7.2.3, and 4.8.1.

In addition, a temporary hazard would exist around the slip during part of the 12- to 14-hour period while the LNG carrier is at the dock and unloading cargo. A fire associated with a potential spill resulting from a nominal cargo tank hole of an intentional event could expose the LNG storage tanks at the LNG terminal to a thermal radiation level of 10,000 Btu/ft²-hr for up to 20 minutes. Depending on the duration of the incident, damage to the LNG storage tanks at the terminal could compound the event. However, this compounded event would not create exclusion zones larger than the zones calculated for an LNG storage tank fire in section 4.11.4 and, therefore, would not create any additional risks for the public.

4.11.5.5 Requirements for LNG Carrier Operations in the Columbia River

The Coast Guard exercises regulatory authority over LNG facilities that affect the safety and security of port areas and navigable waterways under Executive Order 10173; the Magnuson Act (50 USC § 191); the Ports and Waterways Safety Act of 1972, as amended (33 USC § 1221, et seq.); and the Maritime Transportation Security Act of 2002 (46 USC § 701). The Coast Guard is responsible for

matters related to navigation safety, vessel engineering and safety standards, and all matters pertaining to the safety of facilities or equipment located in or adjacent to navigable waters up to the last valve immediately before the receiving tanks. The Coast Guard also has authority for LNG facility security plan review, approval and compliance verification as provided in Title 33 CFR Part 105, and siting as it pertains to the management of vessel traffic in and around the LNG facility.

The Coast Guard regulations in 33 CFR 127 apply to the marine transfer area of waterfront facilities between the LNG carrier and the last manifold or valve located immediately before a storage tank. Title 33 CFR 127 regulates the design, construction, equipment, operations, inspections, maintenance, testing, personnel training, firefighting, and security of LNG waterfront facilities. The safety systems, including communications, ESD, gas detection, and fire protection, must comply with the regulations in 33 CFR 127. Under 33 CFR 127.019, NorthernStar would be required to submit two copies of its Operations and Emergency Manuals to the COTP for examination.

Title 33 CFR 127 separates cargo transfer operations into three distinct phases: Preliminary Transfer Inspection (section 127.315); Declaration of Inspection (section 127.317); and LNG Transfer (section 127.319). These different sections require specific actions to be completed prior to and during the transfer. Additionally, there are specific actions required in the case of a release of LNG (section 127.321).

As required by its regulations (section 127.009), the Coast Guard is responsible for issuing an LOR as to the suitability of the waterway for LNG marine traffic with respect to the following items:

- information submitted under Section 127.007:
 - the physical location of the facility;
 - a description of the facility;
 - the LNG vessels' characteristics and the frequency of LNG shipments to or from the facility; and
 - charts showing waterway channels and identifying commercial, industrial, environmentally sensitive, and residential areas in and adjacent to the waterway used by the LNG vessels en route to the facility, within 25 kilometers (15.5 miles) of the facility.
- density and character of marine traffic;
- locks, bridges, or other manmade obstructions in the waterway; and
- the following factors adjacent to the facility:
 - depth of water;
 - tidal range;
 - protection from high seas;
 - natural hazards, including reefs, rocks, and sandbars;
 - underwater pipes and cables; and
 - distance of berthed vessels from the channel and the width of the channel.

The process of preparing the LOR begins when an applicant submits an LOI to the COTP. In accordance with 33 CFR 127.007, NorthernStar submitted an LOI to the Coast Guard on January 18, 2005 (see Appendix G). On September 9, 2005, the Coast Guard issued a notice in the Federal Register requesting comments pertaining specifically to the maritime safety and security aspects of the proposed LNG facility. In preparation for issuance of an LOR and the completion of certain other regulatory mandates, the comments received were incorporated into a formalized risk assessment process to assess the safety and security aspects of the facility, adjacent poor areas, and navigable waterways. The Coast Guard held a public meeting jointly with the FERC on September 29, 2005, pursuant to the notice. The Coast Guard's comment period ended on October 6, 2005.

The NVIC 05-05 provides Coast Guard COTPs/FMSCs, members of the LNG industry, and port stakeholders with guidance on assessing the suitability of a waterway for LNG marine traffic that takes into account conventional navigation safety/waterway management issues contemplated by the existing LOI/LOR process, but in addition, would also take completely into account MARSEC implications. In accordance with this guidance, each LNG project applicant is to submit a WSA to the cognizant COTP. The WSA process addresses the transportation of LNG from an LNG carrier's entrance into U.S. territorial waters, through its transit to and from the LNG receiving facility, including operations at the LNG carrier/facility interface. In addition, the WSA should address the navigational safety issues and port security issues introduced by the proposed LNG operations. The NVIC 05-05 also provides specific guidance on the timing and scope of the WSA.

NorthernStar's Waterway Suitability Assessment

NorthernStar submitted a preliminary WSA for the proposed project to the Coast Guard in December 2005. Based on feedback from the Coast Guard and other stakeholders, NorthernStar prepared a follow-on WSA, which was submitted to the Coast Guard in May 2006. The Coast Guard, with input from the Area Maritime Security Committee, local law enforcement, and emergency response organizations, has reviewed NorthernStar's WSA in accordance with the guidance in NVIC 05-05. The WSA review focused on the navigation safety and maritime security risks posed by LNG marine traffic, and the measures needed to responsibly manage these security risks.

Coast Guard Waterway Suitability Report

Based on the WSA review and consultations, the Coast Guard advised the FERC in its WSR dated February 28, 2007, that to make the Columbia River suitable for the LNG marine traffic associated with the Bradwood Landing Project, specific risk mitigation measures would be necessary. These measures are further detailed in the WSR (see Appendix G) and include, among others, the following operational conditions:

- a 500-yard moving safety/security zone around the LNG vessel during transit of the waterway where no other vessel may enter without first obtaining permission from the COTP;
- a 200-yard fixed security zone while the LNG vessel is moored at the LNG terminal;
- a 50-yard security zone around the LNG terminal when there is not a vessel at the dock;
- submission by NorthernStar of a Facility Security Plan for Coast Guard approval;

- a restriction on the size of LNG carriers transiting the Columbia River navigation channel to a capacity of 148,000 m³ until a completed site-specific risk analysis for larger ships is approved by the COTP;
- one-way LNG marine traffic along certain portions of the waterway such as at turns;
- submission to the COTP by NorthernStar of an annual update of its WSA to evaluate if any conditions in the waterway have changed that would require issuance of a new LOR;
- requirement that LNG vessels must board a Pilot(s) at least 5 miles before the CR Buoy, and for at least the first 6 months, at least two Pilots must be present throughout the transit;
- requirement that for the first 6 months, all transits must be during daylight hours;
- annual Coast Guard inspections of LNG vessels and facilities;
- escort of the vessel by at least two tugs along the waterway with a third to assist with turning and mooring where all three tugs will be at least 60 Ton Astern Bollard Pull or larger and equipped with Class 1 firefighting capability;
- simulator training for pilots and tug operators who have responsibility for LNG traffic; and
- implementation of a Coast Guard-approved *LNG Vessel Transit Management Plan*.

In addition, the WSR recommends additional facilities and infrastructure to make the waterway suitable for LNG marine traffic. The Coast Guard consulted with a variety of stakeholders, including state and local emergency responders, Marine Pilots, towing industry representatives, members of the Port Waterway Safety Committee, and the Area Maritime Security Committee to preliminarily identify the additional resources, public and/or private, that would be needed to implement prevention and mitigation strategies necessary for LNG operations. These measures include:

- upgrades to navigational aids including installation of three aids at Bradwood, a PORTS station at Bradwood contracted with NOAA to provide real time river level, current, and WX data, and a Doppler docking station;
- installation of a real time system for data collection on the Columbia River Bar conditions including an immersion study of deep-draft LNG vessels;
- augmentation of shoreside firefighting capabilities to provide protection services to the facility as well as communities along the transit route;
- implementation of a public notification system to notify the public along the transit route;
- increased gas detection capability, maintenance, and training to initial responders;
- implementation of a Regional Communication Plan and associated equipment to ensure that the facility, associated command centers, emergency responders, Coast Guard, tug operators, escort vessels, and pilots are able to communicate effectively;

- improvements to the Columbia River's Vessel Traffic Information System, including augmentation of a camera monitoring system capable of monitoring the entire route and detecting vessel traffic in wind, rain, fog, and dark conditions, installation of an AIS repeater located in Astoria; and
- availability of Coast Guard as well as other safety and security resources, including additional safety measures when a cruise ship is in port, security boardings, waterway monitoring, shoreline patrols, and vessel escorts to implement the additional security measures.

In addition to the above measures, additional specific measures, and, where applicable, the resources needed to implement them, are described in a separate supplementary report from the Coast Guard to the FERC on February 28, 2007. This supplementary report, and the specific details of these measures, have been designated Sensitive Security Information as defined in 49 CFR 1520. Because any unauthorized disclosure of details of these measures could be employed to circumvent the proposed security measures, it is not releasable to the public. These additional measures may include security boardings, surveillance and monitoring, patrols, vessel escorts, and additional security measures. Additionally, any security plan is a dynamic document that is subject to change with advances in technologies and improvements in intelligence gathering.

As the Coast Guard has determined that additional measures beyond those proposed by NorthernStar in the WSA would be required to responsibly manage the maritime safety and security risks associated with the LNG marine traffic, **we recommend that:**

- **Throughout the life of the facility, NorthernStar should ensure that the facility and any LNG vessel transiting to and from the facility comply with all requirements set forth by the Coast Guard Captain of the Port Sector Portland, including all risk mitigation measures recommended in the WSR.**

After completion of the final EIS, the Coast Guard will complete its review and issue an LOR to address the suitability of the waterway for LNG transport. If the Coast Guard issues an LOR finding the waterway suitable for LNG marine traffic with conditions, the necessary security measures would be further developed into the detailed *LNG Vessel Transit Management Plan*, which would become the basis for appropriate security measures for each MARSEC threat level. This plan would clearly spell out roles, responsibilities, and specific procedures for an LNG carrier transiting the Columbia River navigation channel up to the proposed Bradwood Landing LNG terminal, as well as for all agencies involved in implementing security and safety during the operation. Prior to the LNG carrier being granted permission to enter the shipping channels, both the vessel and facility would be required to be in full compliance with the Maritime Transportation Security Act and International Ship and Port Facility Security Code, and the security protocols to be established by the COTP in the *LNG Vessel Transit Management Plan*. The plan may include security measures such as: Coast Guard and other law enforcement agency vessels enforcing safety and security zones around the LNG carriers while in transit and moored at the terminal; shoreside surveillance and monitoring; and other prevention/mitigation strategies.

We recognize that the *LNG Vessel Transit Management Plan* would be a dynamic document that would be prepared well before import operations would commence, and that the port's overall security picture may change over that time period. New port activities may commence, infrastructure may be added, or population density may change. Improvements in technology to detect, deter, and defend against intentional acts may also develop. Therefore, **we recommend that:**

- **NorthernStar, until commencement of service, should annually review its WSA relating to LNG marine traffic for the project; update the assessment to reflect**

changing conditions which may impact the suitability of the waterway for LNG marine traffic; provide the updated assessment to the cognizant COTP/FMSC for review and validation and if appropriate, further action by the COTP/FMSC relating to LNG marine traffic; and provide a copy to the FERC staff.

In addition, NorthernStar would provide security for the terminal according to a Facility Security Plan that must be prepared under 33 CFR 105. This plan would need to be approved by the Coast Guard COTP. The requirements of this plan may include:

- a Facility Security Assessment to identify site vulnerabilities, possible security threats, consequences of an attack, and facility protective measures;
- procedures for responding to security incidents;
- a designated FSO responsible for implementing and periodically updating the Facility Security Plan and Assessment;
- scalable security measures to provide increasing levels of security at increasing MARSEC levels;
- security exercises at least once each calendar year and drills at least every 3 months; and
- mandatory reporting of all breaches of security and security incidents.
- Security at the facility would be provided by both active and passive systems. In accordance with federal regulations, the entire site would be surrounded by a protective enclosure (i.e., a fence) with sufficient strength to deter unauthorized access. The enclosure would also be illuminated with not less than 2.2 lux between sunset and sunrise. Intrusion detection systems and day/night camera coverage would identify unauthorized access. A separate security staff would conduct periodic patrols of the plant, and screen visitors and contractors. The security staff may also assist in maintaining security of the marine terminal during cargo unloading. NorthernStar would be required to submit their Facility Security Plan to the COTP for approval 60 days before commencement of operations.

Impact of Vessel Security Requirements

The potential impacts of the proposed LNG marine traffic for the Bradwood Landing Project on other commercial and recreational boaters can be addressed in relation to several general security requirements: 1) a moving safety/security zone for inbound LNG carriers; 2) a security zone around a moored LNG carrier; and 3) other measures as deemed appropriate.

If the Coast Guard issues an LOR finding the waterway suitable for LNG marine traffic with the conditions referenced in the WSR, the Coast Guard would promulgate a moving safety/security zone that would affect other vessels. Pursuant to such a regulation, no vessel would be allowed to enter the safety/security zone without first obtaining permission from the Coast Guard COTP. If the Coast Guard issues an LOR finding the waterway suitable for LNG marine traffic with conditions, it is anticipated that the LNG carriers would transit about 40 miles along the Columbia River navigation channel to the proposed LNG terminal. For the majority of this trip, an LNG carrier would travel at an average speed of 8 to 12 knots. Based on these assumed speeds and allowing time for pilot boarding and tug connecting, it

would take about 5.5 hours for LNG carriers to complete the trip to the LNG terminal. Additional time would be required to maneuver the LNG carrier into the berth.

If a moving safety/security zone during transit, a fixed security zone at the terminal, and one-way traffic in designated areas were implemented, they would affect other commercial and recreational traffic using the channel. The magnitude of the effect would also be influenced by other factors, such as the amount of time it takes to obtain a pilot and other competing ship traffic in the federal navigation channel.

If the proposed LNG terminal is constructed, and if the Coast Guard issues an LOR finding the waterway suitable for LNG marine traffic with the conditions described above under *Coast Guard Waterway Suitability Report*, as many as 125 LNG carriers for the Bradwood Landing LNG terminal could potentially move in and out of the Columbia River navigation channel every year. This is an increase in vessel traffic of about 25 percent for large, deep-draft vessels currently transiting these waterways but only a 7 percent increase overall. Other shipping activities would be moderately affected by this increase in traffic; however, based on the relatively modest current level of shipping activity, the impact is not expected to be substantial. The impacts of LNG marine traffic and associated security requirements on recreational and commercial vessel traffic are discussed in further detail in sections 4.7.1.4 and 4.8.1.7, respectively.

Anchors for the three navigational aides that would be placed to mark the northern edge of the maneuvering basin at the Bradwood Landing LNG terminal would have a localized short-term impact on the riverbed. The light from these navigational aides would be designed so as to have minimal impact on marine life.

Tugboats would have associated air emissions (see section 4.10.1.1); however, because the waterway is an attainment area and the tugs are a transient, mobile source, no significant air quality impacts are anticipated. Nor would the noise associated with the tugboats be likely to unduly disturb wildlife or the human population given their current presence along the waterway. Furthermore, the tugs would enhance safety, security, and fire-fighting capabilities.

The WSR would require a number of upgraded or new safety and security systems and procedures. The FERC has received comments on this and other LNG terminal proposals expressing concern about the cost of applying additional security measures and the potential burden on local taxpayers. Additional funding for state and local resources would be provided by NorthernStar to the extent called for by the Cost-Sharing Plan to be developed with the pertinent state and local agencies, discussed in section 4.11.6 *Emergency Response and Evacuation Planning*.

4.11.6 Emergency Response and Evacuation Planning

Prior to commencing service, NorthernStar would be required to prepare emergency procedure manuals in accordance with 49 CFR 193.2509 that provide for: a) responding to controllable emergencies and recognizing an uncontrollable emergency; b) taking action to minimize harm to the public including the possible need to evacuate the public; and c) coordination and cooperation with appropriate local officials. Specifically, section 193.2509(b)(3) requires, “Coordinating with appropriate local officials in preparation of an emergency evacuation plan...”

While the exclusion zones evaluated for the onshore facility in section 4.11.4 and the consequence areas for marine spills in section 4.11.5.3 provide guidance on the maximum extent of potential hazards, they should not be assumed to represent the evacuation zone for every potential incident. As with any other fuel or hazardous material, the actual severity of the incident would determine what area needs to be evacuated, if any, rather than a worst-case maximum zone. It is

anticipated that the emergency evacuation plans would identify evacuation distances based upon increasing severity of events.

On several LNG import terminal proposals, a number of organizations and individuals (including the ODE and Clatsop County on the Bradwood Landing Project) commented on the need to consider emergency response procedures. Section 3A(e) of the NGA, added by section 311 of the EPAct of 2005, stipulates that in any order authorizing an LNG terminal, the Commission shall require the LNG terminal operator to develop an ERP in consultation with the Coast Guard and state and local agencies. The FERC must approve the ERP prior to any final approval to begin construction.

In July 2006, NorthernStar began developing an ERP and was provided a copy of the FERC staff's prepared guidance for developing ERPs titled "Draft Guidance for LNG Terminal Operator's Emergency Response Plan" (Draft Guidance). In 2007, NorthernStar provided Clatsop County a draft ERP to review. PBS&J, an engineering consulting company, was contracted by Clatsop County to perform a review of NorthernStar's draft ERP. PBS&J's completed review, issued in July 2007, included a list of gaps between the FERC's Draft Guidance and NorthernStar's draft ERP. PBS&J provided a list of recommendations to NorthernStar detailing how the draft ERP could be improved. After PBS&J's review, NorthernStar revised its draft ERP and supplied it to Clatsop County for additional review. In November 2007, PBS&J published a second report detailing how most of their recommendations had been incorporated into NorthernStar's draft ERP. However, several recommendations were still outstanding.

On March 24, 2008, NorthernStar filed the draft ERP with the FERC for review. The draft ERP consists of incident specific plans and an Emergency Management Plan (EMP). The EMP consists of two parts: the EMP base plan, which has nine sections detailing the general purpose, philosophy, organization, responsibility, systems and layout, and the concept of operation for the LNG terminal; and the supporting annexes which cover warnings and notifications, communications, public affairs, evacuation, emergency vessel departure, emergency training, and material safety sheets.

From our initial review of the draft ERP and associated EMP, additional effort would be required to fully meet the requirements of recommendation number 62 in the draft EIS. Key items include the development of a comprehensive Cost-Sharing Plan to cover the costs of state and local resources responsible for security and safety; and documentation of consultation and coordination with the appropriate state and local agencies and Coast Guard in developing the plan. Further, it would be prudent to condense the more than 300 pages in the ERP and EMP documents into a single, user-friendly plan that would provide clear, concise guidance for the various responsible agencies. An outstanding recommendation in the PBS&J report also addressed this issue and should be incorporated into a final plan. As a result, **we continue to recommend that:**

- **NorthernStar should develop an ERP (including evacuation) and coordinate procedures with the Coast Guard, state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies. This plan should include at a minimum:**
 - a. **designated contacts with state and local emergency response agencies;**
 - b. **scalable procedures for the prompt notification of appropriate local officials and emergency response agencies based on the level and severity of potential incidents;**

- c. **procedures for notifying residents and recreational users within areas of potential hazard;**
- d. **evacuation routes/methods for residents and other public use areas that are within any transient hazard areas along the route of the LNG vessel transit;**
- e. **locations of permanent sirens and other warning devices; and**
- f. **an “emergency coordinator” on each LNG vessel to activate sirens and other warning devices.**

The ERP should be filed with the Secretary for review and written approval by the Director of OEP prior to initial site preparation. NorthernStar should notify the FERC staff of all planning meetings in advance and should report progress on the development of its ERP at 3-month intervals.

As required by the EPCRA of 2005, FERC must review and approve each ERP prior to initial site preparation. Accordingly, FERC staff ensures that appropriate state and local agencies have been involved in preparing the plan and that the Coast Guard has been consulted and concurs. The ERP typically addresses the structure of the incident management organization of the LNG terminal, procedures for responding to emergencies within the LNG Terminal, and procedures for emergency evacuation adjacent to the LNG Terminal and along LNG vessel transit route. The ERP also includes plans for initial and continuing training of plant operators and local responders along with provisions for annual emergency response drills by terminal emergency personnel, first responders, emergency response agencies, and appropriate federal, state and local officials. We also review documentation that the required consultation with the Coast Guard and state and local agencies has been completed through correspondence with consulting agencies, and minutes or notes of coordination meetings.

The FERC has also received comments, including comments from the ODE, Oregon Department of Justice, and Clatsop County, expressing concern that the local community would have to bear some of the cost of ensuring the security and emergency management of the LNG facility and the LNG vessels while in transit and unloading at the berth. Section 3A(e) specifies that the ERP shall include a Cost-Sharing Plan that contains a description of any direct cost reimbursements NorthernStar agrees to provide to any state and local agencies with responsibility for security and safety at the LNG terminal and near vessels that serve the facility. Therefore, **we recommend that:**

- **The ERP should include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies. In addition to the funding of direct transit-related security/emergency management costs, this comprehensive plan should include funding mechanisms for the capital costs associated with any necessary security/emergency management equipment and personnel base. The Cost-Sharing Plan should be filed with the Secretary for review and written approval by the Director of OEP prior to initial site preparation.**

The cost-sharing plan must specify what the LNG terminal operator would provide to cover the cost of the state and local resources required to manage the security of the LNG terminal and LNG vessel, and the state and local resources required for safety and emergency management, including:

- Direct reimbursement for any per-transit security and/or emergency management costs (for example overtime for police or fire department personnel);

- Capital costs associated with security/emergency management equipment and personnel base (for example patrol boats, fire fighting equipment); and
- Annual costs for providing specialized training for local fire departments, mutual aid departments, and emergency response personnel; and for conducting exercises.

The cost sharing plan must include the LNG terminal operator's letter of commitment with agency acknowledgement for each state and local agency designated to receive resources.

4.11.7 Conclusions on Marine Traffic Safety

The operational safety of LNG carriers is under the jurisdiction of the Coast Guard. If the Coast Guard issues an LOR determining suitability of the waterway for LNG marine traffic with conditions, operational restrictions that may be imposed by the Coast Guard would minimize the potential for a hazardous event occurring in the Columbia River and affecting the safety of the nearby public.

Since 1959, LNG has been transported by ship without a major release of cargo or a major accident involving an LNG carrier. Over the last 45 years, LNG carriers have made over 44,000 voyages worldwide. Based on the extensive operational experience of LNG shipping and the structural design of an LNG carrier, the likelihood of a cargo containment failure and subsequent LNG spill from a vessel casualty - collision, grounding, or allision - is highly unlikely. For intentional spills, the impacts to public safety and property could exist within the Zones of Concern. The severity of impacts within the zones would depend on the location of the incident relative to a specific area, the scope of the incident, and whether the released LNG is ignited or dispersed. However, if the Coast Guard issues a LOR finding the waterway suitable for LNG marine traffic with the conditions referenced under *Coast Guard Waterway Suitability Report*, the Coast Guard would control the transit of the LNG vessel through the harbor and while unloading cargo. The security provisions and operational controls that would be imposed by the Coast Guard, and the local pilots, to direct movement of LNG carriers would maintain the risk of a marine LNG spill, either with or without ignition, at acceptable levels. Therefore, the NorthernStar LNG Project would be unlikely to result in a significant impact within the Zones of Concern because it is unlikely that a substantial cargo release would occur.

4.11.8 Terrorism and Security Issues

The security requirements for the onshore component of the proposed project are governed by 49 CFR 193, Subpart J - Security. This subpart includes requirements for conducting security inspections and patrols, liaison with local law enforcement officials, design and construction of protective enclosures, lighting, monitoring, alternative power sources, and warning signs. Requirements for maintaining safety of the marine terminal are in the Coast Guard's regulations in 33 CFR 127. Requirements for maintaining security of the marine terminal are in 33 CFR 105.

In the aftermath of the terrorist attacks that occurred on September 11, 2001, terrorism has become a very real concern for the facilities under the Commission's jurisdiction. The FERC, like other federal agencies, is faced with a dilemma in how much information can be offered to the public while still providing a significant level of protection to the facility. Consequently, the FERC has removed energy facility design plans and location information from its website to ensure that sensitive information filed under CEII is not readily available (RM02-4-000 and PL02-1-000 issued February 20, 2003).

Since September 11, 2001, the FERC has been involved with other federal agencies in developing a coordinated approach to protecting the energy facilities of the United States. The FERC continues to coordinate with these agencies, specifically with the Coast Guard, to address this issue. The Coast Guard

now requires arriving ships to provide it with a 96-hour advance notice of arrival that includes key information about the vessel and its crew, which allows the Coast Guard to conduct a terrorism risk assessment and put in place appropriate mitigation before the ship reaches the navigation channel. In addition, interstate natural gas companies are actively involved with several industry groups to chart how best to address security measures in the current environment. A Security Task Force has been created and is addressing ways to improve pipeline security practices, strengthen communications within the industry and the interface with government, and extend public outreach efforts.

On October 22, 2003, the Coast Guard issued a series of six final rules, which promulgated the maritime security requirements of the Marine Transportation Security Act of 2002: Implementation of National Maritime Security Initiatives; Area Maritime Security; Vessel Security; Facility Security; Outer Continental Shelf Facility Security; and the Automatic Identification System. The entire series of rulemakings establishes a new subchapter H in 33 CFR. In support of the rulemakings, the Coast Guard applied a risk-based decision-making process to comprehensively evaluate the relative risks of various target and attack mode combinations and scenarios for those vessel types and port facilities that pose a risk of a security incident. This approach provides a more realistic estimation of risk than a simple worst-case outcome assessment. Risk management principles acknowledge that while risk generally cannot be eliminated, it can be reduced by adjusting operations to lower consequences, threats, or vulnerability - recognizing that it is easier to reduce vulnerabilities by adding security measures.

On December 29, 2003, all terminal owners or operators subject to 33 CFR 105 were required to submit a Facility Security Assessment and Facility Security Plan to the Coast Guard COTP for review and approval. The Facility Security Plans were required to be implemented no later than July 1, 2004, or for facilities constructed after July 1, 2004, 60 days prior to operations. Some of the principal owner or operator responsibilities include:

- designating a FSO with a general knowledge of current security threats and patterns, risk assessment methodology, and the responsibility for implementing the Facility Security Plan and Assessment and performing an annual audit for the life of the project;
- conducting a Facility Security Assessment to identify site vulnerabilities, possible security threats and consequences of an attack, and facility protective measures;
- developing a Facility Security Plan based on the Facility Security Assessment, with procedures for responding to transportation security incidents; notification and coordination with local, state, and federal authorities; prevention of unauthorized access; measures and equipment to prevent or deter dangerous substances and devices; training; and evacuation;
- implementing scalable security measures to provide increasing levels of security at increasing MARSEC levels for facility access control, restricted areas, cargo handling, vessel stores and bunkers, and monitoring;
- conducting security exercises at least once each calendar year and drills at least every 3 months; and
- reporting of all breaches of security and security incidents.

Increased security awareness has occurred throughout the industry and the nation. President Bush established the Department of Homeland Security with the mission of coordinating the efforts of all executive departments and agencies to detect, prepare for, prevent, protect against, respond to, and

recover from terrorist attacks within the United States. The Commission, in cooperation with other federal agencies and industry trade groups, has joined in the efforts to protect the energy infrastructure, including the more than 300,000 miles of interstate natural gas transmission pipeline and associated LNG facilities.

Safety and security are important considerations in any Commission action. The attacks of September 11, 2001 have changed the way pipeline operators as well as regulators must consider terrorism, both in approving new projects and in operating existing facilities. However, the likelihood of future acts of terrorism or sabotage occurring at the proposed terminal expansion, or at any of the myriad of natural gas pipeline or energy facilities throughout the United States is unpredictable given the disparate motives and abilities of terrorist groups. It is possible that a release from the LNG storage tanks could be caused by an intentional act, such as a terrorist attack. Although an intentional breach scenario could result in greater thermal radiation in the immediate vicinity of the release, such scenarios are typically associated with the desire to inflict damage to major infrastructure and population and commercial centers. However, existing and proposed security measures discussed in this section make significant impacts to human life and property from a terrorist attack unlikely. The continuing need to construct facilities to support the future natural gas pipeline infrastructure is not diminished from the threat of any such unpredictable acts.

4.11.9 Pipeline Facilities

The transportation of natural gas by pipeline involves some risk to the public in the event of an accident and subsequent release of gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiate, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death.

Methane has an ignition temperature of 1,000°F and is flammable at concentrations between 5.0 and 15.0 percent in air. Unconfined mixtures of methane in air are not explosive. However, a flammable concentration within an enclosed space in the presence of an ignition source can explode. Methane is buoyant at atmospheric temperatures and disperses rapidly in air.

4.11.9.1 Safety Standards

The DOT is mandated to provide pipeline safety under 49 USC § 601. The PHMSA Office of Pipeline Safety (OPS) administers the national regulatory program to ensure the safe transportation of natural gas and other hazardous materials by pipeline. It develops safety regulations and other approaches to risk management that ensure safety in the design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. Many of the regulations are written as performance standards which set the level of safety to be attained and allow the pipeline operator to use various technologies to achieve safety. The PHMSA ensures that people and the environment are protected from the risk of pipeline incidents. This work is shared with state agency partners and others at the federal, state, and local level. Section 5(a) of the Natural Gas Pipeline Safety Act provides for a state agency to assume all aspects of the safety program for intrastate facilities by adopting and enforcing the federal standards, while section 5(b) permits a state agency that does not qualify under section 5(a) to perform certain inspection and monitoring functions. A state may also act as the DOT's agent to inspect interstate facilities within its boundaries; however, the DOT is responsible for enforcement action. The majority of the states have either 5(a) certifications or 5(b) agreements, while nine states act as interstate agents.

The DOT pipeline standards are published in 49 CFR Parts 190-199. Part 192 of 49 CFR specifically addresses natural gas pipeline safety issues.

Under a Memorandum of Understanding on Natural Gas Transportation Facilities (Memorandum) dated January 15, 1993, between the DOT and the FERC, the DOT has the exclusive authority to promulgate federal safety standards used in the transportation of natural gas. Section 157.14(a)(9)(vi) of the FERC's regulations require that an applicant certify that it will design, install, inspect, test, construct, operate, replace, and maintain the facility for which a certificate is requested in accordance with federal safety standards and plans for maintenance and inspection, or shall certify that it has been granted a waiver of the requirements of the safety standards by the DOT in accordance with section 3(e) of the Natural Gas Pipeline Safety Act. The FERC accepts this certification and does not impose additional safety standards other than the DOT standards. If the Commission becomes aware of an existing or potential safety problem, there is a provision in the Memorandum to promptly alert the DOT. The Memorandum also provides for referring complaints and inquiries made by state and local governments and the general public involving safety matters related to pipeline under the Commission's jurisdiction.

The FERC also participates as a member of the DOT's Technical Pipeline Safety Standards Committee which determines if proposed safety regulations are reasonable, feasible, and practicable.

The pipeline and aboveground facilities associated with the Bradwood Landing Project must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR Part 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. Part 192 specifies material selection and qualification, minimum design requirements, and protection from internal, external, and atmospheric corrosion.

Part 192 also defines area classifications, based on population density in the vicinity of the pipeline, and specifies more rigorous safety requirements for populated areas. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. The four area classifications are defined as follows:

- Class 1 – Location with 10 or fewer buildings intended for human occupancy.
- Class 2 – Location with more than 10 but less than 46 buildings intended for human occupancy.
- Class 3 – Location with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building, or small well-defined outside area occupied by 20 or more people on at least 5 days per week for 10 weeks in any 12-month period.
- Class 4 – Location where buildings with four or more stories aboveground are prevalent.

Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation. Pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require a minimum cover of 36 inches in normal soil and 24 inches in consolidated rock.

Class locations also specify the maximum distance to a sectionalizing block valve (e.g., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3, and 2.5 miles in Class 4). Pipe wall thickness

and pipeline design pressures, hydrostatic test pressures, maximum allowable operating pressure, inspection and testing of welds, and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas. Approximately 2.9 miles of the proposed pipeline would be within Class 3 locations, 10.9 miles would be within Class 2 locations, and the remaining 22.4 would be within Class 1 locations.

DOT regulations at 49 CFR 192.179, entitled Transmission Line Valves, require that each point of any Class 3 pipeline be within 4 miles from a mainline valve unless the DOT Administrator finds that an alternate spacing would offer an equivalent measure of safety. NorthernStar has identified a Class 3 pipeline segment between MPs 13.17 and 13.43 with the nearest mainline valve at MP 18.8. Therefore, **we recommend that:**

- **Prior to construction, NorthernStar should either submit a determination from the DOT documenting agreement with the proposed pipeline valve locations, or submit for the review and written approval by the Director of OEP modified pipeline design plans demonstrating compliance with 49 CFR 192.179.**

If a subsequent increase in population density adjacent to the right-of-way indicates a change in class location for the pipeline, NorthernStar would be required to reduce the maximum allowable operating pressure or replace the segment with pipe of sufficient grade and wall thickness, if applicable, to comply with the DOT code of regulations for the new class location.

In 2002, Congress passed an act to strengthen the Nation's pipeline safety laws. The Pipeline Safety Improvement Act of 2002 (HR 3609) was passed by Congress on November 15, 2002, and signed into law by the President in December 2002. As of December 17, 2004, gas transmission operators must develop and follow a written integrity management program that contains all the elements described in §192.911 and addresses the risks on each covered transmission pipeline segment. Specifically, the law establishes an integrity management program which applies to all high consequence areas (HCAs). The DOT (68 Federal Register 69778, 69 Federal Register 18228, and 69 Federal Register 29903) defines HCAs as they relate to the different class zones, potential impact circles, or areas containing an identified site as defined in §192.903 of the DOT regulations.

The OPS published a series of rules from August 6, 2002 to May 26, 2004 (69 Federal Register 29903), that defines HCAs where a gas pipeline accident could do considerable harm to people and their property and requires an integrity management program to minimize the potential for an accident. This definition satisfies, in part, the Congressional mandate in 49 USC 60109 for the OPS to prescribe standards that establish criteria for identifying each gas pipeline facility in a high-density population area.

The HCAs may be defined in one of two ways. In the first method an HCA includes:

- current Class 3 and 4 locations,
- any area in Class 1 or 2 where the potential impact radius²⁸ is greater than 660 feet and there are 20 or more buildings intended for human occupancy within the potential impact circle,²⁹ or

²⁸ The potential impact radius is calculated as the product of 0.69 and the square root of the MAOP of the pipeline in psi multiplied by the pipeline diameter in inches.

²⁹ The potential impact circle is a circle of radius equal to the potential impact radius.

- any area in Class 1 or 2 where the potential impact circle includes an identified site.³⁰

In the second method an HCA includes any area within a potential impact circle which contains:

- 20 or more buildings intended for human occupancy, or
- an identified site.

Once a pipeline operator has determined the HCAs on its pipeline, it must apply the elements of its integrity management program to those segments of the pipeline within HCAs. The DOT regulations specify the requirements for the integrity management plan at § 192.911. NorthernStar has identified 13 HCAs that are crossed by and adjacent to the proposed pipeline route (see table 4.11.9-1).

TABLE 4.11.9-1					
High Consequence Areas Crossed by and Adjacent to the Bradwood Landing Pipeline ^a					
Beginning MP	Ending MP	Criteria	Distance To Pipeline	Land Use	Comments
0.00	0.15	Class 3	< 660 feet	Future LNG Terminal Site	
3.25	4.10	Class 3	< 660 feet	Wauna Industrial Site	
7.94	8.86	Identified Site	850 feet	Jones Beach ATV Sand Dunes	Potential for 20+ ATVs
13.17	13.43	Class 3	300 feet	Boat Launch/Storage	Potential for 20+ boaters
13.08	13.48	Identified Site	700 feet	Boat Storage/Launch, Fish Processing	Potential for 20+ boaters
18.00	18.91	Class 3	< 660 feet	Port Westward Industrial Site	End 36-inch pipeline
18.91	19.05	Class 3	< 660 feet	Port Westward Industrial Site	Begin 30-inch pipeline
34.00	34.38	Class 3	50-1000 feet	Cowlitz River Beach	Public Access Beach 20+ boaters
34.38	34.63	Class 3	200 feet	Scales/Truck shop	Potential for 5 to 20 workers
34.88	35.09	Identified Site	740 feet	Restaurant/Outside Bar	Potential for 20 or more people
35.09	35.40	Identified Site	550 feet	Interstate Highway 5 truck scale	Potential for 20 or more people
35.40	35.80	Identified Site	500 feet	Church	Potential for 20 or more people
^a For 36-inch-diameter pipeline with a Maximum Allowable Operating Pressure (MAOP) of 1,280 pounds per square inch (psi), the radius for the potential impact circle is 889 feet; for 30-inch-diameter pipeline with a MAOP of 1280 psi, the radius for the potential impact circle is 741 feet.					

The pipeline integrity management rule for HCAs requires inspection of the entire pipeline in HCAs every 7 years.

Part 192 prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Under section 192.615, each pipeline operator must also establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency. Key elements of the plan include procedures for:

- receiving, identifying, and classifying emergency events, gas leakage, fires, explosions, and natural disasters;

³⁰ An identified site is an outside area or open structure that is occupied by 20 or more persons on at least 50 days in any 12-month period; a building that is occupied by 20 or more persons on at least 5 days per week for any 10 weeks in any 12-month period; or a facility that is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate.

- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- emergency shutdown of system and safe restoration of service;
- making personnel, equipment, tools, and materials available at the scene of an emergency; and
- protecting people first and then property, and making them safe from actual or potential hazards.

Part 192 requires that each operator must establish and maintain liaison with appropriate fire, police, and public officials to learn the resources and responsibilities of each organization that may respond to a natural gas pipeline emergency, and to coordinate mutual assistance. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials. NorthernStar would provide the appropriate training to local emergency service personnel before the pipeline is placed in service. No additional specialized local fire protection equipment would be required to handle pipeline emergencies.

4.11.9.2 Pipeline Accident Data

Since February 9, 1970, 49 CFR Part 191 has required all operators of transmission and gathering systems to notify the DOT of any reportable incident and to submit a report on form F7100.2 within 20 days. Reportable incidents are defined as any leaks that:

- caused a death or personal injury requiring hospitalization;
- required taking any segment of transmission line out of service;
- resulted in gas ignition;
- caused estimated damage to the property of the operator, or others, or both, of a total of \$5,000 or more;
- required immediate repair on a transmission line;
- occurred while testing with gas or another medium; or
- in the judgment of the operator was significant, even though it did not meet the above criteria.

The DOT changed reporting requirements after June 1984 to reduce the amount of data collected. Since that date, operators must only report incidents that involve property damage of more than \$50,000, injury, death, release of gas, or that are otherwise considered significant by the operator. Table 4.11.9-2 presents a summary of incident data for the 1970 to 1984 period, as well as more recent incident data for 1986 through 2005, recognizing the difference in reporting requirements. The 14.5-year period from

1970 through June 1984, which provides a larger universe of data and more basic report information than subsequent years, has been subject to detailed analysis, as discussed in the following sections.³¹

TABLE 4.11.9-2		
Natural Gas Service Incidents by Cause		
Cause	Incidents per 1,000 miles of Pipeline (percentage)	
	1970-1984	1986-2005
Outside force	0.70 (53.8)	0.10 (38.5)
Corrosion	0.22 (16.9)	0.06 (23.1)
Construction or material defect	0.27 (20.8)	0.04 (15.4)
Other	0.11 (8.5)	0.06 (23.1)
Total	1.30	0.26

During the 14.5-year period, 5,862 service incidents were reported over the more than 300,000 total miles of natural gas transmission and gathering systems nationwide. Service incidents, defined as failures that occur during pipeline operation, have remained fairly constant over this period with no clear upward or downward trend in annual totals. In addition, 2,013 test failures were reported. Correction of test failures removed defects from the pipeline before operation.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 4.11.9-2 provides a percentage distribution of the causal factors as well as the annual frequency of each factor per 1,000 miles of pipeline in service.

The dominant incident cause is outside forces, constituting 53.8 percent of all service incidents. Outside forces incidents result from the encroachment of mechanical equipment such as bulldozers and backhoes; earth movements due to soil settlement, washouts, or geologic hazards; weather effects such as winds, storms, and thermal strains; and willful damage.

Table 4.11.9-3 shows that human error in equipment usage was responsible for approximately 75 percent of outside forces incidents. Since April 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The "One Call" program is a service used by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts. The 1986 through 2005 data show that the portion of incidents caused by outside forces has decreased to 38.5 percent.

TABLE 4.11.9-3	
Outside Forces Incidents by Cause (1970-1984)	
Cause	Percent
Equipment operated by outside party	67.1
Equipment operated by or for operator	7.3
Earth movement	13.3
Weather	10.8
Other	1.5

³¹ Jones, D.J., G.S. Kramer, D.N. Gideon, and R.J. Eiber, 1986. "An Analysis of Reportable Incidents for Natural Gas Transportation and Gathering Lines 1970 Through June 1984." NG-18 Report No. 158, Pipeline Research Committee of the American Gas Association.

The pipelines included in the data set in table 4.11.9-2 vary widely in terms of age, pipe diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

The frequency of service incidents is strongly dependent on pipeline age. While pipelines installed since 1950 exhibit a fairly constant level of service incident frequency, pipelines installed before that time have a significantly higher rate, partially due to corrosion. Older pipelines have a higher frequency of corrosion incidents (including stress corrosion cracking, the failure of ductile metals subjected to constant stress in a corrosive environment), since corrosion is a time-dependent process. Further, new pipe generally uses more advanced coatings and cathodic protection to reduce corrosion potential.

Older pipelines have a higher frequency of outside forces incidents partly because their location may be less well known and less well marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller diameter pipelines, which have a greater rate of outside forces incidents. Small diameter pipelines are more easily crushed or broken by mechanical equipment or earth movements.

Table 4.11.9-4 clearly demonstrates the effectiveness of corrosion control in reducing the incidence of failures caused by external corrosion. The use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly reduces the rate of failure compared to unprotected or partially protected pipe. The data shows that bare, cathodically protected pipe actually has a higher corrosion rate than unprotected pipe. This anomaly reflects the retrofitting of cathodic protection to actively corroding spots on pipes.

TABLE 4.11.9-4	
External Corrosion by Level of Control (1970-1984)	
Corrosion Control	Incidents per 1,000 miles per Year
None-bare pipe	0.42
Cathodic protection only	0.97
Coated only	0.40
Coated and cathodic protection	0.11

The WUTC notes that there have been four gas transmission rupture incidents in Washington caused by weather-related outside forces, two of which occurred near the proposed project area. On March 16, 1995, Williams Northwest experienced a rupture in the 26-inch pipeline near Castle Rock, Washington. The same line experienced a weather-related rupture on February 9, 1997 near Kalama, Washington. Both of these rupture incidents were linked to heavy rainfall, ground saturation, and increase in groundwater (WUTC, Undated). On November 9, 2006, record rains eroded the Toutle River bank near Castle Rock and exposed approximately 400 feet of Williams Northwest pipeline. Approximately 100 feet of river bank sediment was washed away; however, the exposed pipe did not rupture (Daily News, 2006b) and was subsequently restored by Williams.

The May 1, 2003 rupture of the Williams Northwest pipeline (constructed in 1956) near Lake Tapps, Washington (east of Tacoma) caused the release of natural gas for over an hour and evacuation of local residences, a school, and a business (DOT, 2003a). Subsequent investigation into the cause of the Lake Tapps release found that the rupture was caused by stress corrosion cracking (DOT, 2003b). The same pipeline experienced a release on December 13, 2003 near Toledo, Washington (approximately 20 miles north of Kelso) resulting in gas seepage for approximately 3 hours, no ignition, fatalities or injuries, and voluntary evacuation of four residences (Bellingham, 2003; DOT, 2003b). On December 19, 2003,

OPS and WUTC issued a corrective action order which required Williams to shut down Williams Northwest and either replace the 298-mile pipeline or prove that the line was resistant to stress corrosion cracking (DOT, 2003b; WUTC 2003). Williams filed an application with the FERC to replace the pipeline and was authorized to complete this activity on September 13, 2005 (FERC, 2005).

Investigation of an April 15, 2002 rupture of the Williams Northwest pipeline near Kalama found that the pipeline was laid directly on native material when constructed in 1956. The failure was caused by rock impingement on the pipeline (WUTC, 2002).

4.11.9.3 Impact on Public Safety

The service incident data summarized in table 4.11.9-2 include pipeline failures of all magnitudes with widely varying consequences. Approximately two-thirds of the incidents were classified as leaks, and the remaining third classified as ruptures, implying a more serious failure.

Table 4.11.9-5 presents the average annual fatalities that occurred on natural gas transmission and gathering lines from 1970 to 2005. Fatalities between 1970 and June 1984 have been separated into employees and nonemployees, to better identify a fatality rate experienced by the general public. Of the total 5.0 nationwide average, fatalities among the public averaged 2.6 per year over this period. The simplified reporting requirements in effect after June 1984 do not differentiate between employees and nonemployees. However, the data show that the total annual average for the period 1984 through 2005 decreased to 3.6 fatalities per year. Subtracting two major offshore incidents in 1989, which do not reflect the risk to the onshore public, yields a total annual rate of 2.8 fatalities per year for this period.

TABLE 4.11.9-5			
Annual Average Fatalities - Natural Gas Transmission and Gathering Systems ^{a, b}			
Year	Employees	Nonemployees	Total
1970-June 1984	2.4	2.6	5.0
1984-2005 ^c	-	-	3.6
1984-2005 ^c	-	-	2.8 ^d
^a 1970 through June 1984 - American Gas Association, 1986. ^b DOT Hazardous Materials Information System. ^c Employee/nonemployee breakdown not available after June 1984. ^d Without 18 offshore fatalities occurring in 1989 - 11 fatalities resulted from a fishing vessel striking an offshore pipeline and 7 fatalities resulted from explosion on an offshore production platform.			

The nationwide totals of accidental fatalities from various manmade and natural hazards are listed in table 4.11.9-6 in order to provide a relative measure of the industry-wide safety of natural gas pipelines. Direct comparisons between accident categories should be made cautiously, however, because individual exposures to hazards are not uniform among all categories. Nevertheless, the average of 2.6 public fatalities per year is relatively small considering the more than 300,000 miles of transmission and gathering lines in service nationwide. Furthermore, the fatality rate is approximately two orders of magnitude (100 times) lower than the fatalities from natural hazards such as lightning, tornados, floods, earthquakes, etc.

TABLE 4.11.9-6	
Nationwide Accidental Deaths ^a	
Type of Accident	Fatalities
All accidents	90,523
Motor vehicles	43,649
Falls	14,985
Drowning	3,488
Poisoning	9,510
Fires and burns	3,791
Suffocation by ingested object	3,206
Tornado, flood, earthquake, etc. (1984-93 average)	181
All liquid and gas pipelines (1978-87 average) ^b	27
Gas transmission and gathering lines nonemployees only (1970-84 average) ^c	2.6
^a All data, unless otherwise noted, reflects 1996 statistics from the U.S. Department of Commerce, Bureau of the Census, "Statistical Abstract of the U.S. 118th Edition."	
^b U.S. Department of Transportation, "Annual Report on Pipeline Safety - Calendar Year 1987."	
^c American Gas Association, 1986.	

The available data show that natural gas pipelines continue to be a safe, reliable means of energy transportation. Based on approximately 301,000 miles in service, the rate of public fatalities for the nationwide mix of transmission and gathering lines in service is 0.01 per year per 1,000 miles of pipeline. Using this rate, the Bradwood Landing Project might result in a public fatality every 2,762 years. This would represent a slight increase in risk to the nearby public.

4.12 CUMULATIVE IMPACTS

Cumulative impacts may result when the environmental effects associated with a proposed project are added to temporary (construction-related) or permanent (operations-related) impacts associated with past, present, or reasonably foreseeable future projects. Although the individual impact of each separate project might not be significant, the additive or synergistic effects of multiple projects could be significant. This cumulative analysis focuses on potential impacts from the proposed project on resource areas or issues where their incremental contribution would be potentially significant when added to the potential impacts of other actions.

An action must first meet three criteria to be a candidate for inclusion in the cumulative analysis. The action must:

- affect a resource (e.g., marine biological resources) or resources potentially affected by the proposed project;
- cause this impact within all, or part of, the project area; and
- cause this impact within all, or part of, the timespan for the potential impact from the proposed project.

Existing environmental conditions in the vicinity of the proposed Bradwood Landing Project reflect the extensive changes brought about by long-term human occupancy and use of the project area. For example, native vegetative communities in the project area have been substantially altered from their pre-Euro-American settlement condition by timber harvest, agricultural practices, introduction of non-native species, and commercial/industrial and residential developments, while fisheries have been affected by commercial harvest and physical alteration of rivers and streams used by anadromous species.

Table 4.12-1 lists present or reasonably foreseeable future projects or activities that may cumulatively or additively impact resources that would be affected by construction and operation of the Bradwood Landing Project. Currently, we are aware of one other potential LNG import terminal project along the lower Columbia River: the Oregon LNG project at Warrenton, Oregon. LNG import terminals at Port Westward and Tansy Point are not considered reasonably foreseeable projects because initiation of FERC's review process, which would require the applicants to provide information detailing the scope and magnitude of expected impacts, has not occurred. Therefore, the speculative projects at Port Westward and Tansy Point will not be included in this cumulative impacts analysis.

The FERC approved Oregon LNG's request to implement the Commission's Pre-filing Process on June 19, 2007 (FERC Docket No. PF07-10). The Oregon LNG Project consists of an LNG import terminal proposed to be located on 96 acres at the eastern Skipanon Peninsula along the Columbia River in Warrenton, Oregon. A 121-mile sendout natural gas pipeline would extend southeast and connect with the Williams Northwest Pipeline system in Clackamas County. The LNG terminal would receive up to about 100 LNG carriers annually, and 1.2 million cubic yards of material would be dredged for the turning basin and berth.

The FERC accepted the Palomar Project (PF07-13-000) for Pre-filing review on August 30, 2007. This project would consist of a 220-mile-long, 36-inch-diameter natural gas pipeline from the existing GTN pipeline near Madris, Oregon, potentially connecting with the Bradwood Landing Project.

TABLE 4.12-1

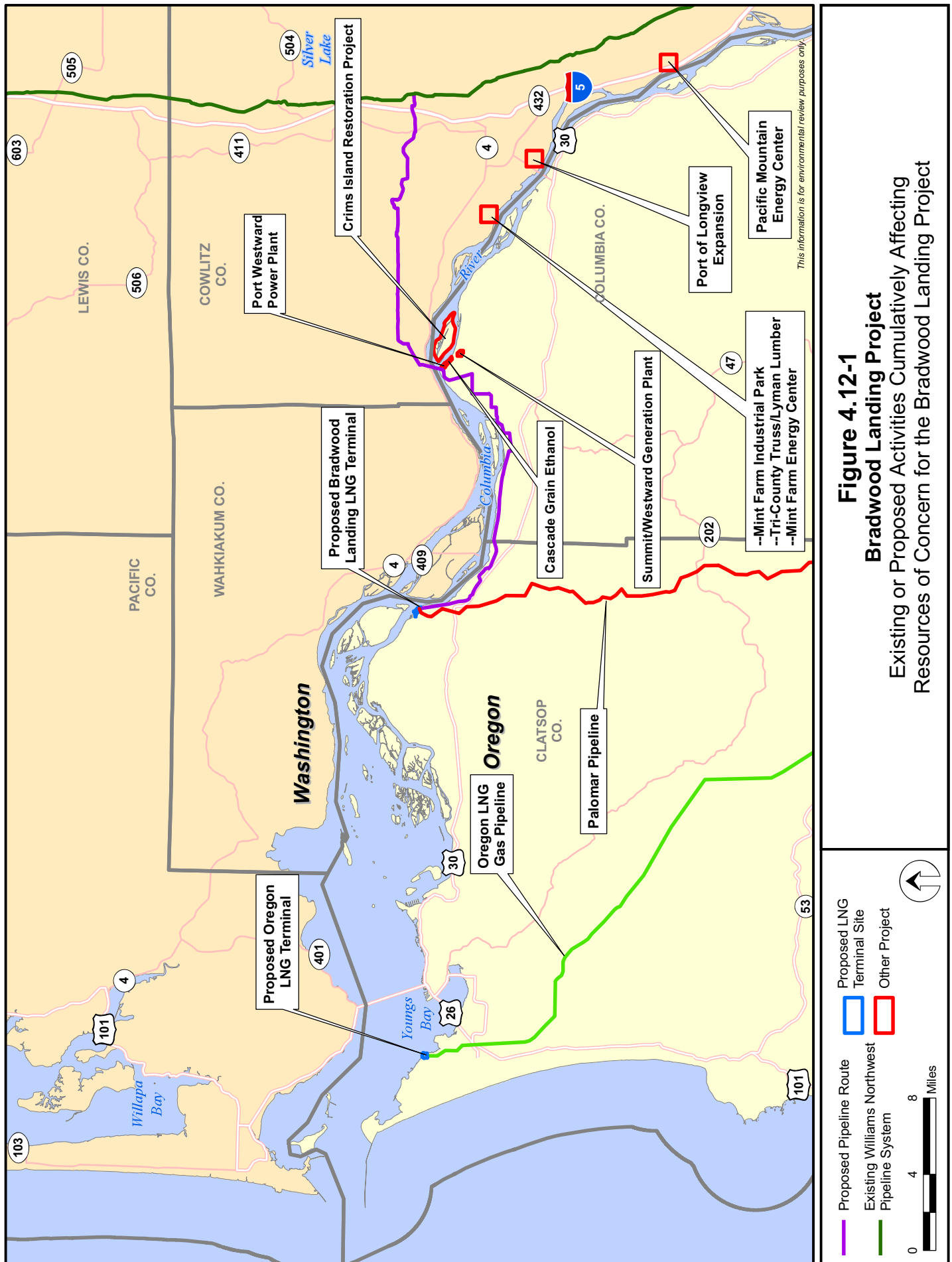
Existing or Proposed Activities Cumulatively Affecting Resources of Concern for the Bradwood Landing Project

Activity/Project	Description	Estimated Timeframe
Logging	Past and ongoing logging operations by companies such as Weyerhaeuser, Plum Creek, Boise Cascade, and Longview Fibre.	Ongoing
Dredging		
Columbia & Lower Willamette Navigation Project	Maintenance dredging of the Columbia River between CRMs 3 and 106.5, and to RM 11 in the Willamette River (within the City of Portland).	Ongoing
Mouth of the Columbia River	Annual maintenance of a 0.5-mile-wide navigation channel for about 6 miles between the Columbia River and Pacific Ocean.	Ongoing
Columbia River Channel Improvement Project	A combined ecosystem restoration and channel deepening project. Ecosystem restoration began in 2006 and primary dredging will be conducted through April 2008. Maintenance of the Columbia River Channel will be ongoing.	Through April 2008/ Ongoing
Maintenance Dredging Projects	Various maintenance dredging projects at the Port of Astoria, Port of Ilwaco, and the mouth of the Skipanon River	Ongoing
Restoration		
Salmon Recovery Strategy	Long-term strategy to recover threatened and endangered fish in the Columbia River Basin through increased water flow, habitat improvements, increased estuary productivity, hatchery reforms, selective fisheries, and reduced load following.	Ongoing
Crims Island Habitat Restoration	Restoration of tidal connectivity to emergent and forested marsh habitat and restoration of tidal marsh and riparian forest habitats.	2005 – 2008
Commercial Shipping	Past and ongoing cargo shipping between the mouth of the Columbia River and southern Idaho.	Ongoing
Commercial and Recreational Fishing	The lower Columbia River supports a number of valuable commercial and recreational fisheries, including salmon, steelhead, white and green sturgeon, eulachon, and bottom fish.	Ongoing
Recreational Boating	Past and ongoing recreational boating along the lower Columbia River includes kayaking, sailing, waterskiing, personal watercraft, and canoeing.	Ongoing
Cruise Ships	Seasonal cruise ship traffic occurring between the mouth of the Columbia River and the Port of Astoria.	Ongoing
Energy, Industrial, and Commercial Development		
Federal Columbia River Power System	System of hydropower projects on the Columbia River and lower Snake River. The closest of the 31 hydropower projects to the proposed Bradwood Landing LNG terminal is the Bonneville Dam, about 120 miles upriver.	Existing
Mist Underground Gas Storage Facility	Underground natural gas storage facility located near Clatskanie, Oregon.	Existing
Southwest Washington/ Northwest Oregon Reinforcement 500-kV Transmission Line Project	Electric transmission line expansion project; final route to be determined.	On Hold
Pacific Mountain Energy Center	An Integrated Gasification Combined Cycle power plant that will include one or two 300 MW combustion turbines and be located at the Port of Kalama, Washington.	2012
Oregon LNG Project	An LNG import terminal proposed to be located on 96 acres at the eastern Skipanon Peninsula along the Columbia River in Warrenton, Oregon. A 121-mile sendout natural gas pipeline would extend southeast and connect with the Williams Northwest Pipeline system in Clackamas County. The LNG terminal would receive up to about 100 LNG carriers annually, and 1.2 million cubic yards of material would be dredged for the turning basin and berth.	2009 – 2012 (construction)
Palomar Pipeline	A 220-mile-long, 36-inch-diameter, bidirectional natural gas pipeline from near Madras, Oregon to near Molalla, Oregon, then northwest to interconnect with various points on Northwest Natural's distribution system, with a potential extension to the Bradwood Landing pipeline.	2010 – 2012

TABLE 4.12-1 (cont'd)

Existing or Proposed Activities Cumulatively Affecting Resources of Concern for the Bradwood Landing Project

Activity/Project	Description	Estimated Timeframe
Port of Vancouver Columbia Gateway Project	Approximately 450 acres of new maritime and industrial development and more than 550 acres of wetland and habitat enhancement.	Potentially within the next 10-15 years
Port of Longview	The Port of Longview has 8 marine terminals and 300 acres of available industrial property located on the Columbia River, 66 miles from the Pacific Ocean. Industries located at and serviced by the Port include steel, over-dimensional, heavy-lift, forest products, dry bulk, and general cargo.	
Port of Longview Expansion	Construction and operation of a new terminal (Berth 8).	1999 – 2000
Mint Farm Industrial Park	The Mint Farm Industrial Park includes nearly 350 acres of land available for industrial development and is located in the City of Longview. Industries currently located at the park include steel and gelatin manufacturing.	
Tri-County Truss/Lyman Lumber	A 37-acre parcel that will have three companies in operation by 2010, including: TCT Truss-Longview, Woodinville Construction Services, and Woodinville Lumber-South.	2006 – 2010
Mint Farm Energy Center	Construction and operation of a natural gas-fired power plant located within the Mint Farm Industrial Park in Longview, Oregon.	TBD
Port Westward Industrial Area	The Port Westward Industrial Area is owned by the Port of St. Helens and includes over 800 acres of industrial land, including a deep-draft marine facility.	
Beaver Power Plant	PGE currently operates a 545 MW power plant.	Existing
Port Westward Power Plant	Construction and operation of a 400 MW natural gas-fired, combined-cycle combustion turbine plant adjacent to PGE's existing Beaver Power Plant. Plant includes a transmission line connecting to the Trojan Switchyard in Rainier, Oregon.	2004 – 2007
Cascade Grains Ethanol Plant	Construction and operation of a 100 million-gallon-per-year ethanol production facility.	2006 – 2008
Praxair CO ₂ Plant	Adjacent to Cascade Grain. Would use CO ₂ produced by the ethanol plant for commercial purposes.	2009
Summit/Westward Cogeneration Project	Natural gas combined-cycle combustion turbine system with 520-MW capability. In March of 2006, Westward Energy filed a request with Oregon Every Facility Siting for a Sixth Amended Site Certificate.	On hold
Columbia County	Road improvements and waterline expansion projects	Ongoing through 2009



Like the Bradwood Landing Project, both the Oregon LNG and Palomar projects would have components in Clatsop County, Oregon. Both the Oregon LNG and the Palomar projects, if expeditiously reviewed and authorized by the FERC, could be constructed within a time frame that overlaps with the construction of the Bradwood Landing Project, if it is authorized in 2008.

Other projects not involving the transmission of natural gas with the potential to cumulatively impact resources are generally concentrated into three general areas, including the Port Westward Industrial Area, Mint Farm Industrial Park, and Port of Longview (see figure 4.12-1). Construction schedules for the future projects depend on factors such as economics, funding, and politics. Projects and activities included in this analysis are generally those of comparable magnitude and nature of impact in the area that would be affected by the Bradwood Landing Project. More geographically distant projects were not assessed because their impact would generally be localized and, therefore, would not contribute significantly to cumulative impacts in the proposed project area. Cumulative impacts that could most directly be associated with the Bradwood Landing Project are discussed below.

We received a number of comments regarding the cumulative impacts of several natural gas projects currently proposed in Oregon, specifically Bradwood Landing, Oregon LNG, and Palomar pipeline. Because of the locations of these projects, the only resources that have potential for cumulative impacts would be air quality, certain socioeconomic resources, and in the case of Oregon LNG, resources that could be affected by dredging and LNG marine traffic. However, we have also provided information on other resources in this section in response to the comments we received.

4.12.1 Geology and Soils

The proposed Bradwood Landing LNG Project would have impacts on near-surface geology and soils. NorthernStar proposes to minimize these impacts through implementation of their ESC Plans and SWPPP as well as our Procedures. We are recommending that NorthernStar revise its pipeline ESC Plan and SWPP to include the measures from the FERC's Plan that provide greater protections. The final design for the Bradwood Landing LNG terminal would include detailed construction specifications, such as deep foundations and vibroflotation to compact soils and mitigate for seismic hazards. Along the pipeline route, NorthernStar would conduct additional studies and produce a Final Pipeline Design Geotechnical Report that provides measures to mitigate for the crossing of potential landslide hazards.

Because the direct effects would be highly localized, cumulative impacts on near-surface geology and soils would only occur if other projects are constructed in the immediate vicinity of the proposed Bradwood Landing Project. The Port Westward Industrial Area is about 12 miles from the proposed LNG terminal site and crossed by the proposed pipeline between MPs 18.0 and 19.0. Construction of the projects within the Port Westward Industrial Area, such as the Port Westward Power Plant, Summit/Westward Cogeneration Project, and the Cascade Grains Ethanol Plant, would require significant excavation or grading and would thus have impacts on near-surface geology and soils. However, construction of these three projects is currently scheduled to be completed before general construction of the pipeline. While there would be potential for cumulative impacts on geological resources and soils if these projects were constructed concurrently with the pipeline, any cumulative impact on geology and soils would be minimized by the implementation of erosion control and restoration measures during construction and restoration of the projects. Consequently, any potential cumulative impacts on geological resources and soils would be minor.

We have no information about impacts on soils or geological resources along the proposed Palomar pipeline, because Palomar has not yet filed its first draft environmental Resource Reports with the FERC. However, only a small portion of the Palomar pipeline would be constructed in proximity to

the Bradwood Landing Project. Consequently, we would not expect a significant cumulative impact on soils and geologic resources.

The Oregon LNG import terminal would be located in an area where dredged materials were deposited, and consists of soils that have a high potential for erosion and poor revegetation potential. About 10 acres at the terminal are classified as prime farmland, although the area was never farmed. The Oregon LNG sendout pipeline would cross 155 mapped soil units. About 45 percent of the route would cross soils which have high potential for water erosion, and 47 percent of the route would cross soils with poor potential for revegetation. About 58 percent of the pipeline route would cross soils classified as prime, unique, or important farmland. Oregon LNG would mitigate impacts on soils by following the FERC's Plan, and its own project-specific Agricultural Impact Mitigation Plan.

Like the Bradwood Landing Project, the Oregon LNG Project would be located within the area influenced by the CSZ. In the case of a seismic event, peak ground accelerations would occur at the proposed Oregon LNG import terminal site, and would decrease along the pipeline eastward. The proposed Oregon LNG pipeline would cross numerous earthquake faults, including the Gales Creek Fault Zone, Mount Angel Fault Canby-Molalla Fault, and Newberg Fault. The Oregon LNG terminal would be located within a mapped tsunami inundation boundary, and risks of inundation are high until about MP 2 of the sendout pipeline. There is also the potential for landslides between MPs 6 and 60 of the pipeline, where it would cross steep slopes over unstable underlying geologic formations. To mitigate for the potential for liquefaction at the Oregon LNG terminal as a result of an earthquake, Oregon LNG would perform ground improvements below critical facilities, including driving piles and jet grouting or cement soil mixing. Along the pipeline route, Oregon LNG would attempt to avoid steep slopes and landslide hazard areas. In situations where these areas cannot be avoided, Oregon LNG would conduct a geological evaluation, install strain gauges where soil creep is anticipated, bury the pipe deeper at some locations, follow the FERC's Plan, and use proper construction and drainage techniques.

Shoreline erosion along the Columbia River is caused by river currents, wind waves, and ship wakes. River currents can erode banks and carry sediment away from the shoreline. Wind waves and ship wakes can also erode banks but they only move sediment locally within the shallow water zone near the shore. The amount of erosion that occurs at a particular location depends on the interaction between the eroding forces of river currents and waves and the resisting forces of the river bank (COE, 1999). As discussed in section 4.1.2.3, the size of waves produced by a vessel passing through a channel depends on the characteristics and speed of the vessel and the characteristics of the channel. However, speed is the most important factor influencing the size of waves produced by a vessel. Large waves contain more energy than small waves and thus, have a greater ability to erode river banks. NorthernStar commissioned a study of wave generation by LNG carriers compared to other large ships along the Columbia River, which indicated that waves generated by LNG carriers for the Bradwood Landing Project would be only slightly larger than those generated by other large ships along the Columbia River operating at the same speed.

Operation of the Bradwood Landing Project and other projects (i.e., Tri-County Truss/Lyman Lumber) would result in increased ship transit up and down the Columbia River. Also, the Oregon LNG Project would, if approved, add an estimated 100 LNG carriers per year transiting to CRM 11.5 beginning as early as 2012. The overall increase in ship traffic would be offset at least in part by the general decreasing trend in ship traffic volume in recent years. The Columbia River Channel Improvement Project will allow larger, deeper draft ships to travel the river.

In a 100-year flood, water may rise up to 9 feet above the current elevation at the location proposed for the Oregon LNG terminal. Oregon LNG indicated that it would need to conduct an evaluation to determine appropriate shoreline erosion control measures for its proposed LNG terminal.

In conclusion, we have determined that the potential impacts on geology and soils, considering the Bradwood Landing Project cumulatively with other past, present, and reasonably foreseeable projects, would not be significant.

4.12.2 Waterbodies and Wetlands

As discussed in sections 4.3.2.2 and 4.3.2.3, the Columbia River is currently considered marginally healthy by the COE, and is water quality limited for temperature, mercury, and arsenic. These water quality conditions reflect both historic and modern activities within and along the river. There are several plans currently in place to improve environmental conditions within the Columbia River, including the *Lower Columbia River Salmon Recovery and Fish & Wildlife Plan*, which was adopted by the NMFS as the *Interim Regional Recovery Plan of the Washington Management Unit for the Lower Columbia River* on February 3, 2006; the *Northwest Power and Conservation Council Fish and Wildlife Program Subbasin Plan for the Lower Columbia Mainstem and Estuary*; the *Lower Columbia River Estuary Program Comprehensive Conservation and Management Plan*; and the *Lower Columbia River Salmon Recovery and Fish & Wildlife Plan*, which is currently being drafted.

In the foreseeable future, there will likely be a number of projects or activities that result in additional stresses on water quality in the lower Columbia River basin, including several of the waterfront projects listed in table 4.12-1 (e.g., Tri-County Truss/Lyman Lumber, Beaver Power Plant, Port Westward Power Plant, Cascade Grains Ethanol Plant, Columbia Tidal Energy Hydroelectric Project, Mint Farm Energy Center, and ongoing maintenance dredging) as well as the Bradwood Landing Project and the Oregon LNG Project.

The Bradwood Landing Project would affect surface water quality (see sections 4.3.2, 4.5.1, and 4.5.2). Specific project-related activities that could have impacts on waterbodies include dredging, dredge disposal, hydostatic testing, water intake by LNG carriers at the berth for ballast and engine cooling, water disposal from operation of SCVs at the LNG terminal, wastewater and stormwater runoff, upland clearing and grading, and pipeline installation. Those activities may:

- increase water turbidity;
- increase water temperature;
- increase erosion;
- cause the filling of wetlands; and
- introduce hazardous materials through potential spills.

Potential construction impacts on waterbodies would be minimized by NorthernStar's compliance with our Plan and Procedures, as well as its SWPPP, ESC Plans, and HDD Contingency Plan. Nevertheless, the Bradwood Landing Project could contribute to cumulative impacts on water quality when considered in combination with other past, present, and reasonably foreseeable projects that may also have impacts on waterbodies within the lower Columbia River basin. The Oregon LNG Project would have impacts on water quality similar to the Bradwood Landing Project. The Oregon LNG sendout pipeline would cross about 190 waterbodies. The proposed Palomar pipeline would cross about 180 waterbodies. Oregon LNG and Palomar would also follow the FERC's Procedures to lessen or mitigate impacts on waterbodies.

Impacts from dredging could be compounded if other significant dredging projects were conducted concurrently at a nearby location (e.g., the Columbia River Channel Improvement Project). The COE is expected to complete its deepening of the navigation channel in the area of the Bradwood Landing site before construction on the proposed LNG terminal would begin. In addition, smaller maintenance dredging projects on the Columbia River are in the preliminary stages, including at the Port

of Astoria, the Port of Ilwaco, and at the mouth of the Skipanon River. The volumes of dredged material at these sites would be much less than the proposed project (Ellis, 2008). Oregon LNG expects that construction of its terminal berth and turning basin would require dredging of about 1,275,000 cubic yards of material. It has not yet stated its preferred placement location for those dredged materials. Permits for dredging in Oregon would be needed from the COE and ODSL, and these agencies would likely impose conditions to mitigate for impacts. There would be a permanent loss of some existing wetlands as a result of construction and operation the proposed Bradwood Landing Project, Oregon LNG Project, Palomar Project, and other reasonably foreseeable future projects located within the Port Westward Industrial Area and Mint Farm Industrial Park. The Bradwood Landing Project would temporarily impact about 15 acres of wetlands at the terminal and 76 acres along the pipeline during construction, and permanently affect about 28 acres total of wetlands during operation of the project. The Oregon LNG terminal would temporarily impact about 21 acres of wetlands during construction, and permanently impact about 15 acres of wetlands during operation. Its sendout pipeline would cross about 240 wetlands. NorthernStar, Oregon LNG, and Palomar would all follow the FERC's Procedures to reduce impacts on wetlands.

The primary cumulative impact associated with dredging is turbidity. Turbidity impacts associated with the projects discussed in this section would be of a short duration and would not be expected to overlap spatially with the Bradwood Landing Project. That is, the turbidity plumes associated with dredging would not likely be additive. Consequently, turbidity impacts are cumulative only in the sense that a single body of water would incur these impacts. Given the volume and dynamic nature of the Columbia River, we would not expect water quality impacts to be cumulatively significant.

These projects would need to obtain permits from the COE, ODSL, ODEQ and WDE to cross or fill wetlands. NorthernStar has drafted a Compensatory Mitigation Plan that proposes measures to be implemented to mitigate for temporary and permanent wetland impacts. That plan calls for the creation of new wetlands or restoration and improvement of habitats at three locations (Hunt Creek, Svensen Island, and Delameter Creek). Oregon LNG also drafted a conceptual *Waterbody and Wetland Construction and Mitigation Procedures Plan* that indicates that it would restore wetlands temporarily impacted, replace lost wetland functions within the same watershed, and purchase mitigation credits. Therefore, the creation of new wetlands and the enhancement of existing wetlands would result in a net increase in regional wetland resources.

4.12.3 Vegetation and Wildlife

When projects are constructed in close proximity at or close to the same time, they have a cumulative impact on vegetation and wildlife occurring in the area where the projects are built. Vegetative clearing and grading and other construction activities associated with the Bradwood Landing Project, along with other construction projects, would result in the removal of vegetation; alteration of wildlife habitat; and displacement of wildlife. Other secondary impacts on vegetation and wildlife include edge effects along the pipeline right-of-way in cleared forest, increased opportunities for predation, and establishment of invasive plant species. These effects would be greatest if the other projects were to be constructed within the same timeframe and geographic area as the Bradwood Landing Project, impacting similar habitats used by the same species.

The proposed Bradwood Landing pipeline would be located adjacent to the existing KB pipeline for 8.0 miles (22 percent of the total route). Construction of the pipeline would affect about 553 acres; of which about 180 acres would be forest. Impacts on forest are considered more severe than effects on other vegetation because a 30-foot-wide corridor over the centerline would be kept permanently cleared of large trees (totaling about 54 acres along the Bradwood Landing pipeline), while it would take some time for forest to regenerate in the temporary work areas. NorthernStar would reduce impacts on

vegetation through implementation of the measures outlined in its pipeline ESC Plan in Oregon and its SWPPP in Washington, and its Noxious Weed and Soil-borne Disease Control Plan. Except within 15 feet of the pipeline, in-kind trees would be replanted, and NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Plan and Procedures.

The majority of the areas within the Port Westward Industrial Area, Mint Farm Industrial Park, and Port of Longview have previously been cleared for industrial development. Because native vegetative communities have been substantially altered at these areas, the cumulative impact of these proposed projects on vegetation is expected to be minor.

About 30 percent of the route for the Oregon LNG sendout pipeline would follow existing rights-of-way, along roads, railroads, and power lines. About 38 percent of the route of the proposed Palomar pipeline would parallel existing rights-of-way. Construction of the Oregon LNG pipeline would affect a total of about 1,461 acres. Forested land along the Oregon LNG pipeline includes the Coastal Uplands, Volcanoes, Willapa Hills, and Willamette River Gallery Forest ecosystems, where construction is expected to clear a total of about 670 acres. Construction of the Palomar pipeline would affect about 3,070 acres. At this time we do not have an estimate for the amount of forest that may be cleared along the Palomar pipeline, but it would cross portions of the Mount Hood National Forest, and Tillamook and Clatsop State Forests.

Cumulative impacts on vegetative communities would be minimized for the FERC regulated projects (Bradwood Landing, Oregon LNG, and Palomar) because they would follow the FERC staff's Plan and Procedures, and implement restoration plans, including reseeding and replanting of vegetation. They may also implement project-specific mitigation measures designed to minimize the potential for erosion, and control the spread of noxious weeds, thereby reducing the degree and duration of their cumulative impacts on vegetation. For example, the Oregon LNG pipeline would cross portions of the Clatsop and Tillamook State Forests, and when crossing those lands Oregon LNG would implement measures consistent with the Northwest Oregon State Forest Management Plan.

Construction of the Bradwood Landing Project at the same time as other projects listed in table 4.12-1 could cause cumulative impacts on coldwater anadromous fisheries, and designated EFH. The geographic extent and duration of disturbances to waterbodies that may affect aquatic species would be minimized for the FERC regulated projects, because they would follow the FERC staff's Plan and Procedures, and would implement project-specific mitigation plans. Additionally, the projects that would involve direct in-stream impacts on anadromous fisheries and other waterbodies designated as EFH would need permits and authorizations from the COE, ODSL, and WDE, and would consult with the ODFW, WDFW, NMFS and FWS. These agencies would require measures to mitigate impacts on aquatic resources. NorthernStar's SEI would be a voluntary program to ensure the future recovery of salmon and the lower Columbia River ecosystem, separate from its other mandatory avoidance and mitigation measures

There are currently about 1,800 commercial ships that call on ports along the lower Columbia River, with about 66 percent of this traffic docking at Portland, 18 percent docking at Vancouver, and 10 percent docking at Longview. We estimate that all of these commercial ships combined intake as much as 10.4 billion gallons per year in ballast water while at dock. We estimate that LNG carriers at the Bradwood Landing LNG terminal berth may take in about 3.1 billion gallons of ballast water per year. LNG carriers at the proposed Oregon LNG terminal may take in an additional 1.3 billion gallons of ballast water per year. The average flow of the Columbia River past Bradwood Landing is about 136 billion gallons per day. The additive water withdrawals for ballast of all current commercial ship traffic on the lower Columbia River, plus future traffic in LNG carriers docking at the Bradwood Landing and Oregon LNG terminals, would total about 14.8 billion gallons per year, which represents about 0.03

percent of the average river flow. To reduce impacts on juvenile fish from intakes for carrier ballast at the Bradwood Landing terminal, NorthernStar would screen all river water withdrawals. We are recommending that either all LNG carriers calling at the Bradwood Landing terminal be retrofitted to use NorthernStar's filtered water system, or NorthernStar would need to file another system design to deliver screened water to non-retrofitted LNG carriers.

The Bradwood Landing Project, in combination with the other projects that may take place in the general geographic region and same time period may have cumulative impacts on animal and plant species and their critical habitat that are listed as threatened or endangered federally and/or by the States of Oregon and Washington. We have identified 36 federally listed threatened and endangered species in the Bradwood Landing project area. The project may affect 13 salmonid ESU/DPS, and the Columbian white-tailed deer. NorthernStar has committed to implement its Compensatory Mitigation Plan, which has been designed to exceed existing mitigation standards and would result in substantially larger areas being restored and/or protected than would be lost to permanent impacts and would be restored to a higher level of ecosystem function. Although the Compensatory Mitigation Plan would benefit a variety of aquatic and terrestrial species, it was designed with additional emphasis on protection and restoration of habitat for federally listed salmonids and the Columbian white-tailed deer. We produced a BA and EFH Assessment for the Bradwood Landing Project in March 2007 that is currently being revised to address comments from the FWS and NMFS.

Along the route of the Palomar pipeline, Palomar identified potential habitat for 20 federally listed species, including the marbled murrelet and the northern spotted owl, and 17 state listed species. Oregon LNG identified 15 fish species, 4 sea turtles, 8 marine mammals, 4 bird species, 1 invertebrate, and 2 plants that are federally listed within its project area.

Both Palomar and Oregon LNG would need to provide a plan for the mitigation of impacts on listed species, prepared in consultation with the ODFW, FWS, and NMFS. Using those mitigation plans, the FERC would produce BA and EFH Assessments for these projects, for review by the FWS and NMFS, who, in their BOs for these projects, may require additional conditions to protect or mitigate impacts on sensitive species. Therefore, although construction and operation of the Bradwood Landing Project along with the other potential projects and activities would result in impacts on aquatic and terrestrial resources, cumulative impacts on federally listed species and their designated critical habitat would be minimized through consultations with the NMFS and FWS, as required under the ESA.

4.12.4 Land Use, Recreation and Special Interest Areas, and Visual Resources

The proposed project and the other foreseeable future projects would result in both temporary and permanent changes to current land uses. The Bradwood Landing LNG terminal would be constructed on a tract of land that was previously used as a lumber mill and for dredged material placement. On March 20, 2008, Clatsop County changed the land use zoning for the proposed Bradwood Landing Project so that the terminal and pipeline would be allowed uses, with certain conditions. The proposed pipeline route would affect agricultural, forest, rangeland, open, commercial/residential, and water land uses. NorthernStar would continue to consult with Columbia County, Oregon, and Cowlitz County, Washington about the installation of its pipeline in a manner that would be consistent with county land use plans and guidelines. Cowlitz County, Washington can adopt this EIS for its SEPA needs.

The majority of the projects listed in table 4.12-1 occur within the Port Westward Industrial Area and Mint Farm Industrial Park, which occupy about 1,150 acres of land. These areas have been developed specifically for commercial and industrial facilities, and significant impacts on land use would not be expected.

About 35 percent of the proposed Palomar pipeline would cross public lands, including about 2 miles of land administered by the BLM, 47 miles within the Mount Hood National Forest, and 24 miles of state of Oregon lands. However, we have no additional data, yet, about potential land use conflicts related to the Palomar Project. The Bradwood Landing pipeline would have no direct impacts on national, state, or local parks or recreational facilities. It would avoid islands that form a part of the JBHNF, and the Lower Columbia River Water Trail, by using the HDD method to cross under the Columbia River. The Oregon LNG sendout pipeline would cross one proposed national wildlife refuge and two state forests. The Oregon LNG terminal would be located on a 96 acre parcel owned by the ODSL and leased to the Port of Astoria, within the City of Warrenton, that is zoned for industrial development. The proposed sendout pipeline for the Oregon LNG Project would cross mostly forest (48 percent) and agricultural land (44 percent). We discussed how impacts on vegetation would be addressed above.

The Bradwood Landing Project, in combination with the other foreseeable regional projects listed on table 4.12-1 could result in cumulative impacts on recreational or special interest areas if these projects would affect the same area or feature (e.g., trails) at the same time. As discussed in section 4.7.1.4, high levels of recreational fishing and boating occur during the summer months along the lower Columbia River (averaging about 300 private fishing boats in the waters of the Columbia River estuary per day between June and August). River users may be affected by the additional marine traffic of 275 LNG carriers per year entering the lower Columbia River navigation channel going to the Bradwood Landing Project and Oregon LNG Project combined. However, the LNG carriers on the waterway to the Oregon LNG terminal would only transit about 11.5 miles up the Columbia River from its mouth to the location of the terminal in Warrenton. Because recreational users of the Columbia River have always had to account for commercial ship traffic, no significant additional cumulative impacts on these activities are likely. Recreational boats would merely need to briefly move out of the way of passing LNG carriers, much as they currently do for other commercial ships. In addition, the Coast Guard, in its WSR and LOR, would impose conditions on LNG carriers in the water to protect and resolve conflicts with other river users.

LNG marine traffic on the waterway to either the Bradwood Landing LNG terminal or the Oregon LNG terminal would pass by parks and trails that would be overlapped by the Zones of Concern. This includes elements of the LCNHP at Fort Stevens and Cape Disappointment State Parks, the LCNHT, the Lower Columbia River Water Trail, Hammond Marina, and the Warrenton Waterfront Trail and Carruthers Park. However, with the implementation of the Coast Guard's requirements for safety and security, the likelihood of an incident resulting in an LNG spill is extremely low, and users of regional parks and trails should not be adversely affected by these proposed projects. Visual impacts on park and trail visitors from LNG marine traffic would be limited, because the viewshed already includes commercial ship traffic of up to 2,000 vessels per year, and because the LNG carriers would take only a few minutes to travel through the viewshed in the waterway at speeds between 8 to 12 knots.

Most of the projects listed in table 4.12-1 are located in previously developed commercial or industrial areas associated with the Port Westward Industrial Area, Port of Longview, and Mint Farm Industrial Area. Construction and operation of new buildings or structures associated with these projects, including those at the proposed LNG terminal, would have a permanent effect on visual resources. However, the cumulative impacts would not be significant, because the facilities would be seen in the context of existing facilities in the area and would not adversely affect the viewshed from sensitive locations or change the character of the landscape in terms of either physical characteristics or land uses. The existing facilities at the Port Westward Industrial Area, Port of Longview, and Mint Farm Industrial Area would screen, backdrop, and otherwise minimize the overall impact on visual resources from these projects to less than significant levels.

The most visible elements of the LNG projects would be the LNG storage tanks, which would be about 170 feet high and 260 feet wide. Other visual elements associated with the LNG project include nonjurisdictional power lines. The Oregon LNG Project would contribute to cumulative visual impacts along the waterway but would be 27 miles from the Bradwood Landing Project. The Oregon LNG terminal would be visible to viewers in Warrenton and Astoria, with a combined population of about 14,000 people. The Bradwood Landing LNG terminal would be most readily visible to residents of Clifton, Puget Island, and Cathlamet, with a combined population of about 1,370 people. NorthernStar would reduce visual impacts of its terminal by implementing a lighting plan, painting the storage tanks to blend into the background of the forested hills, and planting trees along the berm around the process area.

The Bradwood Landing, Oregon LNG, and Palomar pipelines would be installed beneath the ground surface. Once their rights-of-way are properly restored and revegetated, they should not represent significant visual elements, subordinated within the existing landscape character, with the exception of the treeless portion of their permanent easements through what is currently forest. We have discussed impacts of those projects on vegetation above. The cumulative visual impacts of these combined projects would be reduced within the context of the existing landscape, which already includes land uses that have altered that landscape, including timber harvesting activities, farming and other agricultural activities, industrial, commercial, and residential developments, and infrastructure such as roads and power lines.

4.12.5 Socioeconomics

Present and reasonably foreseeable future projects and activities could cumulatively impact socioeconomic conditions in the project area. Employment, housing, infrastructure, public services, and traffic could experience both beneficial and detrimental impacts. None of the projects appear to have environmental justice issues.

Economy and Employment

The projects considered in this section would have cumulative effects on employment during construction if more than one project is built at the same time. The Bradwood Landing Project expects to employ up to 750 workers during the peak construction months. NorthernStar anticipates that most of the labor force for construction of the project would come from the four-county project area, or from the Portland MSA. Approximately 20 non-local specialty workers and managers may be hired for the Bradwood Landing Project. If several of the larger projects, such as the Summit/Westward Cogeneration, Palomar, and Oregon LNG projects, are built simultaneously, the demand for workers could exceed the local supply of appropriately skilled labor. Construction of the Oregon LNG terminal is expected to require an average of 456 construction workers during a 44-month-long period, with 60 percent being hired within Oregon. The Portland MSA and four-county project area has a civilian labor force of about 5,893,060 people and an average unemployment rate of 6.6 percent. This suggests that the local labor force could meet some of the employment needs induced by construction of these projects, although it is unknown whether a sufficient number of these unemployed persons have the necessary skills to work on these projects. If all the major projects in the region are constructed during the same time period, and the demand for local workers exceeds supply, it is assumed that the remainder of the employment positions would be filled by non-local hires.

Operation of the Bradwood Landing Project would employ about 65 permanent workers. In addition, tug operations required to support the terminal would require about 40 employees. The Oregon LNG Project would likely have 63 permanent operational employees. Based on the current commuting patterns of workers at Wauna Mill, almost all of the operational workers for the LNG terminal projects are expected to come from the local four-county area. Additional tug operators may need to be brought in from outside of the area if not enough local workers that are trained or willing to be trained are available.

These projects are expected to have cumulative benefits for the local economy in terms of direct payroll expenditures, purchase of supplies and materials, indirect employment in service sector, and taxes. As discussed in sections 4.8.2.4 and 4.8.3.4, the estimated payroll for the proposed Bradwood Landing Project would be about \$110 million during the construction phase, and direct expenditures for goods, equipment, and services would total \$88 million. The total indirect and induced effect of the Bradwood Landing Project would be about \$77 million, with annual property taxes anticipated to be \$7.7 million during operation of the LNG terminal. The Oregon LNG Project estimates that it could spend up to a total of \$361 million on labor costs, and \$672 million on material purchases. Annual property taxes during operation of the Oregon LNG terminal would be about \$6.8 million to Clatsop County, Oregon.

Housing

NorthernStar would mostly employ local workers who would reside within commuting distance of the project. For the proposed Bradwood Landing Project, an estimated maximum of 20 housing units would be needed per month to accommodate the non-resident construction workforce. If 40 percent of the work force hired by the Oregon LNG Project were non-local, about 300 workers may require housing. The non-local workers would be expected to rent houses, apartments, hotel/motel rooms, or stay in recreational vehicle camps. The total housing unit vacancy rate in Clatsop County, Oregon is about 25 percent. According to Oregon LNG, the vacancy rates for hotels/motels in Astoria range from almost 80 percent in the winter to 50 percent in the summer. We estimated that there were a total of about 1.2 million housing units in the four counties affected by the Bradwood Landing Project and the Portland MSA (see section 4.8.2.2). Given the vacancy rates, the number of housing units, and the availability of hotel/motel rooms and campgrounds in the region, it is not anticipated that construction crews would encounter difficulty in finding temporary housing. If construction occurs concurrently with other projects, temporary housing would still be available but may be slightly more difficult to find and/or more expensive to secure during the summer tourist season. Regardless, these effects would be temporary, lasting only for the duration of construction, and there would be no long-term cumulative effect on housing.

Infrastructure and Public Services

The cumulative impact of the Bradwood Landing Project and the other projects listed in table 4.12-1 on infrastructure and public services would depend on the number of projects under construction at one time. The area has a relatively small number of police, fire, and emergency service personnel (see section 4.8.1.6, 4.8.2.6, and 4.8.3.6); therefore, if several projects were to be constructed at once, the incremental demands of those projects could become difficult for police, fire, and emergency service personnel to address.

NorthernStar has indicated that trained personnel and fire fighting equipment would be maintained at the LNG terminal in the event of an emergency. NorthernStar has produced a draft ERP, which, in accordance with the EPAct, includes a cost-sharing plan that outlines how NorthernStar would fill resource gaps and supplement the first-responder capabilities of the local communities near its proposed LNG terminal. The draft ERP will be reviewed by the FERC and Coast Guard, and revised accordingly. The Oregon LNG Project would also be required to have an ERP and cost-sharing agreement for emergency services in place. The additional emergency resources required for a second LNG facility on the lower Columbia River may be less than those needed for the first because a fire or other incident would be unlikely to occur at both facilities or on two LNG carriers at the same time. Therefore, it is possible that certain emergency response resources could be shared. With implementation of the ERPs, no long-term cumulative effect on infrastructure and public services is anticipated.

Transportation and Traffic

Road Traffic

The cumulative impacts associated with the construction of several of the projects listed in table 4.12-1 at the same time would include construction equipment traffic and worker commuting traffic. Both construction equipment and workers constructing the Bradwood Landing LNG Project would use Highway 30 as a main access route in Oregon, but construction equipment and workers may also travel on Highway 4 in Washington. Both Highway 30 and Highway 4 may be used during construction of other projects in Longview and Port Westward. Construction of the Oregon LNG terminal is expected to mainly have traffic impacts on Highway 105 and Highway 101 in the Warrenton/Astoria area; thus it would not add cumulative impacts on traffic for the roads used by construction vehicles for the Bradwood Landing Project.

As discussed in section 4.8.2.7, an independent traffic study for the Bradwood Landing Project counted 6,200 daily trips along Highway 30 at Clifton Road. During construction of its LNG terminal, NorthernStar anticipates an average of 30 project-related trucks a day. NorthernStar would make improvements to Clifton Road to handle construction traffic. In addition, it would bus in workers from a parking lot near Taylorville. We have recommended that NorthernStar produce a final traffic management plan, in consultation with Clatsop County and ODOT, to mitigate impacts on other road traffic.

Pipeline construction equipment would use local access roads and the right-of-way. Some roads crossed by the pipeline may be open cut, which could temporarily disrupt other road traffic. However, these roads are in rural areas that do not have high volumes of traffic. NorthernStar would apply for necessary local permits for road crossings and comply with permit stipulations. NorthernStar would consult with the affected counties to address traffic flow and control issues and minimize impacts. Potential cumulative impacts on road traffic from construction of any of these projects located in close geographic proximity during the same time period would be minor and short term.

Ship Traffic

Annual commercial ship traffic at the mouth of the Columbia River in recent years has been roughly 2,000 round-trips, with a downward trend since 2000 (Kraley, 2006). It is estimated that the number of ship trips along the Columbia River has decreased by roughly 25 percent in the last 20 years while the volume of cargo has remained relatively stable. This indicates a greater reliance on bigger ships, many of which are similar in size to the LNG carriers that could transit to the Oregon LNG terminal or Bradwood Landing. In order to better accommodate the large vessels making calls on ports along the Columbia River, the COE is deepening the navigation channel from 40 to 43 feet (Columbia River Channel Coalition, 2006).

If both the Oregon LNG Project and the Bradwood Landing Project were authorized and built within a similar time period, there may be as many as 275 LNG carriers per year entering the lower Columbia River. That would represent an increase of about 14 percent above current levels of commercial ship traffic, but would still not approach historic highs in past commercial ship traffic on the Columbia River.

Operation of the Tri-County Truss/Lyman Lumber facilities at the Mint Farm Industrial Park would also result in an increase in ship traffic along the Columbia River, although the quantity of additional ship traffic these facilities would generate is currently unknown. In addition, the Port of Vancouver Columbia Gateway project could add about 365 deep-draft cargo ships per year. However,

the industrial development district levy that would have funded the project failed to pass in August 2007. The Port of Vancouver indicates that the project could “potentially” be developed in 10 to 15 years (Port of Vancouver, 2008). However, because shipping activity within the Columbia River would remain below historic levels, combined with the fact that the Columbia River is currently undergoing channel deepening to better accommodate large vessel traffic, we do not expect that operation of other projects would have significant cumulative impacts on commercial ship traffic on the Columbia River.

LNG marine traffic on the waterway may cause some delays for other commercial ship traffic, due to the timing of crossing of the Columbia River Bar, safety and security zones, and non-passing zones. However, a study conducted for NorthernStar indicated that half the time an LNG carrier would be crossing the bar it would not encounter any other commercial ships, and only 20 percent of the time would an LNG carrier cause a delay for another commercial ship at the bar. The worst case scenario is that another ship would have to wait an entire tidal cycle to cross the bar. However, with proposed navigation protocols, scheduling priorities, pro-active communication between LNG carriers and other commercial ships, and coordination between pilots and the Coast Guard, delays would be minimized.

4.12.6 Cultural Resources

There are no statutory requirements that privately developed projects protect cultural resources, unless a federal license, permit, or funding would be involved, or the project would affect other public lands. Under Oregon regulations, permits would be required from the Oregon SHPO in order to conduct cultural resources surveys on non-federal public lands, and to excavate archaeological sites on non-federal public and private lands. If there is a federal nexus, the project must comply with section 106 of the NHPA and take the impacts of the undertaking on historic properties into consideration. The proposed projects listed in table 4.12-1 that are defined as federal actions, such as Oregon LNG and Palomar Pipeline, would need to consult with the SHPO, identify historic properties that may be affected, and implement measures to resolve impacts on affected properties. Non-federal actions would need to comply with whatever conditions may be imposed by the state or local permitting agencies with regards to the protection of cultural resources.

We have not yet completed compliance with section 106 of the NHPA for the FERC regulated projects, because surveys for the entire APE cannot be done until after the FERC issues an Order, and the applicants would have access to lands where it was previously denied. There is a known significant archaeological site (35CO16) at Port Westward that Columbia County should take into consideration when planning or authorizing future actions in its Industrial Zone. The Bradwood Landing pipeline would avoid impacts on site 35CO16 by using an HDD under the Columbia River. We and the SHPO agree that the Bradwood Landing Project would not adversely affect the LCNHT and ACRR. Along the Oregon LNG pipeline, nine sites were identified that require additional work to evaluate their NRHP eligibility. However, the Oregon LNG pipeline and Bradwood Landing pipeline are not located in the same geographic area, and would not have cumulative impacts on cultural resources.

4.12.7 Air Quality and Noise

Construction of most of the reasonably foreseeable future projects listed in table 4.12-1 would involve the use of heavy equipment that would produce noise, air contaminants, and dust that would contribute cumulatively to impacts on air and noise quality. The counties that could be affected by the Bradwood Landing Project are currently in attainment with air quality standards, or are unclassified. Cumulative impacts on air quality would be limited primarily to areas where more than one project is proposed within the same airshed. Portions of the Oregon LNG and Bradwood Landing Project would overlap, especially for LNG carrier traffic in the waterway up to CRM 11.5; and both proposed LNG import terminals would be located in Clatsop County, Oregon. We estimate that if both the Oregon LNG

Project and the Bradwood Landing Project are authorized and built, there would be cumulative impacts on local air quality from LNG marine traffic in the waterway. It is not currently feasible to exactly model air quality impacts from combined LNG carrier traffic due to the complexity of modeling moving LNG carriers, changing topography along the river, and microclimates along the waterway. From a cumulative impact standpoint, operation of both the Oregon LNG and Bradwood Landing terminals would increase county emissions of NO_x and SO₂, primarily due to ship emissions as shown in table 4.12.7-1.

TABLE 4.12.7-1					
Estimated Operational LNG Project Emissions in Clatsop County, Oregon					
Facility	NO _x (tpy)	CO (tpy)	VOC (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)
Bradwood Landing Project	622.4	275.2	44.1	655.2	26.2
Oregon LNG Project	499	138	27.4	624.7	16.6
Total	1121.4	413.2	71.5	1,279.9	42.8
County Inventory	6,500 ^a	32,000 ^a	4,224 ^b	1,134 ^b	6,970 ^b
Increase in County Inventory (percent)	17.3	1.3	1.7	112.9	0.6
^a Provided by ODEQ.					
^b EPA, 2001.					

It should be noted that the inventory data we have for VOCs, SO₂, and PM₁₀ is not current; the newest data available for these pollutants is from 2001. Data for NO_x and CO inventories were obtained from the ODEQ and is more representative of current emission inventories. In addition, both Oregon LNG and Bradwood Landing would each have to obtain air quality permits from the ODEQ. Those permits would contain conditions and stipulations that may minimize cumulative impacts on air quality.

Because the other projects listed in table 4.12-1 are located over a large area; have varying construction schedules; and must adhere to federal, state, and local regulations for the protection of ambient air quality; it is impossible to quantitatively determine the incremental cumulative impacts that the Bradwood Landing Project would have in combination with these facilities and activities. As stated above, although Oregon LNG and Bradwood Landing may have large impacts on county emissions, it is unlikely that the addition of these facilities would have significant impacts on overall regional quality, although some degradation of overall air quality would be anticipated.

Noise impacts are particularly localized and attenuate quickly as the distance from the noise source increases. Therefore, cumulative impacts on noise associated with construction and operation of these projects would be unlikely.

4.12.8 Reliability and Safety

Impacts on reliability and public safety would be mitigated through the implementation of applicable federal, state, and local rules and regulations for each individual project. The specific rules and regulations that apply to each individual project would ensure that the applicable design standards are implemented to protect the public and to prevent accidents and failures. The LNG terminal facilities would be sited, designed, constructed, operated, and maintained in compliance with the federal safety standards summarized in table 2.8.1-1. The pipelines and aboveground facilities associated with the Bradwood Landing Project, Oregon LNG Project, and Palomar Pipeline would be designed, constructed, operated, and maintained in accordance with DOT Minimum Federal Safety Standards in 49 CFR 192.

4.12.9 Cumulative Impact Conclusions

We conclude that construction of the projects listed in table 4.12-1, especially if they are constructed on an overlapping timeline with the Bradwood Landing Project, has the potential to contribute cumulative impacts on the project area. The greatest potential for cumulative impacts is associated with the Oregon LNG Project. The type of project, construction methods, and impacts would be similar for the two projects. Each of these projects would result in temporary and minor effects during construction, but each project would be designed to avoid or minimize impacts on water quality, marine resources, and marine transportation. Additionally, significant impacts on sensitive resources resulting from these projects would be mitigated, and mitigation generally leads to the avoidance or minimization of cumulative impacts.

We recognize that unanticipated accidents during construction or operation could result in potential undefined impacts. However, a meaningful evaluation of those potential impacts is impossible, as quantification of potential impacts would be speculative at best. Accordingly, we consider project monitoring and mitigation programs to be critical in addressing unanticipated impacts, should they occur. With NorthernStar's proposed construction and operation methods, and strict adherence to our recommendations, federal and state regulations, and permitting requirements, impacts associated with the Bradwood Landing Project would be minimized, and would not constitute a significant impact in combination with other past, present, or reasonably foreseeable projects.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF THE STAFF'S ENVIRONMENTAL ANALYSIS

The conclusions presented are those of the environmental staff of the FERC working in cooperation with the Coast Guard and the COE. The Coast Guard LOR will address the suitability of the Columbia River for LNG marine traffic, and the Coast Guard's LNG Operations Plan will address issues related to the public impact of safety and security zones for LNG vessels. Likewise, the COE will present its own conclusions and recommendations in the dredging, dredged material placement, and wetland permits it may issue pursuant to section 10 of the RHA and section 404 of the CWA. The EPA has the authority to review and veto the COE decisions on the section 404 permit.

We (the Commission's staff) have determined that construction and operation of the Bradwood Landing Project would result in limited adverse environmental impacts. However, we have proposed measures to mitigate such impacts. We have also determined that the Bradwood Landing Project is unlikely to result in significant adverse environmental impact on particular resources within the Zones of Concern because it is unlikely that a substantial cargo release would occur. If the proposed project is found to be in the public interest and is constructed and operated in accordance with recommended mitigation measures, it would be an environmentally acceptable action. Our conclusion is based on information provided by NorthernStar; analyses and field investigations by Commission staff; literature research; alternatives analyses; comments from federal, state, and local agencies; and input from public groups and individual citizens. As part of our review, we developed measures that would appropriately and reasonably avoid, minimize, or mitigate environmental impacts resulting from construction and operation of the proposed project. As such, we recommend that our mitigation measures be attached as conditions to any authorization issued by the Commission.

If the Coast Guard issues an LOR finding the waterway suitable for LNG marine traffic, the arrival, transit, cargo transfer, and departure of LNG carriers would be required to adhere to the procedures of an *LNG Vessel Transit Management Plan* to be developed by the Coast Guard Sector Portland. In addition, NorthernStar would develop Operations and Emergency Manuals in consultation with the Coast Guard. These procedures would be developed to ensure the safety and security of all operations associated with LNG marine transits and unloading.

If an accidental or intentional breach of an LNG carrier resulting in a release of LNG were to occur during transit of the waterway, impacts on the various environmental resources within the Zones of Concern could result. LNG would not contaminate water, because it is not soluble, it floats, and the LNG would vaporize shortly after being spilled. The primary hazard from an LNG spill would be a pool fire if the vapors are ignited. A pool fire could have adverse effects on vegetation, wildlife, structures, and people. In general, the area of effect of an LNG release and any resulting fire would be fairly limited in area and short-lived. The severity and duration of the impacts would vary depending on the resource and its distance from the source, as resources in Zone 1 would be more severely impacted than resources in Zone 3. However, with implementation of the mitigation measures described in the Coast Guard's WSR, a release would be highly unlikely and the potential impact on resources would be less than significant.

5.1.1 Geology

The geology of the Pacific Northwest is dominated by the CSZ. The project area is located within the rotating block of that zone, including the Oregon Coast Range and Willapa Hills physiographic regions. The proposed Bradwood Landing LNG terminal was used by the COE to deposit materials dredged from the navigation channel of the Columbia River, and sand piles ranging from 10 to 15 feet

high are currently on site. Below the dredge material is alluvium, sands, silts and clays over basalt bedrock.

The proposed Bradwood Landing site has a high seismic risk associated with proximity to the CSZ. The site also is susceptible to soil liquefaction and lateral spreading at the design earthquake levels of shaking, and requires extensive ground improvements to make the site suitable for the LNG terminal. The project would be designed to withstand an earthquake of magnitude 9 on the CSZ, without loss of LNG containment. Measures to mitigate soil liquefaction impacts include supporting the LNG tanks and other integral structures on deep foundations and vibroflotation to compact existing soils and new fill. We are recommending that the final engineering design for the LNG terminal incorporate a number of detailed seismic specifications and other measures to mitigate the impacts of seismic hazards. The seismic hazard components of final engineering design would be reviewed and approved before construction of the LNG terminal. We are also recommending that prior to construction, NorthernStar retain the services of an independent Board of Consultants to provide oversight of the design and construction of all civil and structural components of the project with particular emphasis on the seismic design requirements and geological hazard mitigation measures for both the LNG terminal and sendout pipeline.

Landslide areas along the pipeline route would be mitigated by one or more of the following: relocation of the pipeline route; HDD crossing of the feature to place the pipeline below potential failure surfaces; and instrumentation of the pipe and/or the surrounding rock or soil to monitor strain in the pipe and movement of the surrounding ground. We are recommending that NorthernStar conduct additional studies and produce a Final Pipeline Design Geotechnical Report with site-specific mitigation measures prior to construction, which would be subject to review by the Board of Consultants and approval by the Director of OEP.

LNG marine traffic in the waterway, and construction and operation of the proposed LNG terminal and pipeline would not be adversely affected by other geological hazards. There is a low potential for tsunamis in this area, and the terminal would be raised to an elevation above the 100-year flood plain.

There is an inactive quarry within the parcel controlled by NorthernStar, outside of the portion that would be developed into the LNG terminal. Otherwise, the project would avoid impacting extractive mineral resources, with no active mines or quarries within 500 feet of the pipeline.

NorthernStar prepared a *Shoreline Monitoring Plan* for the LNG terminal to address shoreline erosion that may occur as a result of dredging for the maneuvering basin. We are recommending that NorthernStar prepare a similar plan to address potential shoreline erosion at the west end of Puget Island that may occur during operation of the project as a result of LNG marine traffic. Based on our review of NorthernStar's plan, as it relates to modification of critical fishery habitats, additional information will be included in the revised BA and EFH Assessment.

5.1.2 Soils and Sediments

The proposed LNG terminal is dominated by sandy soils. Soils along the proposed pipeline route are variable with surface textures ranging from gravelly and silt loams to loamy sands. About 8 percent of the soils that would be crossed by the proposed pipeline are classified as prime farmland, about 29 percent are hydric soils, and 38 percent are soils prone to compaction. Construction of the pipeline would not convert prime farmland to other uses, because it could still be used for agricultural purposes after the pipeline is installed and the right-of-way restored.

Potential impacts on soils would be minimized through measures specified in NorthernStar's terminal ESC Plan (for the LNG terminal) and pipeline ESC Plan and SWPPP (for the pipeline). However, our review of NorthernStar's plans found them to be too general, and we are recommending that NorthernStar revise its pipeline ESC Plan and SWPPP to include the measures from the FERC's Plan that provide greater protection.

NorthernStar's Environmental Site Assessment identified several potential RECs within the proposed LNG terminal property. Ten potentially contaminated sites were identified within 1,500 feet of the pipeline construction work areas. Given the potential presence of contamination at the terminal site and the possibility that contaminated soils could be encountered during installation of the pipeline, we are recommending that NorthernStar prepare a CMMP before construction.

The location for the construction worker parking lot has been changed from the original location proposed by NorthernStar and no information has been provided about the new site regarding soils or other resources. In addition, modifications are now being proposed to Bradwood Road and Clifton Road that would disturb areas outside the current footprint. Therefore, we are recommending that, prior to construction, NorthernStar submit additional information on resources that would be impacted during construction for the new proposed construction worker parking lot, Bradwood Road, and Clifton Road.

Construction of the LNG terminal would require the dredging of about 700,000 cubic yards of sediment for the ship berth and maneuvering area. NorthernStar proposes to place up to the entire 700,000 cubic yards of the dredged material on the LNG terminal site to raise the grade to an elevation of up to 25 feet NAVD 88. Any dredged material not placed at the terminal would be primarily used for beach nourishment at the Wahkiakum County Sand Pit site, located at the northern end of Puget Island. About 80,000 cubic yards of material would be removed from the ship berth and maneuvering area approximately every 2 to 4 years as part of maintenance dredging and placed at the Wahkiakum County Sand Pit site or another approved dredged material disposal site.

NorthernStar proposes to use hydraulic cutterhead dredging to excavate the proposed turning basin and berthing facilities. Dredging activities would resuspend sediments and result in increases in TSS and turbidity. However, the sediments are primarily sand and would settle quickly. As a result, the size of the sediment plume would be small and confined to an area immediately surrounding the proposed dredging site. We are recommending that NorthernStar prepare a plan to monitor the side slopes of the maneuvering basin after dredging and implement side slope protection measures to protect shallow water habitat if necessary.

River bottom samples were taken from the proposed maneuvering area, and analyzed for contamination by metals, inorganic compounds, and organic compounds. Trace amounts of some contaminants were found in the sediment samples, but none exceeded threshold levels that would be considered a threat to human health or would have an adverse effect on aquatic species.

5.1.3 Water Resources

NorthernStar proposes to install a water well at the terminal that would be used to produce a total of about 12.3 million gallons of non-potable water during the 3-year terminal construction period and about 1.1 million gallons annually during operation. Based on the anticipated pumping rates, the well's location, and the permeability of the soils, the drawdown from the well would be unlikely to have an effect on groundwater reserves, wetlands, Hunt Creek, or the Columbia River. NorthernStar has obtained a permit from ODWR to drill and operate this well.

NorthernStar has identified 20 registered private water wells along the pipeline route. Additional surveys and consultations with landowners would be conducted by NorthernStar to locate other wells in or near the proposed pipeline construction right-of-way where access was previously denied. NorthernStar developed a preliminary well protection plan to address the effects of HDD and pipeline trenching activities. In the event a water well is damaged as a result of the pipeline construction, NorthernStar would arrange for a temporary source of potable water and provide for the repair of the well or replacement of the water supply, as necessary. Additionally, NorthernStar would follow the measures outlined in its pipeline ESC Plan and SWPPP to avoid or minimize impacts on groundwater resources.

Dredging the maneuvering area would have limited temporary impacts on water quality in the Columbia River. NorthernStar proposes to place up to 700,000 cubic yards of dredged material on the LNG terminal site. Before dredged material placement, a perimeter berm would be constructed around the area receiving dredged materials, forming a basin into which the dredged material would be placed. NorthernStar indicated that the water settling out from the dredge material slurry placed at the proposed LNG terminal would mostly infiltrate into the ground and would not be allowed to overtop the perimeter berm and discharge to the river untreated. NorthernStar conducted hydraulic and sediment transport analyses that demonstrated that the proposed dredging would not significantly change river flows, bed conditions, or the form of Clifton Channel. However, the model showed that there may be minor changes in the bed elevation of the Columbia River near the navigation channel. We will further study project-related impacts on sediment transport and deposition within Clifton Channel and the lower Columbia River regarding biological function and value for aquatic resources. The results of our analyses will be included in our revised BA and EFH Assessment.

During construction, NorthernStar would appropriate about 15 million gallons of water from the Columbia River for soil compaction and ground improvements at the LNG terminal. This water would not be discharged to surface waters. NorthernStar would also obtain up to 60 million gallons of water from the Columbia River for hydrostatic testing of the LNG storage tanks. After use, the hydrostatic test water from the tanks would be discharged to the Columbia River through a temporary outfall extending approximately 300 feet offshore. About 8.9 million gallons of water would be withdrawn from the Columbia River for hydrostatic testing of the pipeline and would then be discharged to the ground surface. Additional surface water usage during operation of the LNG terminal would include approximately 13.7 million gallons per year for weekly fire suppression system testing, which would be discharged to the river. NorthernStar has obtained a permit from ODWR for these surface water appropriations.

No ballast water from LNG carriers would be discharged into the Columbia River during their transit to the terminal. However, once at dock each LNG carrier would take in up to an estimated 20 to 50 million gallons of water from the Columbia River for ballast and engine cooling during offloading operations. Water withdrawals during project construction and operation would not significantly affect the volume or flow of the Columbia River, as the typical flow of the river is about 45 million gpm and all permanent and temporary surface water intakes would be screened in accordance with the NMFS and ODFW requirements. We are recommending that NorthernStar conduct post-installation water flow mapping through all water intake screens at the LNG terminal, and provide the results of the flow mapping to the FERC, NMFS, and ODFW, for review and approval by the Director of OEP prior to operation of the screens. In addition, we are recommending that NorthernStar develop performance standards for water temperature and biocide use to minimize impacts on water quality associated with cooling water discharges from LNG carriers at the terminal. LNG carrier operations and any resulting impacts on water quality would be comparable to typical shipping traffic, and mitigated to a less than significant level through implementation of our recommendations.

During operation of the LNG terminal, the SCVs would generate about 160 gpm that would be discharged into the Columbia River under an NPDES permit following pH adjustment. While this SCV discharge water would be generally warmer than ambient water temperatures, it would not exceed the ODEQ's temperature standard of 68 °F for fish rearing and migration. The SCV water would be discharged using an outfall/diffuser system designed to rapidly mix the discharged condensate with river water.

NorthernStar proposes to replace the bridge over Hunt Creek as part of the improvement of Bradwood Road for upland access to the LNG terminal. While NorthernStar indicated it would implement specific measures and BMPs to avoid or reduce impacts on Hunt Creek, we are recommending that monitoring be conducted both upstream and downstream of the bridge during demolition and construction activities to ensure that water quality is not adversely affected.

The proposed 36.3-mile-long pipeline would cross 94 waterbodies, including 4 sensitive surface waters in Oregon and 9 sensitive surface waters in Washington. Sensitive surface waters include those containing federally listed threatened and endangered species or their designated critical habitat. The segment of the Columbia River that would be impacted by the proposed project is designated as EFH for coho and Chinook salmon, critical habitat for 12 salmonid ESUs or DPS, and as Aquatic Natural or Aquatic Conservation areas by Clatsop County. The LNG terminal site location is also included in the Lower Columbia River Estuary, which belongs to the EPA's National Estuary Program. At the terminal site, the Columbia River is listed on ODEQ's 303(d) water quality-limited list for temperature (year round, non-spawning) and for exceeding TMDL for arsenic, DDT, and PCBs year-round. NorthernStar would use the HDD construction method at each sensitive waterbody crossing to avoid impacts on waterbody banks and beds.

NorthernStar would use the HDD or conventional bore method at up to 23 waterbody crossings, thus eliminating the need for in-water construction activities that could result in sedimentation and turbidity as well as impacts on waterbody banks and beds. NorthernStar's HDD contingency plan provides procedures and measures to mitigate an inadvertent release of drilling mud to the waterbody. We are recommending that NorthernStar revise its HDD contingency plan to include mitigation measures for frac-outs in uplands. NorthernStar would use open-cut construction methods for the remainder of the waterbody crossings. To minimize impacts on surface waters, NorthernStar would implement its *Waterbody and Wetland Construction and Mitigation Procedures Plan*, in addition to implementing the protective measures specified in our Procedures and NorthernStar's pipeline ESC Plan and SWPPP. NorthernStar's *Waterbody and Wetland Construction and Mitigation Procedures Plan* has not been finalized. NorthernStar is consulting with the FWS, NMFS, and state agencies regarding specific mitigation measures that should be implemented to account for the potential loss of in-stream habitat within the waterbodies crossed by the pipeline. We are recommending that NorthernStar continue to consult with the appropriate federal and state agencies to develop a revised *Waterbody and Wetland Construction and Mitigation Procedures Plan* that includes a description of the specific methods of in-water habitat mitigation to be conducted, measures to prevent the spread of invasive species, and procedures for monitoring the success of revegetation and weed control efforts. With the implementation of the proposed measures and our recommendations, impacts on open-trenched waterbodies would be temporary, and suspended sediment and turbidity levels would return to preconstruction levels soon after the stream crossings are completed.

5.1.4 Wetlands and Terrestrial Vegetation

Construction of the LNG terminal would result in temporary impacts on about 15 acres of wetlands. About 13 acres of wetlands would be permanently lost by conversion of the land to industrial purposes for operation of the terminal. Construction of the pipeline would temporarily affect about 98

acres of wetlands. Operation of the proposed pipeline facilities would result in the permanent conversion of 15 acres of forested wetlands to other wetland types within the permanently maintained right-of-way. NorthernStar would mitigate temporary construction-related impacts by implementing its ESC Plans, SWPPP, and our Procedures, and by complying with the COE's section 404 permitting conditions and ODSL and WDE's section 401 permit conditions. After construction, any wetlands temporarily impacted would be restored back to their former use and function. Forested wetlands would be replanted with in-kind wetland tree specimens, except for a 10-foot-wide strip centered on the pipeline. Trees planted between 5 and 15 feet from the pipeline would be limited to a maximum height of 15 feet to allow for aerial inspection of the pipeline.

Although our Procedures specify that the construction right-of-way through wetlands should be limited to 75 feet, NorthernStar proposes to use a 100-foot-wide construction right-of-way when installing its pipeline across wetlands greater than 100-feet-long, and an 85-foot-wide construction right-of-way through wetlands less than that length. Given the saturated nature of the wetland soils, the need to separate spoil piles, and the larger trench size to accommodate concrete-coated pipe; the wider rights-of-way through wetlands are necessary to allow for safe construction of the pipeline with the least environmental damage.

We identified 24 areas where NorthernStar proposed to locate additional temporary extra workspaces within 50 feet of wetlands, which does not conform to our Procedures. In 21 cases where extra workspaces are needed for HDD or bores, we found the exception to our Procedures is justified, given the site-specific construction constraints. In three other situations, we are recommending that NorthernStar fence and avoid wetlands or relocate the extra workspace. We are recommending that NorthernStar fence wetlands at the pipe storage and contractor yard in Washington and that no work be performed within 50 feet of the wetland at this site.

NorthernStar has drafted a Compensatory Mitigation Plan to account for the permanent loss of some wetlands. Permanent impacts on wetlands would be mitigated by preserving or restoring a greater area of habitat with similar ecological function at different locations, including at the mouth of Hunt Creek, Svensen Island, and Delameter Creek. Because NorthernStar's Compensatory Mitigation Plan has not been finalized, we are recommending that NorthernStar continue to consult with the COE, NMFS, FWS, ODSL, WDE, and other appropriate agencies to finalize its Compensatory Mitigation Plan before project construction.

Construction of the proposed LNG terminal and related ancillary facilities, including the non-jurisdictional 1.5-mile-long power line, would affect about 31 acres of forest and 13 acres of scrub-shrub vegetation. About 10 acres of upland vegetation would be permanently converted to industrial use within the footprint of the operational LNG terminal facilities.

Construction of the proposed sendout pipeline would affect about 180 acres of forest and 7 acres of scrub-shrub vegetation. About 54 acres of forest and 3 acres of scrub-shrub vegetation would be within the permanent operational pipeline right-of-way. NorthernStar would restore and revegetate areas of upland vegetation that would be temporarily cleared during construction of the project.

Long-term impacts would occur on forested communities (i.e., coniferous, deciduous, mixed, early seral, and riparian forests) because of the time required to restore the woody vegetation to its preconstruction condition. NorthernStar would plant upland forested areas in-kind with trees, except for a 30-foot-wide strip centered on the pipeline, which would be planted with a native grass seed mix and maintained in an herbaceous state to facilitate maintenance and inspection. This would result in the conversion of currently forested communities within the permanent right-of-way to a grassland/herbaceous cover type. Annual clearing for maintenance of the pipeline in forested

communities would be limited to a 10-foot-wide corridor centered on the pipeline. NorthernStar's Compensatory Mitigation Plan describes the measures that would be implemented to compensate for impacts on both upland and wetland vegetation.

NorthernStar identified several species of noxious weeds occurring in the project area, including Scotch broom, Himalayan blackberry, and reed canary-grass. To prevent and mitigate for the distribution of noxious weeds during construction and control noxious weeds that develop after construction, we are recommending that NorthernStar revise its *Noxious Weeds and Soil-borne Plant Disease Control Plan* based on consultations with appropriate resource agencies.

5.1.5 Wildlife and Aquatic Resources

The impact of the proposed project on terrestrial wildlife would vary depending on the timing of construction, techniques used, types of habitat affected, and the behavior of individual species. In general, impacts on terrestrial wildlife would be short term because much of the area affected by construction would be restored back to its previous habitat type. Typically, mobile species would relocate to similar adjacent habitat during construction, and return after the area is restored.

Operational lighting at the LNG terminal could affect both terrestrial wildlife and aquatic species. We are recommending that NorthernStar continue to consult with the NMFS, FWS, ODFW, and other appropriate agencies regarding its Lighting Plan and that it be filed for review and approval by the Director of OEP prior to operation of the LNG terminal.

Blasting may occur during construction of the LNG terminal at a quarry near the southwest corner of the site approximately 800 feet from the Columbia River. Special blasting techniques and cover material are typically used to control blasting noise. We are recommending that NorthernStar consult with the NMFS, FWS, ODFW, and other appropriate agencies in developing its Blasting Management Plan to minimize potential impacts on sensitive wildlife sites and species during blasting activities.

Marine mammals and sea turtles may use the lower Columbia River and Pacific Ocean near the Oregon coast overlapped by the waterway for LNG marine traffic. The potential for LNG carrier strikes on marine mammals and sea turtles in the waterway during transit to and from the proposed LNG terminal is low, given the speed of the LNG carriers and historic records indicating that vessel strikes of marine animals rarely occur in the lower Columbia River.

LNG carriers transiting the lower Columbia River over the operational life of the LNG terminal are likely to result in the stranding of some sub-yearling fish. In addition, the LNG carriers could increase shoreline erosion, which may have associated adverse impacts on aquatic resources, including salmonids. We are recommending that NorthernStar consult with the NMFS and conduct additional studies of impacts on juvenile fish from wake stranding and shoreline erosion due to LNG carrier traffic in the waterway. Further analysis of these issues will be contained in the revised BA and EFH Assessment.

Dredging the maneuvering area and pile driving during construction of the marine berth at the terminal could have impacts on pinnipeds. Therefore, we are recommending that NorthernStar develop, before construction begins, more protective measures (including safety, buffer, and noise impact zones) to avoid or minimize impacts on pinnipeds. To address the potential for impacts on marine mammals from noise and other construction related activities during the driving of piles for the terminal berth, NorthernStar would apply for an Incidental Harassment Authorization from the NMFS under the MMPA section 101(a)(5)(D).

At the terminal wharf, NorthernStar proposes a system capable of delivering filtered river water to the LNG carriers, and the recirculation of engine cooling water to be reused for ballast. This system would use a screened water intake located at the ship berth that would minimize the entrainment and impingement of juvenile fish. Since issuance of the draft EIS, NorthernStar has stated that LNG carriers may arrive at the terminal without the necessary retrofitting in place to allow the use of the screened water intake system. To minimize impacts on aquatic resources, we are recommending that NorthernStar require that LNG carriers are retrofitted, as recommended in the draft EIS, or develop an alternative system for non-retrofitted carriers that would offer similar protection. The screened water supply system would be further analyzed during consultation with NMFS and we are recommending that the final design plans be approved by the Director of OEP prior to initial site preparation at the LNG terminal.

We identified EFH for groundfish, coastal pelagic species, Pacific Coast salmon, and highly migratory species within the project area. Species with EFH designated in the vicinity of the proposed project could potentially be impacted by dredging, pile driving, and in-water activities associated with both construction and operation of the LNG terminal, and construction of the pipeline. Although there would be permanent impacts on EFH as a result of project construction and operation, mitigation for impacts on EFH would be included in the Compensatory Mitigation Plan, as discussed below. We consolidated EFH consultations for the Bradwood Landing Project with the consultations required under the ESA. The FERC staff is currently revising the BA and EFH Assessment. Upon completion, the BA and EFH Assessment will be resubmitted to the agencies with a request to initiate consultation. After reviewing the EFH Assessment, the NMFS will provide recommendations regarding further measures that can be taken to conserve EFH. The FERC will respond to any EFH Conservation Recommendations issued by the NMFS through the EFH/ESA consultation process.

Hydrodynamic and sediment transport modeling for the dredging of the maneuvering area showed that the combined background and project-related suspended sediment concentrations would be well below the lethal level for fish. In addition, sediment sampling and analysis did not detect any elevated contaminant concentrations within the proposed dredged materials and leave surface that could adversely affect aquatic species. Therefore, impacts on aquatic species from increased TSS and associated turbidity would be temporary and minor. Dredging would remove the current benthic population of organisms within the sediments, including prey species such as sand shrimp, daphnia, and copepods. Rates of recovery for these species may range from several months to as much as 2 to 3 years depending on substrate type and currents in the affected area.

Before and during dredged material placement, including filling of the former mill log pond at the LNG terminal, NorthernStar would capture and remove fish from the log pond to minimize risk of injury to fish. To minimize re-entry of individuals into the log pond, we are recommending that NorthernStar place nets at the outlet of the log pond during collection efforts that only allow emigration from the pond.

Tubular steel piles would be installed as part of the marine berth at the proposed LNG terminal. Driving steel piles can generate intense underwater sound pressure waves that can affect nearby marine organisms. To minimize impacts on aquatic species as a result of pile driving, NorthernStar would observe the in-water work window for the Columbia River and would use fewer, large-diameter, vertical piles, vibratory pile driving as conditions allow, and pile caps. In addition, we are recommending that NorthernStar develop a revised Bubble Curtain Contingency Plan in consultation with the appropriate resource agencies prior to construction.

Waterbodies affected by construction and operation of project facilities provide habitat for spawning, breeding, feeding, growth, and shelter to numerous species of fish and fish prey. The proposed pipeline route would impact 94 waterbodies; however, in-water activities would be avoided in the most sensitive waterbodies by the use of the HDD or conventional bore construction methods. Impacts on

streams crossed using typical open-cut pipeline construction methods would be temporary, and should have no long-term effects on water temperature, pH, dissolved oxygen, benthic invertebrate populations, or fish populations. To reduce sedimentation and erosion that may affect waterbodies crossed by the pipeline, NorthernStar would implement its *Waterbody and Wetland Construction and Mitigation Procedures Plan*, pipeline ESC Plan for Oregon, and its SWPPP for Washington as well as our Procedures.

During construction and operation of the proposed pipeline, habitat modification, increased noise and lighting, and vegetative clearing could adversely affect migratory birds occurring along the pipeline route. In order to minimize potential impacts, NorthernStar would clear the pipeline route between August 1 and April 15 to avoid the peak nesting season. However, due to the importance of the area for migratory birds, we are recommending that NorthernStar consult with the FWS and other appropriate agencies to develop a Migratory Bird Nest Avoidance Plan to minimize impacts on migratory birds during the peak nesting season.

Following construction of the LNG terminal and pipeline, habitat and ecosystem function would be restored in place. Permanent impacts on aquatic resources would be mitigated by restoring habitat with similar ecological function. As part of its Compensatory Mitigation Plan, NorthernStar proposes to preserve or restore habitat in areas substantially larger than that lost to permanent impacts, and to a higher level of ecosystem function at Svensen Island, Peterson Point, Hunt Creek, and Delameter Creek. We are recommending that NorthernStar continue to consult with appropriate resource agencies to finalize its Compensatory Mitigation Plan. NorthernStar has voluntarily developed an SEI that would contribute about \$59 million over the life of the project (i.e., 40 years) to fund measures for the recovery of salmon and the lower Columbia River ecosystem. The SEI would be above and beyond the activities outlined in the Compensatory Mitigation Plan.

5.1.6 Federally-listed Threatened and Endangered Species

Informal consultations with the FWS and NMFS identified 37 federally listed endangered or threatened species that potentially occur in the vicinity of the Bradwood Landing Project, including the waterway for LNG marine traffic. The federal list includes 13 anadromous salmonids and the North American green sturgeon. Of these, critical habitat has been designated for 12 salmonid species. There are also four reptiles (sea turtles), nine mammals (including seven whales; Steller sea lion; and Columbian white-tailed deer), six birds, one invertebrate, and three plants that are federally listed that may occur in the project area.

We submitted our BA and EFH Assessment to the FWS and NMFS in March 2007. The FWS and NMFS requested additional data; therefore, the FERC staff is currently revising its BA and EFH Assessment for the Bradwood Landing Project.

To address issues raised by the FWS, we are recommending that prior to construction, NorthernStar should conduct additional surveys to identify any federally listed plant species or bald eagles at the proposed LNG terminal or along the sendout pipeline route and restrict pipeline construction activities within potential Columbian white-tailed deer habitat between June 1 and July 15. We are also recommending that NorthernStar coordinate with the NMFS to determine appropriate LNG carrier speed, seasonal restrictions, or other applicable measures to avoid or minimize impacts on whales, wake stranding of juvenile fish, and shoreline erosion. We are also recommending that NorthernStar expand the protective measures to avoid or minimize impacts on Steller sea lions to include all pinnipeds. The results of these additional consultations and analyses will be incorporated into our revised BA and EFH Assessment.

Based on NorthernStar's proposed construction and mitigation measures and our recommendations and consultations to date, we conclude that the project would have no effect on the following species and/or designated critical habitat:

- Columbia River bull trout DPS (and its designated critical habitat);
- designated critical habitat for the green sea turtle;
- designated critical habitat for the leatherback sea turtle;
- Oregon spotted frog;
- designated critical habitat for the southern resident killer whale;
- designated critical habitat for the Steller sea lion;
- designated critical habitat for the northern spotted owl;
- short-tailed albatross;
- western snowy plover;
- yellow-billed cuckoo;
- Oregon silverspot butterfly (and its designated critical habitat); and
- proposed critical habitat for Kincaid's lupine.

We conclude that the project may affect, but is not likely to adversely affect, the following species and/or designated critical habitat:

- steelhead:
 - designated critical habitat for the Middle Columbia River DPS;
 - designated critical habitat for the Upper Columbia River DPS;
 - designated critical habitat for the Upper Willamette River DPS;
 - designated critical habitat for the Snake River Basin DPS;
- green sea turtle;
- leatherback sea turtle;
- loggerhead sea turtle;
- olive ridley sea turtle;
- blue whale;
- humpback whale;
- North Pacific right whale;
- sei whale;
- Southern Resident killer whale;
- sperm whale;
- brown pelican;
- designated critical habitat for the marbled murrelet;
- northern spotted owl;
- streaked horned lark;
- designated critical habitat for the western snowy plover;
- Kincaid's lupine;
- Nelson's checker-mallow; and
- water howellia.

We conclude that the project is likely to adversely affect the following species and/or designated critical habitat:

- Chinook salmon:
 - Lower Columbia River ESU (and its designated critical habitat)

- Upper Columbia River Spring-run ESU (and its designated critical habitat)
- Upper Willamette River ESU (and its designated critical habitat)
- Snake River Spring/Summer-run ESU (and its designated critical habitat);
- Snake River Fall-run Chinook salmon ESU (and its designated critical habitat);
- Columbia River chum salmon ESU (and its designated critical habitat);
- Lower Columbia River coho salmon ESU;
- Snake River sockeye salmon ESU (and its designated critical habitat);
- steelhead:
 - Lower Columbia River DPS (and its designated critical habitat);
 - Middle Columbia River DPS;
 - Upper Columbia River DPS;
 - Upper Willamette River DPS;
 - Snake River Basin DPS;
- North American green sturgeon;
- fin whale;
- Steller sea lion;
- Columbian white-tailed deer; and
- marbled murrelet

We are recommending that construction should not be allowed until after the FERC completes formal consultations under the ESA and NorthernStar completes consultation under the MMPA.

5.1.7 Land Use, Recreation, and Visual Resources

The area along the shore of the waterway for LNG marine traffic is mostly rural, with forest being the main land use. There are a number of houses and commercial buildings within the communities along the waterway overlapped by the Zones of Concern for LNG marine traffic. The urban areas along the waterway with the highest populations include the cities of Astoria with about 9,800 people, Warrenton with about 4,100 people, and Cathlamet with about 600 people. Puget Island has a dispersed rural population of about 800 people. All the other communities overlapped by the Zones of Concern along the waterway have populations of less than 500 people each. On the western end of Puget Island, the Zones of Concern overlap at least 74 structures. In addition, the Zones of Concern overlap the LCNWR, JBHNWR, elements of the LCNHP, some state and local parks, and other recreation and public interest areas along the waterway for LNG marine traffic.

The Bradwood Landing Project could have minor impacts on commercial fishing and recreational users of the Columbia River. The Zones of Concern along the waterway used by LNG marine traffic would overlap marinas in Hammond, Warrenton, Astoria, and Cathlamet. Boaters and fishermen may have to briefly move out of the way of LNG marine traffic heading upriver to the LNG terminal, as the Coast Guard would impose a moving 500-yard safety and security zone around LNG carriers transiting up the waterway. This zone would be an area over which the Coast Guard would have authority and is not meant to be an exclusion zone. Jet-skiers, wind-surfers, kite-surfers, kayakers, and canoers typically stay in shallow water outside of the navigation channel. The effects of wakes from LNG carriers on small craft would be no different than the effects from wakes from large vessels currently using the lower Columbia River. About 19 cruise ships per year dock at Astoria Pier 1, which is overlapped by Zone 1. The Coast Guard's WSR has specific conditions to protect these cruise ships while at berth, or in meeting situations with an LNG carrier transiting up the Columbia River.

LNG marine traffic may also have visual impacts for people residing in the shoreline communities, traveling along highways adjacent to the waterway, using the parks and public interest areas

within the Zones of Concern, or other river users. Visual impacts would be short term, as it would typically take an LNG carrier only a few minutes to pass through a viewshed while traveling at average speeds between 8 and 12 knots. In addition, viewers are accustomed to seeing up to 2,000 other commercial ships per year move up and down the Columbia River.

Under normal operations, LNG carriers transiting the waterway would have no significant impacts on current land uses, recreation, or visual resources. Because of its physical properties, released LNG would disperse in the atmosphere or, if ignited, burn in a pool fire. Impacts from a marine release of LNG with ignition would depend on the location of the incident within the waterway and the scope of the incident. Damage to shoreline structures and vegetation along the waterway resulting from a pool fire would range from mild to severe, with the greatest impacts occurring within Zone 1 and decreasing outward through Zones 2 and 3. However, due to the safety and security measures described in the Coast Guard's WSR, the likelihood of an LNG spill is extremely remote.

The proposed LNG terminal would be located within a 411-acre parcel that is privately held but controlled by NorthernStar through a purchase option. This tract was the site of several historic lumber mills that operated between about 1843 and 1852, 1910 and 1920, and 1930 and 1962, and the townsite of Bradwood, that was founded around 1930 and abandoned by 1985. Between 1966 and 2002, the COE deposited almost 900,000 cubic yards of dredged material at Bradwood Landing from maintenance of the navigation channel.

The proposed ship berth and maneuvering area for the LNG terminal would cover about 58 acres of open water within the Columbia River. Construction of the onshore portion of the terminal, including the proposed power line would disturb about 65 acres total, of which about 21 acres is dredged sand piles, 26 acres is forest, 13 acres is scrub-shrub vegetation, and 5 acres is developed former industrial areas. About 40 acres would be permanently converted to industrial use for operation of the facilities. The remainder of the parcel controlled by NorthernStar would be retained in its current land use. However, NorthernStar proposes to improve wetland habitat at the mouth of Hunt Creek.

There are no residences closer than 0.6 mile from the proposed LNG terminal, but 21 residences are located between 0.6 and 1.0 mile away, all on the western tip of Puget Island, in Wahkiakum County, Washington. Temporary construction impacts on nearby residents could include inconveniences caused by noise generated during dredging of the maneuvering area and pile driving for the marine berth, as well as dust. Potential operational impacts on residences in the vicinity of the terminal include lighting, noise, and visual impacts. Noise and dust impacts are discussed further below.

NorthernStar produced computer-generated simulations to assess visual impacts from viewpoints on Tenasillahe Island within the JBNWR, Cathlamet, and Skamokawa. The most visible part of the LNG terminal would be the storage tanks, which would be about 170 feet high. Visual impacts of the LNG facility would be minor because views would be screened by landscape, vegetation, and distance. The facilities would be painted to blend into the backdrop of the hills to the south of the terminal site. An earthen berm enclosing the LNG onshore facilities and landscaping along the shoreline would provide an additional visual barrier between the river and the terminal.

Construction and operation of the LNG terminal and sendout pipeline would not directly impact any national, state, or local parks, developed recreational facilities, or public interest areas. For about 8.0 miles, the Bradwood Landing natural gas sendout pipeline would be adjacent to the existing KB pipeline, while the remainder of the route would be on newly created right-of-way. The pipeline would have limited visual impacts, because it would be buried underground. Only the clearing of forest along the pipeline route would have long-term visual impacts, as discussed above.

Construction of the pipeline, inferred laterals, and associated aboveground facilities would disturb about 309 acres of forest, 89 acres of agricultural land, and about 59 acres of rangeland. Other land uses crossed by the pipeline route include residential areas, commercial/industrial areas, open land, and water. About 232 acres would be retained as part of the permanent 50-foot-wide operational right-of-way. Except for a 10-foot-wide corridor centered on the pipeline that could be mowed annually and maintained in a grassy/herbaceous state, the temporary construction right-of-way would be returned to its previous condition and use.

NorthernStar has identified three residences within 50 feet of proposed construction work areas for the pipeline. No residences are located within 50 feet of the associated aboveground facilities. NorthernStar filed its *Residential Construction Conceptual Mitigation Plan* that outlines the general measures that NorthernStar would implement to minimize construction related impacts on residences and other structures located within 50 feet of the proposed pipeline construction right-of-way. NorthernStar recognized that it did not yet have access to some properties along the pipeline route, and so it could not develop detailed site-specific residential construction mitigation plans for all residences within 50 feet of the construction right-of-way. Therefore, we are recommending measures that NorthernStar should implement during construction to reduce impacts on residences within 50 feet of the construction work area, and file a final residential mitigation plan before pipeline construction begins.

We did not identify any future planned residential or commercial developments in close proximity to the proposed pipeline route in Clatsop County Oregon. Cowlitz County, Washington indicated that a building permit application has been submitted to the county for a proposed single family dwelling located adjacent to the Bradwood Landing pipeline route. Therefore, we are recommending that NorthernStar study Cowlitz County records to determine all plans for future residential and commercial developments along the proposed pipeline route in Washington, and provide details about how NorthernStar would avoid or mitigate impacts on that future residence.

Columbia County has identified several development projects at the Port Westward Industrial Area and the Port of St. Helens, as well as its intended expansion of Hermo Road. Therefore, we are recommending that NorthernStar document that it has consulted with the Port of St. Helens, the Columbia County Development Agency, and other appropriate agencies and representatives of Columbia County, to determine if its pipeline may have impacts on county improvements in the vicinity of the Port Westward Industrial Area.

In February 2007, NorthernStar submitted a comprehensive application for permits and land use approvals to Clatsop County, Oregon. Following information requests and a number of public hearings, the Clatsop County Board of Commissioners made a final decision in March 2008 approving NorthernStar's proposed zoning changes, subject to a series of conditions. The LNG terminal and pipeline are now accepted uses in Clatsop County, consistent with local zoning and state planning guidelines.

The pipeline route in Columbia County, Oregon, would cross lands zoned as agricultural (PA-38), industrial (RIPD), and residential (RR-5). While installation of a natural gas pipeline would be an allowed use across PA-38 and RIPD zoned lands in Columbia County, it would normally not be allowed across RR-5 zone lands without a zoning change or amendment to the county ordinances. However, the Planning Director for Columbia County has acknowledged that the local permitting process is preempted by the FERC's authority to site pipelines under the NGA.

The pipeline would cross unzoned lands in Cowlitz County, Washington. The county may review the environmental impacts of the proposed pipeline under county and state regulations, including the SEPA, Shoreline Management Act, Cowlitz County's Critical Areas Ordinance, its Gas and Oil Pipeline

Ordinance, and its Comprehensive Plan. Cowlitz County is the lead agency for SEPA, and may adopt this EIS as part of its environmental review process.

NorthernStar submitted a revised consistency certification on October 23, 2007. On November 21, 2007, ODLCD determined that its 6-month review period began with the submission of the revised consistency certification. On April 10, 2008, the ODLCD and NorthernStar executed a Stay Agreement that allowed for a 150-day continuation period, during which NorthernStar could provide additional information to supplement its application with the ODLCD. We are recommending that NorthernStar file documentation that its project is consistent with the CZMA before we allow any construction to begin.

5.1.8 Socioeconomics

The population within the Zones of Concern along the waterway for LNG traffic could be affected by an accidental or intentional breach of an LNG carrier resulting in a release of LNG and a pool fire if the vapors are ignited. The degree of impact from an LNG release and related pool fire would depend on the location and extent of the incident, with effects being most severe in Zone 1 and decreasing outward through Zones 2 and 3. However, with the implementation of the safety and security measures and conditions outlined in the Coast Guard's WSR, an LNG release along the waterway would be highly unlikely and impacts on populations would be less than significant.

No appreciable changes to the local population are expected to occur as a result of the proposed project. NorthernStar estimates that an average of 331 workers would be employed during the 3-year terminal construction period, with a peak workforce of 506 occurring between months 20 and 26. Approximately 75 percent of the construction workforce is expected to commute from the Portland MSA (5 percent of this total would reside in Columbia County, Oregon). Others are expected to commute from Clatsop County, Oregon (15 percent) and Wahkiakum and Cowlitz Counties, Washington (10 percent). In addition, 313 workers are expected to be employed during peak construction of the pipeline, occurring during month 13. Approximately 86 percent of the construction workforce for the pipeline is expected to commute from the Portland MSA (with 6 percent residing in Columbia County), while the remainder of workers would probably commute from Cowlitz, Clatsop, and Wahkiakum Counties.

We estimate that about 20 specialty workers or managers may temporarily relocate to the area during project construction. The non-local workers and their families that may relocate to the area would be easily absorbed into the regional communities and would not present a strain on local housing or public services. There are currently about 2.2 million people in the Portland MSA, plus Clatsop County, Oregon, and Cowlitz and Wahkiakum Counties, Washington. This area has over 5,000 vacant housing units available, plus 2,000 temporary camp sites at RV parks and campgrounds.

NorthernStar expects to hire and train local residents to operate the LNG terminal. Based on the current commuting patterns at the nearby Georgia-Pacific paper mill at Wauna, it is expected that nearly all these workers would come from the four-county area. Therefore, operation of the project would have no significant impacts on regional population or housing.

The project should not have any significant impacts relating to environmental justice. The waterway for LNG marine traffic, LNG terminal, and sendout pipeline would not be located in communities with disproportionately high percentages of minorities, Native Americans, or low income populations. The project should not adversely affect property values. Studies of areas surrounding existing LNG peak shaving plants have not found any negative impacts on property values, and other independent research found that the presence of a pipeline on a tract of property had little influence on its sale price.

The project would have positive effects on local employment and the regional economy. Total construction costs for the project are estimated to be \$726 million. NorthernStar estimates that total payroll (which includes both wages and benefits) for the construction of the project would be \$110 million. Within the four-county area, NorthernStar estimates that total direct expenditures on goods, equipment, and services during construction of the project would be \$87.9 million. NorthernStar estimates that total indirect and induced effect on the regional economy as a result of construction of the project would be an influx of about \$77 million.

Operation of the Bradwood Landing Project would result in about 65 new permanent positions at the LNG terminal, with a total payroll of about \$3.9 million per year. NorthernStar calculated that operation of the project would generate a total of about \$20.4 million per year in direct and indirect economic benefits to the four-county study area, including payroll and expenditures. NorthernStar would pay about \$7.8 million in annual property taxes to Clatsop County during operation of the terminal. Based on the portion of the pipeline in each of the counties and tax rates from the different taxing entities, property taxes for the pipeline would be paid as follows: approximately \$284,029 to Clatsop County, \$518,465 to Columbia County, and \$740,250 to Cowlitz County.

About 91 existing roads would be crossed by the pipeline. No new roads would be needed for access during construction of the pipeline. Construction of the Bradwood Landing Project could affect transportation and traffic in the project area by increasing the number of vehicle trips per day on area roads as a result of commuting workers and construction equipment, temporarily closing some roads that are crossed during pipeline construction, and the possible modification of access roads to accommodate large construction equipment and vehicles. These increased traffic levels associated with construction of the LNG terminal and pipeline would be temporary and limited to the period of construction (about 3 years at the LNG terminal site and about 16 months along the pipeline route). NorthernStar would reduce worker commuter traffic by creating a parking lot near Taylorville and busing workers to their job sites. Clifton Road would be widened to 28 feet, resulting in two 12-foot travel lanes with a 2-foot shoulder on each side of the road. An east-bound turning lane and a west-bound deceleration lane would be installed on Highway 30 at the intersection of Clifton Road. We are recommending that NorthernStar file its final traffic management plan for review and approval prior to construction. In finalizing the traffic management plan, we are recommending that NorthernStar consult with the appropriate agencies regarding measures to minimize impacts on narrow roads that would be used to access the construction right-of-way.

NorthernStar, PWRR, and ODOT are negotiating an agreement to allow the relocation of the railroad through the terminal tract. We are recommending that NorthernStar file a copy of the final Railroad Relocation Agreement prior to construction.

Operation of the LNG terminal could affect other ships using the waterway. Approximately 125 LNG carriers per year would travel up the Columbia River to deliver cargo to the LNG terminal, resulting in about a 7 percent increase in commercial ship traffic. As described in the WSR, the Coast Guard would enforce measures that would affect other ships using the lower Columbia River navigation channel, including establishment of a 500-yard moving safety and security zone around an LNG vessel while it is underway to the LNG terminal. Although one-way traffic would be imposed along certain portions of the waterway during the LNG carrier transit, four passing zones along the transit route would allow two-way traffic. Through careful traffic management, prearrangement of meeting locations, and an expanded vessel information system, ship traffic delays are expected to be negligible.

A marginal increase in ship traffic could occasionally increase the wait time for ships in Astoria. If a large number of ships arrive at the mouth of the Columbia River in a short time period, some may need to wait for a pilot. A similar scenario plays out just upriver of Astoria when bar and river pilots

replace one another. The worst case delay scenario is that another ship would be required to wait an entire tide cycle (12 hours or more). Because the river currently supports a high level of cargo shipping, it is anticipated that other vessels have extensive experience with ship traffic and would be adept at minimizing wait time. NorthernStar has filed a proposal for navigation protocols and priorities that would minimize delays to other commercial vessels on the lower Columbia River due to LNG carrier traffic.

The proposed project should not adversely affect businesses related to tourism. The Coast Guard's WSR has special conditions to protect cruise ships. There are 12 hotels in Astoria and 2 bed-and-breakfast type accommodations on the western end of Puget Island that would be overlapped by Zones 1 and 2 along the waterway for LNG marine traffic. However, with the safety and security measures to be implemented by NorthernStar, and the conditions outlined in the Coast Guard's WSR, the likelihood of an LNG carrier incident that may affect commercial businesses, hotels, or tourists along the waterway is extremely remote.

5.1.9 Cultural Resources

We considered whether project-related LNG marine traffic would have the potential to adversely affect historic properties. It is highly unlikely that an LNG carrier transiting in the waterway could have any impacts on the 37 known shipwrecks along the Pacific Coast and Columbia River in Oregon within the Zones of Concern, because those resources are located outside of the navigation channel, and even if an LNG carrier lost steerage it would run aground before coming near to those shipwrecks. We identified a number of historic properties along the shoreline of the waterway, including individual sites at Fort Stevens State Park, Warrenton, Astoria, Altoona, and Cathlamet, and NRHP districts at Cape Disappointment State Park, Skamokawa, and Astoria. However, with the implementation of NorthernStar's proposed safety and security measures and the conditions outlined in the Coast Guard WSR, the likelihood of an incident involving an LNG carrier along the waterway is extremely remote and potential impacts on historical properties would be less than significant.

NorthernStar's cultural resource consultant identified the LCNHT as a resource that may be potentially eligible for the NRHP. Although the LCNHT follows the lower Columbia River along the route of the 1804-1805 Lewis and Clark expedition, no Lewis and Clark campsites have been recorded in the project area, nor has the LCNHT been documented in this region. We and the Oregon SHPO agree the project would have no adverse effects on the LCNHT.

NorthernStar had a cultural resources consultant survey about 28 acres within its proposed LNG terminal parcel. That survey recorded two historic archaeological sites: the remains of the town of Bradwood and its associated lumber mill (35CLT88), and the ACRR (now operated as the PWRR). We and the Oregon SHPO concur that the project would have no adverse effects on the ACRR/PWRR. However, the SHPO requested that the evaluation of site 35CLT88 be better justified, and wanted additional information provided about the unrecorded historic Hunt lumber mill whose remains may exist within the property controlled by NorthernStar, but outside of the LNG terminal construction area.

Additional surveys were conducted of facilities associated with the LNG terminal. About 82 acres were inspected along the proposed route for the power line to the terminal, alternative routes, and access roads, that resulted in the recording of seven isolated finds and one historic archaeological site (remains of an abandoned segment of old Highway 30). All of those resources were evaluated as not eligible for the NRHP.

About 25 miles along the route of the proposed natural gas sendout pipeline have been inventoried. No new cultural resources were identified. The unrecorded Abernathy Cemetery near Oak

Point and previously recorded prehistoric archaeological site 35CO16 at Port Westward should be avoided by NorthernStar's proposed HDD under the Columbia River between MPs 19.0 and 19.7. The Oregon SHPO has requested additional information about the HDD relative to site 35CO16. The Washington SHPO has requested a schedule for future surveys and plan for future actions.

We have not yet completed the process of complying with section 106 of the NHPA. Cultural resources surveys are needed for about 11 miles total of the pipeline route after access is obtained. In addition, NorthernStar needs to conduct additional investigations and revise its reports to address comments from the SHPOs and the FERC staff. Once cultural resources surveys and evaluations are complete, the FERC, in consultation with the cooperating agencies and the Oregon and Washington SHPOs, would make determinations of NRHP eligibility and project effects. If any historic properties would be affected by the proposed project, we would seek ways to resolve adverse effects. We are recommending that construction be deferred until after these surveys are completed; NorthernStar files required reports and plans, including treatment plans for any historic properties that would be adversely affected; the SHPOs' comments on the reports and plans are filed; the ACHP has had an opportunity to comment; the FERC staff has reviewed and approved all reports and plans; and the Director of OEP issues a letter stating that treatment measures should be implemented or construction may proceed.

We have fulfilled our obligations to address compliance with the Native American Religious Freedom Act, section 101(d)(6) of the NHPA, and 36 CFR 800.2(c)(2). Through our NOI, we contacted Indian tribes that may have historically occupied or used the project area and might attach religious or cultural significance to historic properties in the APE. At their request, the FERC staff met independently with the CRITFC, including representatives of the Nez Perce Tribal Council, and with the Warm Springs Tribal Council. In addition, the FERC provided copies of the draft EIS to Indian tribes and other Native American organizations listed in Appendix A. No traditional cultural properties, religious, cultural, or sacred sites which may be affected by the project were identified by any tribes, NorthernStar's cultural resources consultants, or by the SHPOs. NorthernStar documented consultations with Indian tribes and appropriate Native American groups that might have an interest in the project. We are recommending that NorthernStar file documentation of continued consultation with Indian tribes, including correspondence and providing copies of revised reports of cultural resources investigations.

5.1.10 Air Quality and Noise

Construction of the proposed LNG terminal and pipeline would have temporary adverse impacts on air quality due to gasoline and diesel combustion emissions, primarily NO_x and CO, associated with operating construction equipment and vehicles as well as fugitive dust emissions. NorthernStar proposes to use the following measures to reduce emissions from construction equipment and commuter vehicles: limit truck idling as much as possible, properly maintain construction equipment in accordance with manufacturers' specifications or standard practices, encourage construction workers to carpool to the construction site, use BMPs to minimize dust, and implement a shuttle service to and from retail services and food establishments during lunch hours or provide lunch services at the site.

Operation of the LNG terminal would result in air emissions from: stationary equipment (SCVs and emergency engines), LNG carriers, security vessels, and tugs. Because the emissions from the marine vessel traffic would be periodic and transient, they are not expected to result in significant long-term air quality impacts, although there could be short-term localized impacts.

NorthernStar submitted an application to the ODEQ for an air quality permit in early 2006 and a revised application in March 2007. NorthernStar modeled the impacts associated with operational emissions from stationary sources as well as emissions from LNG carriers using site-specific meteorological data. The results were provided to the ODEQ along with the March 2007 air quality

permit application. The modeling estimates show that operational impacts on air quality would be below the NAAQS.

NorthernStar would minimize air emissions from the proposed stationary sources through the use of clean fuel (natural gas and low sulfur diesel oil), the employment of BMPs for operation and maintenance procedures, and limiting annual hours of operation from the diesel-fired units.

Operational emissions from the proposed pipeline would be limited to blowdown emissions that would occur during emergency situations and fugitive emissions during operation. Blowdowns would rarely occur and fugitive emissions would be negligible due to the small amount of natural gas emitted and the small fraction of VOCs contained in the natural gas. Therefore, these emissions would not have a significant effect on air quality.

Noise would be generated during construction of the pipeline and during construction and operation of the LNG terminal. In most areas, the increase in noise during construction would be localized, temporary, and limited primarily to daylight hours. However, noise associated with dredging operations could occur up to 24 hours per day, 7 days per week for a period of approximately 48 to 72 days. Increases in noise levels during construction of the sendout pipeline would be limited to areas close to the construction activity. The most prevalent construction noise in and around the project area would be engine-driven construction equipment.

During operation of the project, the intermittent operation of LNG carriers and tugs in the waterway would contribute to an increase in the background noise level. However, given the relative low frequency of ship and tug traffic, the overall day and nighttime-weighted noise level should not change significantly from existing background conditions.

The nearest NSA to the proposed LNG terminal is located adjacent to the north side of the boundary for the 411-acre property controlled by NorthernStar. Noise impact modeling indicates that noise generated by operation of the proposed LNG terminal would be lower than the FERC sound level requirement of 55 dBA L_{dn} , but slightly higher than the nighttime L_{eq} of 50 dBA at the second closest NSA (the sound level would be lower than both the FERC required L_{dn} and L_{eq} at the closest NSA). To minimize the noise impact on nearby NSAs from LNG terminal operations, NorthernStar would incorporate the following noise attenuation measures: noise barriers or enclosures to block sound transmission from operating equipment; valves with "low-noise" trims; acoustical insulation for aboveground piping; and equipment types with the least noise emissions. We are recommending that NorthernStar file the results of a noise survey after the terminal is operating to document that noise at the nearby NSAs does not exceed 55 dBA L_{dn} .

Dredging activities to create the turning basin would continue all day for up to 72 consecutive days, with dredging noise estimated to exceed 66 dBA at the nearest NSAs. In order to protect residents of Puget Island from excessive dredging noise, we are recommending that NorthernStar file for review and approval a finalized dredging noise mitigation plan prior to construction. HDDs would also drill for 24 hours straight over several days or weeks, and noise from this drilling may affect nearby residences. Therefore, we are recommending that NorthernStar file a revised HDD noise mitigation plan identifying the noise mitigation measures and monitoring to be implemented during HDD activities to reduce noise levels at nearby NSAs to no more than 10 dBA above ambient noise levels if the resulting impact is above 55 dBA L_{dn} .

Operation of the proposed pipeline would generate noise at only four locations where pressure reduction valves for taps would be located aboveground. Because these facilities would operate 24 hours per day, they would need to meet the nighttime standards specified in the applicable noise codes.

NorthernStar would provide noise attenuation to meet the 55 dBA L_{dn} noise standard, if required. Based on preliminary engineering and the noise estimates, the Wauna Mill, Northwest Natural, and Williams Northwest pipeline valves would likely require additional noise control, such as enclosures, beyond selection of particular valve types. NorthernStar has prepared a noise mitigation plan for the Wauna Mill, Northwest Natural, and Williams Northwest pipeline valves to reduce noise at the NSAs to meet 55 dBA L_{dn} . We are recommending that NorthernStar file noise surveys no later than 60 days after placing the valves into service and proposed mitigation if 55 dBA L_{dn} is not met.

5.1.11 Reliability and Safety

We evaluated the safety of both the proposed facilities and the related LNG vessel transit through the Columbia River navigation channel. As part of our evaluation, we performed a cryogenic design and technical review of the proposed terminal design and safety systems. Several areas of concern were noted with respect to the proposed facility, and we identified specific recommendations to be addressed by NorthernStar before initial site preparation, before construction after final design, before commissioning, or before commencement of service.

Thermal radiation distances were calculated for 1,600 to 10,000 Btu/ft²-hr incident flux levels for an LNG storage tank impoundment fire. The resulting distances would be 377 feet for the 10,000 Btu/ft²-hr zone; 714 feet for the 3,000 Btu/ft²-hr zone; and 912 feet for the 1,600 Btu/ft²-hr zone, which all stay on site. Flammable vapor hazard distances were calculated for accident scenarios in the process area which resulted in a distance of 325 feet to the 2.5 percent average gas concentration.

Thermal radiation and flammable vapor hazard distances were calculated for an accident or an attack on a 140,000-m³ LNG carrier. For 1.0-, 1.4-, 2.5-, 3.0-, and 3.9-meter-diameter holes in an LNG cargo tank, we estimated distances to range from 2,154 to 5,225 feet for a thermal radiation level of 1,600 Btu/ft²-hr, the level which is hazardous to unprotected persons located outdoors. Based on a 1.0-meter-diameter hole, an unignited release would result in an estimated pool radius of 421 feet. The unignited vapor cloud would extend to 10,237 feet to the LFL and 13,618 feet to one-half the LFL. The results of these calculations are in agreement with the Zones of Concern use by the Coast Guard in assessing waterway suitability. Flammable vapor dispersion for larger holes was not performed since, realistically, the cloud would not even extend to the maximum distance for a 1.0-meter-diameter hole before encountering an ignition source. However, the evaluation of safety is more than an exercise in calculating the consequences of worst case scenarios. Rather, it is a determination of the acceptability of risk which considers: the probability of events, the effect of mitigation, and the consequences of events. Based on the extensive operational experience of LNG shipping, the structural design of an LNG vessel, and the operational controls imposed by the Coast Guard and the local pilots, the likelihood of a cargo containment failure and subsequent LNG spill from a vessel casualty – collision, grounding, or allision – is highly unlikely. As a result, the risk to the public from accidental spills from LNG carriers should be considered negligible.

Unlike accidental causes, historical experience provides little guidance in estimating the probability of a terrorist attack on an LNG vessel. For an LNG import terminal proposal that would involve having a large volume of energy transported and stored, the perceived threat of a terrorist attack is a primary concern of the local population and requires that resources be directed to mitigate possible attack paths. While the risks associated with the transportation of any hazardous cargo can never be entirely eliminated, they can be managed.

In accordance with 33 CFR 127.007, NorthernStar submitted an LOI to the Coast Guard on January 18, 2005 conveying its intention to construct and operate an LNG import terminal at the proposed site. In December 2005, NorthernStar submitted a preliminary WSA to the Coast Guard in accordance

with the guidance in NVIC 05-05. Based on feedback from the Coast Guard and other stakeholders, NorthernStar prepared a follow-on WSA, which was submitted to the Coast Guard in May 2006. The Coast Guard, with input from the Area Maritime Security Committee, local law enforcement, and emergency response organizations, completed a review of NorthernStar's WSA in accordance with the guidance in NVIC 05-05. The WSA review focused on the navigation safety and maritime security risks posed by LNG marine traffic, and the measures needed to responsibly manage these security risks.

As part of our marine traffic analysis, we considered how vessel security requirements for LNG carriers calling on the proposed LNG terminal might affect other ship and boat traffic in the Columbia River. Based on the Coast Guard's review of NorthernStar's WSA and consultations, the Coast Guard advised the FERC in its WSR dated February 28, 2007 that to make the Columbia River suitable for the LNG marine traffic associated with the Bradwood Landing Project, specific risk mitigation measures would be necessary such as the safety and security zones described above.

While the LOR would address the suitability of Columbia River navigation channel for LNG marine transportation, it would not constitute a final authority to commence LNG operations. Issues related to the public impact of safety and security zones would be addressed later in the development of the Coast Guard's *LNG Vessel Transit Management Plan*. This plan would be developed in conjunction with state and local law enforcement and emergency response communities.

An issue that has developed for several LNG terminal projects, including the Bradwood Landing Project, is a concern that local communities would have to bear some of the costs of ensuring the security/emergency management of the LNG facility and the LNG vessel while in transit and unloading at the dock. The specific security/emergency management costs for the proposed project are not yet available. The final costs associated with security would be determined after the specific security needs and responsibilities have been established by the Coast Guard through consultations with other federal, state, and local agencies.

Section 3A(e) of the NGA, added by section 311 of the EPOA of 2005, requires the LNG terminal operator to develop an ERP in consultation with the Coast Guard and state and local agencies. On March 24, 2008, NorthernStar filed a draft ERP with FERC for review. The draft ERP submitted by NorthernStar is still in the process of being completed and items required to be included in the ERP, such as the Cost Sharing Plan, have not yet been finalized. Therefore, we are recommending that NorthernStar develop an ERP (including evacuation) and coordinate procedures with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies. The ERP must include a Cost-Sharing Plan that contains a description of any direct cost reimbursements the applicant agrees to provide to any state and local agencies with responsibility for security and safety at the LNG terminal and near vessels that serve the facility.

We have identified a segment of pipeline through a Class 3 area, between MPs 13.17 and 13.43, where the nearest MLV would be located more than 5.3 miles away at MP 18.8. According to DOT regulations, an MLV must be located within 4 miles of a Class 3 area, unless the DOT administrator finds that alternative spacing would offer an equivalent measure of protection to the public. Therefore, we are recommending that, prior to construction, NorthernStar should either document that the DOT has approved its MLV spacing, or provide, for the review and written approval of the Director of OEP, a modified pipeline design that adheres to the requirements of 49 CFR 192.179.

5.1.12 Alternatives

The EIS addresses alternatives to the proposed action. Alternatives considered by the FERC include no action or postponed action, system alternatives, LNG terminal site alternatives, LNG terminal

layout alternatives, and pipeline route alternatives. While denying project approval or taking no action (or postponing action) would eliminate the environmental impacts identified in this EIS, the project objective would not be met of providing a new source of natural gas to the Pacific Northwest. Two possible outcomes of the no action alternative would be: 1) economic impacts associated with limited future supplies of natural gas; and/or 2) the development of other natural gas infrastructure projects to meet growing future regional demands and the environmental impacts associated with the construction of those other projects.

We considered if existing natural gas pipeline systems in the region could be expanded to meet the project objectives by supplying volumes equivalent to those proposed by NorthernStar. Although five LNG “peak shaving” storage facilities are currently located in the Pacific Northwest, converting any of these facilities into an import terminal would not be feasible.

We considered five newly proposed jurisdictional interstate pipelines as system alternatives to the Bradwood Landing Project. One of these pipelines (Palomar) could bring Canadian and Rocky Mountain gas to the Portland metropolitan area. The potential Sunstone and Blue Bridge projects would increase the amount of Rocky Mountain natural gas that could be transported on the Williams Northwest and GTN systems to serve markets in the Pacific Northwest, northern California, and northern Nevada. The Ruby and Bronco pipeline projects, which are in different stages of review, would both transport Rocky Mountain gas to the Oregon/California border. These proposed pipelines would not be environmentally preferable system alternatives because they are longer than the sendout pipeline for the Bradwood Landing Project. However, the FERC would review each of these proposals individually, on their own merits, if they file applications, and if authorized, market conditions would determine which projects are ultimately built and put into service.

We considered if other LNG import terminals proposed for the west coast of North America could serve as reasonable alternatives to replace the Bradwood Landing Project. These include: the WestPac LNG Facility and Kitimat LNG Terminal in British Columbia, Canada; Energia Costa Azul LNG Facility in Ensanada, Mexico; Terminal GNL de Sonora near Puerto Libertad, Mexico; and the Long Beach LNG Import Project and the Clearwater, Cabrillo and Ocean Way deep water port proposals in southern California. We concluded that some of these projects are not feasible, and none would meet all the objectives of the Bradwood Landing Project.

We considered alternative LNG terminal locations along the coast of Washington and Oregon that would be accessible to LNG carriers and within a reasonable distance of an interstate pipeline system. Sites in the Puget Sound area or Grays Harbor area of Washington do not appear to be environmentally preferable to the Bradwood Landing Project, and those locations have constraints which have prevented them so far from being considered by potential developers as LNG import terminals. In September 2007, Jordan Cove filed an application with the FERC for a proposed LNG import terminal in Coos Bay, Oregon and PCGP filed its application for a 230-mile-long sendout pipeline. The Oregon LNG Project in Warrenton, Oregon and its associated 121-mile-long sendout pipeline are currently being studied under the FERC’s Pre-filing Review Process. Neither the Jordan Cove nor the Oregon LNG projects appear to be environmentally superior to the Bradwood Landing Project, because of their longer sendout pipelines. However, the FERC will conduct an independent environmental review of the Jordan Cove and Oregon LNG projects, and would make decisions based on their individual merits. The Commission does not choose between competing projects, and if any of the LNG terminals in Oregon are authorized the market would ultimately determine which projects are viable.

We also examined other potential LNG import terminal locations along the lower Columbia River in Oregon. No developer is currently proposing either the Tansy Point or Port Westward site under the FERC Pre-filing Review Process. Our initial review of those locations found that they have no clear

environmental advantages over the Bradwood Landing LNG Project. An offshore LNG import terminal near the mouth of the Columbia River would not be a viable alternative to the Bradwood Landing Project due to deep, rough sea conditions off the Oregon Coast; technological limitations associated with an offshore terminal; and the additional environmental impacts associated with the longer sendout pipeline.

We reviewed various alternative designs for facilities at Bradwood Landing, and concluded that the current proposal is reasonable given technical, engineering, safety, and environmental considerations. Furthermore, we did not identify dredged material placement alternatives that were technically, economically, and/or environmentally preferable to the proposed action of placing the material at the LNG terminal site and the Wahkiakum County Sand Pit site.

We evaluated four major sendout pipeline routes as alternatives to the route proposed by NorthernStar, but none would provide significant environmental advantages over the proposed pipeline route. A number of minor route variations were also considered in an effort to eliminate or minimize potential impacts on specific localized resources, including residences, wetlands, or waterbodies. In some cases NorthernStar adopted minor route variations that we agree are environmentally preferable, in other cases we agree that the minor route variation alternative offered no clear environmental advantages over NorthernStar's selected proposed route.

The proposed action for the Coast Guard is to issue an LOR finding the waterway suitable for LNG marine traffic with conditions. Among the conditions that may be included are: 1) establishment of a 500-yard moving safety/security zone during LNG vessel transit of the waterway, including the requirements for one-way LNG marine traffic along certain portions of the waterway such as at turns and for a 200-yard security zone around the LNG vessel when it is moored at the LNG terminal; 2) a 50-yard security zone around the LNG terminal when there is not a vessel at the dock; 3) annual review by NorthernStar of its WSA to evaluate if any conditions in the waterway have changed that would require issuance of a new LOR and submittal of the annual review to the COTP for his/her review and issuance of a new LOR if necessary; 4) the requirement that LNG vessels must board a pilot(s) at least 5 miles before the CR Buoy and for at least the first 6 months, at least two pilots must be on board throughout the transit and that at least two tugs escort the vessel along the waterway with a third to assist with turning and mooring; 5) implementation of a Coast Guard-approved *LNG Vessel Transit Management Plan*; 6) improvements to the Columbia River's Vessel Traffic Information System; and 7) availability of Coast Guard as well as other safety and security resources to implement the above security measures. If these and other conditions to the LOR are imposed, the potential for accidental releases or releases from terrorist attacks would be minimized.

Reasonable alternatives to the Coast Guard's proposed action with conditions include: 1) issuance of a Coast Guard LOR finding the waterway suitable for LNG marine traffic without conditions; and 2) issuance of a Coast Guard LOR finding the waterway not suitable for LNG marine traffic (no action alternative). The Coast Guard's preferred alternative is to issue an LOR finding the waterway suitable for LNG traffic with certain conditions.

The no action alternative for the Coast Guard would avoid any project-related environmental effects in the waterway; however, it would also prevent LNG carriers from delivering LNG to the proposed import terminal and the project objectives would not be met. A reasonable alternative to the Coast Guard action of issuing an LOR, which finds the waterway suitable for LNG marine traffic with certain conditions, is to issue an LOR without any conditions. With this alternative, some of the adverse economic effects of the conditions would be lessened. However, the potential for adverse environmental effects would be greater if conditions were not imposed.

In summary, we have determined that NorthernStar's proposed project, as modified by our recommended mitigation measures, is the preferred alternative that can meet the project objectives.

5.2 FERC STAFF'S RECOMMENDED MITIGATION

If the Commission approves the proposed Bradwood Landing Project, we recommend that the Commission's authorizations include the measures recommended below to further mitigate the environmental impacts associated with the construction and operation of the proposed project.

1. NorthernStar shall follow the construction procedures and mitigation measures described in its application, supplemental filings (including responses to staff data requests), and as identified in the EIS, unless modified by the Order. NorthernStar must:
 - a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;
 - b. justify each modification relative to site-specific conditions;
 - c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and
 - d. receive approval in writing from the Director of the OEP **before using that modification.**
2. For pipeline facilities, the Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources **during construction and operation** of the Bradwood Landing Project. This authority shall allow:
 - a. the modification of conditions of the Commission's Order; and
 - b. the design and implementation of any additional measures deemed necessary (including stop work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from project construction and operation.
3. For LNG facilities, the Director of OEP has delegated authority to take all steps necessary to ensure the protection of life, health, property, and the environment **during construction and operation** of the project. This authority shall include:
 - a. stop-work authority and authority to cease operation; and
 - b. the design and implementation of any additional measures deemed necessary to assure continued compliance with the intent of the conditions of the Order.
4. **Before any construction** for the LNG terminal and the pipeline, NorthernStar shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, EIs, and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs before becoming involved with construction and restoration activities.
5. The authorized facility locations shall be as shown in the EIS, as supplemented by filed alignment sheets, and shall include all of the staff's recommended facility locations. **As soon as they are available, and before the start of construction** for the LNG terminal and the pipeline, NorthernStar shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.

6. NorthernStar shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, new access roads, and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, and documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of OEP **before construction** in or near that area.

This requirement does not apply to extra workspace allowed by the Plan, minor field realignments per landowner needs, and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

- a. implementation of cultural resources mitigation measures;
- b. implementation of endangered, threatened, or special concern species mitigation measures;
- c. recommendations by state regulatory authorities; and
- d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

- | 7. **At least 60 days before construction** of the LNG terminal and the pipeline begins, NorthernStar shall file an initial Implementation Plan with the Secretary for review and written approval by the Director of OEP describing how NorthernStar will implement the mitigation measures required by the Order. NorthernStar must file revisions to the plan as schedules change. The plan shall identify:

- a. how NorthernStar will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel;
- b. the number of EIs assigned per spread, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;
- c. company personnel, including EIs and contractors, who will receive copies of the appropriate material;
- d. the training and instructions NorthernStar will give to all personnel involved with construction and restoration (initial and refresher training as the project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s);
- e. the company personnel (if known) and specific portion of NorthernStar's organization having responsibility for compliance;
- f. the procedures (including use of contract penalties) NorthernStar will follow if noncompliance occurs; and
- g. for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram), and dates for:

- (1) the completion of all required surveys and reports;

- (2) the mitigation training of onsite personnel;
 - (3) the start of construction; and
 - (4) the start and completion of restoration.
- 8. NorthernStar shall develop and implement an environmental complaint resolution procedure. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the project and restoration of the right-of-way. **Before construction** of the LNG terminal and the pipeline, NorthernStar shall mail the complaint procedures to each landowner whose property would be crossed by the project.
 - a. In its letter to affected landowners, NorthernStar shall:
 - (1) provide a local contact that the landowners shall call first with their concerns; the letter shall indicate how soon a landowner shall expect a response;
 - (2) instruct the landowners that, if they are not satisfied with the response, they shall call NorthernStar's Hotline; the letter shall indicate how soon to expect a response; and
 - (3) instruct the landowners that, if they are still not satisfied with the response from NorthernStar's Hotline, they shall contact the Commission's Enforcement Hotline at (888) 889-8030.
 - b. In addition, NorthernStar shall include in its weekly status report a copy of a table that contains the following information for each problem/concern:
 - (1) the date of the call;
 - (2) the identification number from the certificated alignment sheets of the affected property;
 - (3) the description of the problem/concern; and
 - (4) an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved.
- 9. NorthernStar shall employ at least one EI at the LNG terminal and one EI per pipeline spread. The EI shall be:
 - a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;
 - b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 7 above) and any other authorizing document;
 - c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;
 - d. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and
 - e. responsible for maintaining status reports.
- 10. NorthernStar shall file updated status reports prepared by the EI with the Secretary **on a weekly basis until all construction and restoration activities are complete**. On request, these status

reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

- a. the current construction status of the project, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;
 - b. a listing of all problems encountered and each instance of noncompliance observed by the EI(s) during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);
 - c. corrective actions implemented in response to all instances of noncompliance, and their cost;
 - d. the effectiveness of all corrective actions implemented;
 - e. a description of any landowner/resident complaints which may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and
 - f. copies of any correspondence received by NorthernStar from other federal, state or local permitting agencies concerning instances of noncompliance, and NorthernStar's response.
11. NorthernStar must receive written authorization from the Director of OEP **before commencing service** from the project. Such authorization will only be granted following a determination that the LNG facility has been constructed in accordance with Commission approval and applicable standards, can be expected to operate safely as designed, and the rehabilitation and restoration of the right-of-way is proceeding satisfactorily.
12. **Within 30 days of placing the authorized facilities in service**, NorthernStar shall file an affirmative statement with the Secretary, certified by a senior company official:
 - a. that the facilities have been constructed in compliance with all applicable conditions, and that continuing activities will be consistent with all applicable conditions; or
 - b. identifying which of the conditions of the order NorthernStar has complied with or will comply with. This statement shall also identify any areas affected by the project where compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.
13. NorthernStar shall continue to consult with the COE, NMFS, FWS, ODFW, ODSL, WDE, and other appropriate agencies to finalize its Compensatory Mitigation Plan. NorthernStar shall file the final Compensatory Mitigation Plan along with agency comments and appropriate approvals with the Secretary **prior to construction** of the LNG terminal and pipeline facilities. (*EIS Section 2.1.5*)
14. **Prior to pipeline construction**, NorthernStar shall file with the Commission the following information on the nonjurisdictional lateral pipeline facilities:
 - a. final routing and design information, including maps depicting the location of the facilities;
 - b. documentation of consultations with the appropriate agencies and the status of federal, state, or local permits or approvals required for their construction; and
 - c. status and copies of agency clearances (or copies of any surveys and reports prepared) for wetlands, threatened and endangered species, and cultural resources. (*EIS Section 2.2.2*)

15. NorthernStar shall develop and fund a third-party environmental monitoring program to be implemented **during construction** of the Bradwood Landing Project. The program shall allow for on-site, third-party compliance monitors representing the FERC to be present full-time during all pipeline construction phases, and periodically during LNG terminal construction, to ascertain that the project is being built as outlined in this EIS, and in accordance with the environmental conditions of the FERC Order. **Prior to construction**, NorthernStar shall file a plan describing the third-party environmental monitoring program with the Secretary for the review and written approval of the Director of OEP. (*EIS Section 2.6*)
16. NorthernStar shall be required to implement the following peer review process:
- a. **Prior to construction** of the LNG terminal and pipeline, NorthernStar shall retain a “Board of Consultants” (Board) composed of three or more qualified independent engineering consultants experienced in the critical disciplines of geotechnical, civil, structural, and mechanical engineering, to review the final design and to perform construction quality inspections of the civil and structural aspects of the project in accordance with the specifications contained in the FERC’s Draft Seismic Design Guidelines and Data Submittal Requirements for LNG Facilities (FERC Seismic Guidelines) and other measures agreed to by NorthernStar.
 - b. NorthernStar shall file with the Secretary the names and qualifications of the Board members for approval by the Director of OEP.
 - c. The Board shall certify that all civil and structural detailed design calculations, analyses, and construction documents are in compliance with all applicable codes and standards, project-specific civil, structural, and mechanical design criteria, and other engineering requirements of the Order, including the FERC Seismic Guidelines. The Board shall further certify, based on construction inspections by the Board that all civil and structural construction of the terminal facilities is in conformance with the project construction documents. The Board shall also certify that all procured equipment has been properly seismic qualified in conformance with the project-specific seismic qualification requirements, and the FERC Seismic Guidelines, that seismic detailing of structures has been properly implemented, and the pipeline has been designed to minimize the hazard of rupture due to ground instability.
 - d. Among other things, the Board shall assess the adequacy of the following:
 - final geotechnical investigations necessary to support all final foundation designs in satisfying the FERC Seismic Guidelines, and final pipeline routing/mitigation measures through geologically hazardous areas;
 - field tests and associated results used to verify ground improvement, pile driving, and all civil and structural construction;
 - selection and implementation of the final seismic design categorization of all structures, systems, and components of the LNG terminal in satisfying the FERC Seismic Design Guidelines;
 - proposed seismic recording instrumentation and shutdown alarms in satisfying the FERC Seismic Guidelines;
 - construction procedures and progress; and
 - continuous and/or periodic inspections made by the Board to ensure that the construction quality of all Seismic Category I, II, and III structures, systems, and components is acceptable.

- e. The Board shall meet as necessary to allow the timely progress of the final design approvals and construction of the project in accordance with NorthernStar's production of acceptable interim and final design data.
 - f. Before each meeting, NorthernStar shall file the following material with the Commission and furnish copies to members of the Board, and other appropriate federal and/or state agencies at the request of the Director of OEP:
 - a statement of the specific level of review the Board is expected to provide;
 - an agenda for the meeting;
 - a list of the items to be discussed;
 - a discussion of significant events in the design and construction that have occurred since the previous Board meeting;
 - drawings of the design and construction features; and
 - documentation of the details, calculations, and analyses of the design and construction features to be discussed.
 - g. NorthernStar shall ensure that the Commission and the Board has sufficient time to review all pertinent materials before each meeting.
 - h. **Within 30 days** of each Board meeting, NorthernStar shall file with the Commission copies of the Board's report and a statement of intent to comply with the Board's recommendations or a statement of a plan to resolve the issue(s). NorthernStar must provide detailed reasons for any recommendation of the Board not implemented.
 - i. The Board's review comments shall be submitted prior to or simultaneously with NorthernStar's request(s) for approval to proceed with any specific construction-related activities that may be required by the Order. The Director of OEP must approve in writing all requests to proceed with construction. *(EIS Section 4.1.3.3)*
17. **Prior to commissioning** of the LNG terminal or commencing service through the pipeline, NorthernStar shall file the Board's final report, which shall contain a statement indicating the Board's opinion with respect to the construction, safety, and adequacy of the LNG terminal structures and mitigation measures employed along the pipeline route in areas subject to ground instability. *(EIS Section 4.1.3.3)*
18. NorthernStar shall prepare a Shoreline Monitoring Plan for the west end of Puget Island that is similar in scope to the monitoring plan prepared for the Clatsop County Conditional Use Permit. The plan shall be filed with the Secretary for the review and written approval of the Director of OEP **prior to operation** of the LNG terminal. *(EIS Section 4.1.3.3)*
19. **Prior to construction** of the LNG terminal, NorthernStar shall file with the Secretary the following information regarding the new proposed construction worker parking lot, Bradwood Road, and Clifton Road: map of disturbed area; soils; impacts on upland vegetation, waterbodies and wetlands, and wildlife habitat; occurrence of state- or federally listed species; land use and zoning; cultural resources, and restoration plans. NorthernStar shall include status and copies of agency clearances for wetlands, threatened and endangered species, and cultural resources, as applicable. *(EIS Section 4.2.2.1)*
20. NorthernStar shall prepare its CMMP to address the discovery and management of contaminated soils and groundwater. This plan shall comply with applicable state and federal regulations and shall include procedures for the identification and management of unknown contaminants if any are encountered during construction of the proposed LNG terminal and pipeline facilities. The

plan shall be filed with the Secretary for the review and written approval of the Director of OEP **prior to construction.** (*EIS Section 4.2.2.1*)

21. NorthernStar shall prepare a plan to monitor the side slopes of the maneuvering area after dredging. The plan shall include slope protection measures, shall such mitigation be necessary. The plan shall be filed with the Secretary for the review and written approval of the Director of OEP **prior to construction** of the LNG terminal. (*EIS Section 4.2.2.2*)
22. NorthernStar shall revise its pipeline ESC Plan and SWPPP to include the measures from the FERC's Plan that provide greater protections. NorthernStar's revised plans shall be filed with the Secretary for the review and written approval of the Director of OEP **prior to construction** of the pipeline. (*EIS Section 4.2.3.2*)
23. NorthernStar shall conduct water quality monitoring at points both 100 feet downstream and 100 feet upstream from the Hunt Creek Bridge **during demolition or construction activities.** In the event that water clarity exceeds a level approximately 10 percent above the baseline observation at the either monitoring point, work would cease **until** either the turbidity was cleared or it could be ascertained that the difference in turbidity levels was not due to construction activities. (*EIS Section 4.3.2.3*)
24. **Within 30 days** after the issuance of the final EIS, NorthernStar shall develop the following performance standards for water discharges at the Bradwood Landing terminal wharf:
 - a. standards for water temperature impacts due to discharging cooling water from LNG carriers into the Columbia River that shall include modeling to determine the temporal and spatial extent of impacts on water quality and salmonids; and
 - b. standards for impacts from biocide use that shall include specific forms and concentrations of biocide that would be used, the anticipated concentration of biocide at the discharge location, and modeling to determine the temporal and spatial extent of toxicity to aquatic resources. (*EIS Section 4.3.2.3*)
25. NorthernStar shall revise its *HDD Contingency Plan* to include mitigation measures for frac-outs to uplands. **Prior to pipeline construction,** the revised *HDD Contingency Plan* shall be filed with the Secretary for the review and written approval of the Director of OEP. (*EIS Section 4.3.2.4*)
26. NorthernStar shall continue to consult with the COE, NMFS, FWS, and other appropriate federal and state agencies to finalize its *Waterbody and Wetland Construction and Mitigation Procedures Plan*. The final plan shall include the following:
 - a. a description of the specific methods of in-water habitat mitigation to be conducted;
 - b. measures to prevent the spread of invasive species due to construction activities within waterbodies; and
 - c. procedures for monitoring the success of the revegetation and weed control efforts.

The plan, including agency comments on the plan, shall be filed with the Secretary for review and written approval by the Director of OEP **prior to pipeline construction.** (*EIS Section 4.3.2.4*)
27. **Prior to activities** within the pipe storage and contractor yard in Washington, wetlands potentially affected by activities within the yard shall be fenced. Construction activities shall not

occur within 50 feet of any wetland without prior review and written approval by the Director of OEP. (*EIS Section 4.4.1.3*)

28. **During construction**, NorthernStar shall implement the following measures at the three extra temporary workspaces listed below and in table 4.4.1-7 that would be within 50 feet of wetlands:
 - a. B0505 – Wetland shall be fenced and avoided regardless of the presence of saturated conditions during construction activities.
 - b. EST-3 – The pull string section for the Abernathy Creek HDD shall avoid this wetland and the waterbody located within the wetland boundaries.
 - c. AA0424 – The extra workspace shall be relocated and centered on the upland area approximately 250 feet west of the current location. (*EIS Section 4.4.1.3*)
29. NorthernStar shall continue to consult with the COE, FWS, NMFS, Oregon and Washington Departments of Agriculture, and other appropriate resource agencies to revise its *Noxious Weeds and Soil-borne Plant Disease Control Plan*. NorthernStar shall file the final *Noxious Weeds and Soil-borne Disease Control Plan* along with agency approvals with the Secretary **within 30 days** after issuance of the final EIS. (*EIS Section 4.4.2.3*)
30. NorthernStar shall coordinate with the NMFS to determine appropriate LNG carrier speed, or other applicable measures, to avoid or minimize impacts on juvenile fish from wake stranding and shoreline erosion due to LNG carrier transit along the waterway. Results of modeling and coordination, including any specific measures to be implemented, shall be filed with the Secretary, **within 30 days** after issuance of the final EIS. (*EIS Section 4.5.1.1*)
31. NorthernStar shall consult with the appropriate federal and state agencies to develop a revised Bubble Curtain Contingency Plan that establishes a performance standard to assess whether or not bubble curtains are adequately working. The plan shall describe specific noise attenuation methods to be implemented if monitoring indicates poor noise attenuation performance. The plan, including agency comments on the plan, shall be filed with the Secretary for the review and written approval of the Director of OEP **prior to beginning offshore pile driving activities** at the LNG terminal. (*EIS Section 4.5.2.1*)
32. **During fish collection efforts** at the former mill log pond at the LNG terminal, NorthernStar shall place nets at the outlet of the log pond that only allow emigration from the pond (e.g., winged fyke net without collection chamber attached or two disconnected block nets oriented outward from the pond). (*EIS Section 4.5.2.1*)
33. NorthernStar shall conduct **post-installation** water flow mapping through all intake screens at the LNG terminal, and develop and implement a monitoring program to assess the effects of impingement and entrainment from use of the screened water supply system on juvenile salmonids during terminal operations. The monitoring program and water flow mapping plans shall be developed in consultation with the NMFS and ODFW and, as appropriate, incorporate adaptive management strategies to identify and mitigate any adverse effects specifically associated with the project. The final monitoring program and water flow mapping results, as well as any agency comments, shall be filed with the Secretary for the review and written approval of the Director of OEP **prior to operation of the screens**. In addition, NorthernStar shall provide **annual reports** to both the FERC and NMFS regarding the efficacy of the screened water intake system, which would identify any problems and address how such problems would be rectified. (*EIS Section 4.5.2.1*)

34. **Within 30 days** of the issuance of the final EIS, NorthernStar shall:

- a. prepare a plan that outlines how NorthernStar would ensure only LNG carriers that are retrofitted to use the proposed screened water supply system at the wharf are allowed to unload cargo at the Bradwood Landing terminal. The plan shall include a method of certifying to the FERC, in advance of a LNG carrier's initial call to the Bradwood Landing terminal, that the LNG carrier has been retrofitted to utilize NorthernStar's screened water intake system; or
- b. develop a plan for delivering screened engine cooling and ballast water to LNG carriers at the Bradwood Landing terminal that does not require carrier retrofitting.

The proposed screened water supply system design plan shall include monitoring, reporting, and adaptive management strategies to assure the system's efficacy at minimizing entrainment and impingement of sensitive species of juvenile fish. *(EIS Section 4.5.2.1)*

35. **Prior to initial site preparation** at the LNG terminal, NorthernStar shall file the final screened water system design plans and performance standards, along with NMFS comments on the plans and standards, with the Secretary for review and written approval by the Director of OEP. *(EIS Section 4.5.2.1)*

36. NorthernStar shall continue to consult with the NMFS, FWS, ODFW, and other appropriate agencies regarding revisions to its Lighting Plan. NorthernStar shall file its final Lighting Plan along with agency comments with the Secretary for review and written approval by the Director of OEP **prior to operation** of the LNG terminal. *(EIS Section 4.5.2.1)*

37. NorthernStar shall consult with the NMFS, FWS, ODFW, and other appropriate agencies in developing its Blasting Management Plan relative to the proposed noise mitigation measures. NorthernStar shall file its Blasting Management Plan along with agency comments on the plan with the Secretary **prior to blasting activities**. *(EIS Section 4.5.2.3)*

38. NorthernStar shall coordinate with the NMFS to determine appropriate LNG carrier speed and seasonal restrictions, or other restrictions to be implemented, to avoid or minimize impacts on whales. Results of the coordination, including a discussion of restrictions to be implemented, shall be filed with the Secretary, **within 30 days** after issuance of the final EIS. *(EIS Section 4.6.2.1)*

39. **Prior to construction** of the LNG terminal and pipeline facilities, NorthernStar shall conduct additional botanical surveys, where necessary, for federally listed endangered and threatened plants in the appropriate habitats within the project area during the appropriate survey period. **Before the initiation** of surveys, NorthernStar shall consult with the FWS for appropriate survey methods and periods for each species. If project facilities are not constructed **within 1 year** from the date of issuance of authorizations, NorthernStar shall consult with the appropriate offices of the FWS to update the species list and to determine if additional surveys are required. The survey reports and any FWS comments on the survey and its conclusions shall be filed with the Secretary. The survey reports shall include the following information:

- a. name(s) and qualifications of the person(s) conducting the survey;
- b. method(s) used to conduct the survey;
- c. date(s) of the survey;
- d. area surveyed (include the mileposts surveyed); and
- e. proposed mitigation measures that would substantially minimize or avoid potential impacts on listed endangered or threatened plants found in the project area.

NorthernStar must receive written approval from the Director of OEP **before implementing any mitigation measures.** (*EIS Section 4.6.2.2*)

40. NorthernStar shall conduct a survey for bald eagles, where necessary, **prior to construction** of the LNG terminal and pipeline facilities. **Before the initiation** of surveys, NorthernStar shall consult with the FWS, ODFW, and WDFW for appropriate survey methods and periods for the surveys. The survey reports and any agency comments on the survey and its conclusions shall be filed with the Secretary. The survey reports shall include the following information:
- a. name(s) and qualifications of the person(s) conducting the survey;
 - b. method(s) used to conduct the survey;
 - c. date(s) of the survey;
 - d. area surveyed (include the mileposts surveyed); and
 - e. proposed mitigation measures that would substantially minimize or avoid potential impacts on bald eagles found in the project area.

NorthernStar must receive written approval from the Director of OEP **before implementing any mitigation measures.** (*EIS Section 4.6.2.2*)

41. NorthernStar shall expand the protective measures that would be used to avoid or minimize impacts on Steller sea lions **during construction** of the LNG terminal (e.g., safety, buffer, and noise impact zones) to include all pinnipeds. (*EIS Section 4.6.2.2*)
42. NorthernStar shall consult with the FWS and other appropriate agencies to develop a Migratory Bird Nest Avoidance Plan to minimize impacts on migratory birds during the peak nesting season. NorthernStar shall file its Migratory Bird Nest Avoidance Plan along with agency comments with the Secretary **prior to the commencement** of clearing activities at the LNG terminal and the pipeline. (*EIS Section 4.6.2.2*)
43. Pipeline construction activities shall not occur within potential habitat for Columbian white-tailed deer (MPs 4 to 19) **between June 1 and July 15.** (*EIS Section 4.6.2.3*)
44. NorthernStar shall not begin construction activities at the LNG terminal and the pipeline **until**:
- a. the staff completes formal consultation with the NMFS and FWS;
 - b. NorthernStar completes consultation with the NMFS under section 101(a)(5)(D) of the MMPA; and
 - c. NorthernStar has received written notification from the Director of OEP that construction or use of mitigation may begin. (*EIS Section 4.6.3*)
45. **Prior to construction** of the LNG terminal and the pipeline, NorthernStar shall file with the Secretary documentation of concurrence from the ODLCD that the project is consistent with the CZMA. (*EIS Section 4.7.2.4*)
46. **Before pipeline construction** begins, NorthernStar shall file with the Secretary, for the review and written approval of the Director of OEP, a plan outlining measures that shall be implemented to mitigate pipeline construction impacts on domestic water supply systems and septic systems. For all residences located within 50 feet of the pipeline construction work area, **during construction** of the pipeline, NorthernStar shall:

- a. not remove mature trees and landscaping within the edge of the construction work area, unless necessary for safe operation of construction equipment;
 - b. immediately after backfilling the trench, restore all lawn areas and landscaping within the construction work area consistent with the requirements of the FERC staff's Plan;
 - c. fence the edge of the construction work area adjacent to the residence for a distance of 100 feet on either side of the residence to ensure that construction equipment and materials, including the spoil pile, remain within the construction work area;
 - d. try to maintain a minimum distance of 25 feet between the residence and the edge of the construction work area; and
 - e. for any residence closer than 25 feet to the construction work area, file a site-specific plan with the Secretary for the review and written approval of the Director of OEP **before construction**. The plan shall include:
 - (1) a description of construction techniques to be used (such as reduced pipeline separation, centerline adjustment, use of stove-pipe or drag-section techniques, working over existing pipelines, pipeline crossover, bore, etc.), and include a dimensioned site plan that shows:
 - i. the location of the residence in relation to the new pipeline and, where appropriate, the existing pipelines;
 - ii. the edge of the construction work area;
 - iii. the edge of the new permanent right-of-way; and
 - iv. other nearby residences, structures, roads, or waterbodies.
 - (2) a description of how NorthernStar would ensure the trench is not excavated until the pipe is ready for installation and the trench is backfilled immediately after pipe installation; and
 - (3) evidence of landowner concurrence if the construction work area and fencing would be located within 10 feet of a residence. (*EIS Section 4.7.3.3*)
47. **Prior to construction** of the pipeline, NorthernStar shall study Cowlitz County records to determine all plans for future residential and commercial developments along the proposed pipeline route in Washington, and file the results of that study with the Secretary, for the review and written approval of the Director of OEP. The study shall specifically include the Castle family house plans, and provide details about how NorthernStar would avoid or mitigate impacts on that future residence, including the distance (in feet) from the proposed house to the pipeline construction right-of-way. (*EIS Section 4.7.3.3*)
48. **Prior to pipeline construction**, NorthernStar shall document that it has consulted with the Port of St. Helens, the Columbia County Development Agency, and other appropriate agencies and representatives of Columbia County, to determine if its pipeline may have impacts on county improvements in the vicinity of the Port Westward Industrial Area, and file with the Secretary a plan to avoid or mitigate those impacts, for the review and approval of the Director of OEP. (*EIS Section 4.7.3.3*)
49. NorthernStar shall file with the Secretary a copy of the final Railroad Relocation Agreement **prior to LNG terminal construction**. (*EIS Section 4.8.2.7*)
50. NorthernStar shall consult with the ODOT, WDOT, and appropriate local agencies in the development of its final traffic management plan. The final traffic management plan shall include the design for improvements along Highway 30 and Clifton Road, and measures to

reduce impacts on narrow roads that would be used to access the construction right-of-way. **Prior to construction** of the LNG terminal and the pipeline, NorthernStar shall file its final traffic management plan, and documentation of consultations with the ODOT, WDOT, and local county government agencies, with the Secretary for the review and written approval of the Director of OEP. (*EIS Section 4.8.3.7*)

51. **Prior to construction** of the LNG terminal and the pipeline, NorthernStar shall file with the Secretary:
 - a. documentation that it re-initiated consultations with all Indian tribes listed on table 4.9.3-1 of the final EIS, and copies of correspondence to and from Indian tribes that expressed interest in its project after the issuance of the draft EIS (in August 2007); and
 - b. documentation that it provided copies of revised reports of cultural resources investigations to all Indian tribes that have expressed an interest in the project, including the Confederated Tribes of the Grande Ronde Reservation, and copies of any comments the tribes may have on those reports. (*EIS Section 4.9.3*)
52. NorthernStar shall defer construction and use of its proposed facilities, including related ancillary areas for staging, storage, temporary work areas, and new or to-be-improved access roads **until**:
 - a. NorthernStar files with the Secretary all additional required cultural resources survey and evaluation reports, any necessary treatment/avoidance plans, and a cultural resources management plan;
 - b. NorthernStar files with the Secretary comments of the Oregon and Washington SHPOs on all cultural resources investigation reports and plans;
 - c. the ACHP has been given an opportunity to comment, if any historic properties would be adversely affected by the project; and
 - d. the Director of OEP reviews and approves all cultural resources investigation reports and plans, and notifies NorthernStar in writing that treatment plans/mitigation measures may be implemented or construction may proceed.

All material filed with the Commission containing **location, character, and ownership information** about cultural resources must have the cover and any relevant pages therein clearly labeled in bold lettering: “**CONTAINS PRIVILEGED INFORMATION - DO NOT RELEASE.**” (*EIS Section 4.9.4*)

53. **Prior to LNG terminal construction**, NorthernStar shall file with the Secretary, for review and written approval by the Director of OEP, a finalized dredging noise mitigation plan. This plan shall identify all noise mitigation which NorthernStar would implement during dredging to reduce noise at the NSAs. Specifically, during dredging operations NorthernStar shall monitor noise and make all reasonable efforts to restrict noise increases from operations to no more than 10 dBA above ambient if the resulting impact is above 55 dBA L_{dn} . (*EIS Section 4.10.2.2*)
54. NorthernStar shall file a noise survey for the terminal with the Secretary **no later than 60 days** after placing the LNG terminal in service. If the noise attributable to the operation of the LNG terminal exceeds 55 dBA L_{dn} at any nearby NSAs, NorthernStar shall file a report on what changes are needed and shall install additional noise controls to meet the level **within 1 year** of the in-service date. NorthernStar shall confirm compliance with these requirements by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*EIS Section 4.10.2.2*)

55. **Prior to pipeline construction**, NorthernStar shall file with the Secretary, for the review and written approval by the Director of OEP, a finalized noise mitigation plan for HDD sites Nos. 3, 5, 7, 8, 9, 10, 11, 12, 13, as identified in table 4.10.2-6 of the final EIS. This plan shall identify all noise mitigation that NorthernStar would implement during drilling activity to reduce noise at any nearby NSAs. Specifically, during HDD operations NorthernStar shall monitor noise and make all reasonable efforts to restrict noise increases from HDD operations to no more than 10 dBA above ambient if the resulting impact is above 55 dBA L_{dn} . (*EIS Section 4.10.2.3*)
56. NorthernStar shall file noise surveys with the Secretary **no later than 60 days** after placing the Wauna Mill, Northwest Natural, PGE Beaver Power Plant, and Williams Northwest pipeline valves into service. If the noise attributable to the operation of the authorized pipeline valves exceeds an L_{dn} of 55 dBA at any nearby NSAs, NorthernStar shall file a report on what changes are needed and shall install the additional noise controls to meet the level within **1 year** of the in-service date. NorthernStar shall confirm compliance with the above requirement by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*EIS Section 4.10.2.3*)
57. **Prior to construction**, NorthernStar shall either: a) submit a determination from the DOT documenting agreement with the proposed pipeline valve locations, or b) submit for the review and written approval by the Director of OEP modified pipeline design plans demonstrating compliance with 49 CFR 192.179. (*EIS Section 4.11.9.1*)

Recommendation numbers 58 through 71 shall apply to the project design and construction details. Information pertaining to these specific recommendations shall be filed with the Secretary for review and approval by the Director of OEP either: prior to initial site preparation; prior to commencing final design; prior to construction; or prior to commissioning as indicated by each specific condition. All detailed design documents (drawings, calculations, specifications, etc.) and design submittals shall satisfy the requirements of Section 4, Part II of the FERC's draft "Seismic Design Guidelines and Data Submittal Requirements for LNG Facilities," January 2007 (FERC Seismic Guidelines).

58. Seismic specifications to be used in conjunction with the procuring equipment as described in section 3.10 of Part II of the FERC Seismic Guidelines shall be submitted for review **prior to commencing final design**. (*EIS Section 4.1.3.3*)
59. Quality Control and Assurance procedures as described in section 3.11 of Part II of the FERC Seismic Guidelines that will be used for design and construction shall be submitted for review **prior to commencing final design** of the project. (*EIS Section 4.1.3.3*)
60. A list of Seismic Category assignments for all structures, systems and components shall be submitted **prior to commencing final design** for review as described in section 3.6 of Part II of the FERC Seismic Guidelines. (*EIS Section 4.1.3.3*)
61. Seismic Design Criteria shall be provided for all Seismic Design Category I, II, and III structures, systems, and components as described in section 3.7 of Part II of the FERC Seismic Guidelines **prior to commencing final design**. The Seismic Design Criteria shall satisfy Part I of the FERC Seismic Guidelines. (*EIS Section 4.1.3.3*)
62. LNG Tank (including outer containment tank) and Foundation Preliminary Design shall comply with Part I of the FERC Seismic Guidelines. In particular, site response analysis and soil structure interaction analysis shall comply with section 6 of Part I and section 3.5.1 (10) and (11)

of Part II of the FERC Seismic Guidelines. LNG tank preliminary design drawings and structural calculations as requested in Section 3.9 of Part II of FERC Seismic Guidelines shall be submitted for review **prior to commencing final design**. Final LNG Tank (including outer tank) and foundation detailed design drawings and structural calculations that demonstrate compliance with Part I of FERC Seismic Guidelines shall be submitted for review **prior to construction**. (*EIS Section 4.1.3.3*)

63. MCE and DE seismic design ground motions shall satisfy section 5 of Part I of the FERC Seismic Guidelines. Submittals that demonstrate compliance shall be provided **prior to commencing final design**. (*EIS Section 4.1.3.3*)
64. SSE and OBE seismic design ground motions shall satisfy section 5 of Part I of the FERC Seismic Guidelines. Submittals that demonstrate compliance shall be provided **prior to commencing final design**. (*EIS Section 4.1.3.3*)
65. Details of the liquefaction mitigation method(s), procedures, plan extent, and verification methods proposed to verify mitigation of liquefaction potential shall be provided **prior to commencing final design**. (*EIS Section 4.1.3.3*)
66. Detailed calculations of seismic slope stability and lateral movements anticipated after the liquefaction mitigation is implemented shall be provided **prior to commencing final design** to verify the stability of critical structures for the project design earthquake motions. (*EIS Section 4.1.3.3*)
67. Details of the types of piles finally selected for supporting the LNG tanks and results of indicator pile program, including load tests, shall be submitted for review and approval **prior to construction/pile installation**. (*EIS Section 4.1.3.3*)
68. Final foundation design recommendations including pile foundation design and/or liquefaction mitigation measures for all other structures shall be submitted for review and approval **prior to construction**. The foundation design and/or liquefaction measures shall satisfy the FERC Seismic Guidelines. (*EIS Section 4.1.3.3*)
69. All other items identified in the submitted geotechnical/seismic reports which were proposed to be addressed during the detailed design shall be submitted for review and approval **prior to construction**. (*EIS Section 4.1.3.3*)
70. A seismic instrumentation plan as described in section 3.12 of Part II of the FERC Seismic Guidelines shall be provided **prior to commissioning**. (*EIS Section 4.1.3.3*)
71. The results of the hydrostatic load tests on the LNG storage tanks, including settlement data as described in section 7.4.1 shall be provided **prior to commissioning**. (*EIS Section 4.1.3.3*)

Recommendation numbers 72 through 105 shall apply to the project design and construction details. Information pertaining to these specific recommendations shall be filed with the Secretary for review and approval by the Director of OEP either: prior to initial site preparation; prior to construction of final design; prior to commissioning; or prior to commencement of service as indicated by each specific condition. Specific engineering, vulnerability, or detailed design information meeting the criteria specified in Order No. 683 (Docket No. RM06-24-000), including security information, shall be submitted as CEII pursuant to 18 CFR 388.112. See *Critical Energy Infrastructure Information*, Order No. 683, 71 Federal Register 58,273 (October 3, 2006), FERC

Statutes & Regulations ¶ 31,228 (2006). Information pertaining to items such as: off-site emergency response; procedures for public notification and evacuation; and construction and operating reporting requirements would be subject to public disclosure. All information shall be submitted a minimum of 30 days before approval to proceed is required.

72. **Prior to initial site preparation**, NorthernStar shall file calculations or a re-designed configuration showing how the troughs feeding the impoundment sumps would adequately handle a spill from the unloading line at the maximum unloading line rate. *(EIS Section 4.11.4)*
73. Complete plan drawings and a list of the hazard detection equipment shall be filed **prior to initial site preparation**. The list shall include the instrument tag number, type and location, alarm locations, and shutdown functions of the proposed hazard detection equipment. Plan drawings shall clearly show the location of all detection equipment. *(EIS Section 4.11.2)*
74. NorthernStar shall provide a technical review of its proposed facility design that:
 - a. identifies all combustion/ventilation air intake equipment and the distances to any possible hydrocarbon release (LNG, flammable refrigerants, flammable liquids and flammable gases); and
 - b. demonstrates that these areas are adequately covered by hazard detection devices and indicate how these devices would isolate or shutdown any combustion equipment whose continued operation could add to or sustain an emergency.

NorthernStar shall file this review **prior to initial site preparation**. *(EIS Section 4.11.2)*

75. Complete plan drawings and a list of the fixed and wheeled dry-chemical, fire extinguishing, and other hazard control equipment shall be filed **prior to initial site preparation**. The list shall include the equipment tag number, type, size, equipment covered, and automatic and manual remote signals initiating discharge of the units. Plan drawings shall clearly show the planned location of all fixed and wheeled extinguishers. *(EIS Section 4.11.2)*
76. Facility plans showing the proposed location of, and area covered by, each monitor, hydrant, deluge system, hose, and sprinkler, as well as piping and instrumentation diagrams, of the fire water system shall be filed **prior to initial site preparation**. *(EIS Section 4.11.2)*
77. A copy of the hazard design review and list of recommendations that are to be incorporated in the final facility design shall be filed **prior to initial site preparation**. *(EIS Section 4.11.2)*
78. NorthernStar shall develop an ERP (including evacuation) and coordinate procedures with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies. This plan shall include at a minimum:
 - a. designated contacts with state and local emergency response agencies;
 - b. scalable procedures for the prompt notification of appropriate local officials and emergency response agencies based on the level and severity of potential incidents;
 - c. procedures for notifying residents and recreational users within areas of potential hazard;
 - d. evacuation routes/methods for residents and public use areas that are within any transient hazard areas along the route of the LNG vessel transit;
 - e. locations of permanent sirens and other warning devices; and
 - f. an “emergency coordinator” on each LNG carrier to activate sirens and other warning devices.

The ERP shall be filed with the Secretary for review and written approval by the Director of OEP **prior to initial site preparation**. NorthernStar shall notify FERC staff of all planning meetings in advance and shall report progress on the development of its ERP at **3-month intervals**. *(EIS Section 4.11.6)*

79. The ERP shall include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies. In addition to the funding of direct transit-related security/emergency management costs, this comprehensive plan shall include funding mechanisms for the capital costs associated with any necessary security/emergency management equipment and personnel base. The Cost-Sharing Plan shall be filed with the Secretary for review and written approval by the Director of OEP **prior to initial site preparation**. *(EIS Section 4.11.6)*
80. The **final design** of the fixed and wheeled dry-chemical, fire extinguishing hazard control equipment shall identify manufacturer and model. *(EIS Section 4.11.2)*
81. The **final design** shall include an updated fire protection evaluation carried out in accordance with the requirements of NFPA 59A, 2001 edition, chapter 9.1.2. *(EIS Section 4.11.2)*
82. The **final design** shall include a minimum of eight permanent bench marks located equally spaced around the top of the concrete base slab for each LNG tank. *(EIS Section 4.11.2)*
83. The **final design** shall include a discretionary vent valve for each LNG tank, operable through the distributed control system. *(EIS Section 4.11.2)*
84. The **final design** shall include a shutoff valve at the suction and discharge of each high pressure LNG pump. *(EIS Section 4.11.2)*
85. The **final design** shall specify that dual temperature elements and transmitters are provided for low temperature alarm and shutdown at the discharge of each vaporizer. *(EIS Section 4.11.2)*
86. The **final design** shall include a check valve between the LNG vaporizer discharge shutoff valve and the discharge manual isolation valve. *(EIS Section 4.11.2)*
87. The **final design** shall include a pilot relief valve or operated vent valve sized for thermal relief at the discharge of the vaporizer. *(EIS Section 4.11.2)*
88. The **final design** shall include provisions for the future installation of LNG pumps for the vapor return KO out drum and the boil-off compressor suction drum. *(EIS Section 4.11.2)*
89. The **final design** shall specify that for LNG and natural gas service, branch piping and piping nipples less than 2 inches are to be no less than schedule 160. *(EIS Section 4.11.2)*
90. The **final design** shall specify that spiral wound gaskets for LNG, natural gas service, or other hydrocarbon fluid service are to be equipped with inner and outer stainless steel retaining rings. *(EIS Section 4.11.2)*
91. The **final design** shall specify that piping and equipment that may be cooled with liquid nitrogen is to be designed for liquid nitrogen temperatures, with regard to allowable movement and stresses. *(EIS Section 4.11.2)*

92. The **final design** shall specify that the wharf area switchboards are connected to the backup generator. *(EIS Section 4.11.2)*
93. The **final design** shall include details of the shutdown logic, including cause and effect matrices for alarms and shutdowns. *(EIS Section 4.11.2)*
94. The **final design** shall include ESD of equipment and systems activated by hazard detection devices for flammable gas, fire, and cryogenic spills, when applicable. *(EIS Section 4.11.2)*
95. The **final design** shall include details of the air gaps to be installed downstream of all seals or isolations installed at the interface between a flammable fluid system and an electrical conduit or wiring system. Each air gap shall vent to a safe location and be equipped with a leak detection device that: shall continuously monitor for the presence of a flammable fluid; shall alarm the hazardous condition; and shall shutdown the appropriate systems. *(EIS Section 4.11.2)*
96. The **final design** shall include a hazard and operability review of the completed design. A copy of the review and a list of the recommendations shall be filed with the Secretary. *(EIS Section 4.11.2)*
97. The **final design** shall provide up-to-date Piping & Instrument Diagrams (P&IDs) including a description of the instrumentation and control philosophy, type of instrumentation (pneumatic, electronic), use of computer technology, and control room display and operation. Drawings and all information shall be clearly legible on 11- by 17-inch paper and the piping legend and symbology shall be in accordance with accepted practice. All drawings shall be filed in black and white. The following information shall be included on the P&IDs:
- a. equipment tag number, name, size, duty, capacity and design conditions;
 - b. piping with line number, piping class specification, size and insulation;
 - c. LNG tank pipe penetration size or nozzle schedule;
 - d. piping specification breaks and insulation limits;
 - e. isolation flanges, blinds and insulating flanges;
 - f. valve type, in accordance with the piping legend symbol;
 - g. all control valves numbered;
 - h. all valve operator types and valve fail position;
 - i. instrumentation numbered;
 - j. control loops including software connections;
 - k. alarm and shutdown set points;
 - l. shutdown interlocks;
 - m. relief valves numbered, with set point;
 - n. relief valve inlet and outlet piping size;
 - o. car sealed valves and blinds;
 - p. equipment insulation;
 - q. drawing revision number and date;
 - r. all manual valves numbered, including check, vent, drain, and car sealed valves; and
 - s. alarm and shutdown set points. *(EIS Section 4.11.2)*
98. The **final design** shall specify that all hazard detection equipment shall include redundancy, fault detection and fault alarm monitoring. *(EIS Section 4.11.2)*
99. All valves including drain, vent, main, and car sealed valves shall be tagged in the field during construction and **prior to commissioning**. *(EIS Section 4.11.2)*

100. The design details and procedures to record and to prevent the tank fill rate from exceeding the maximum fill rate specified by the tank designer shall be filed **prior to commissioning**. (*EIS Section 4.11.2*)
101. A tabulated list of the proposed hand-held fire extinguishers shall be filed **prior to commissioning**. The information shall include a list with the equipment number, type, size, number, and location. Plan drawings shall include the type, size, and number of all hand-held fire extinguishers. (*EIS Section 4.11.2*)
102. Operation and Maintenance procedures and manuals, as well as safety procedure manuals, shall be filed **prior to commissioning**. (*EIS Section 4.11.2*)
103. The FERC staff shall be notified of any proposed revisions to the security plan and physical security of the facility **prior to commencement of service**. (*EIS Section 4.11.2*)
104. Progress on construction of the LNG terminal shall be reported in monthly reports filed with the Secretary. Details shall include a summary of activities, projected schedule for completion, problems encountered and remedial actions taken. Problems of significant magnitude shall be reported to the FERC **within 24 hours**. (*EIS Section 4.11.2*)
105. NorthernStar, until commencement of service, shall **annually** review its WSA relating to LNG marine traffic for the project; update the assessment to reflect changing conditions which may impact the suitability of the waterway for LNG marine traffic; provide the updated assessment to the cognizant COTP/FMSC for review and validation and if appropriate, further action by the COTP/FMSC relating to LNG marine traffic; and provide a copy to the FERC staff. (*EIS Section 4.11.5.5*)

Recommendation Numbers 106 through 110 shall apply throughout the life of the facility:

106. **Throughout the life of the facility**, NorthernStar shall ensure that the facility and any LNG vessel transiting to and from the facility comply with all requirements set forth by the Coast Guard Captain of the Port Sector Portland, including all risk mitigation measures recommended in the WSR. (*EIS Section 4.11.5.5*)
107. The facility shall be subject to regular FERC staff technical reviews and site inspections on at least an **annual basis or more frequently** as circumstances indicate. Prior to each FERC staff technical review and site inspection, NorthernStar shall respond to a specific data request including information relating to possible design and operating conditions that may have been imposed by other agencies or organizations. Up-to-date detailed piping and instrumentation diagrams reflecting facility modifications and provision of other pertinent information not included in the semi-annual reports described below, including facility events that have taken place since the previously submitted semi-annual report, shall be submitted. (*EIS Section 4.11.2*)
108. **Semi-annual** operational reports shall be filed with the Secretary to identify changes in facility design and operating conditions, abnormal operating experiences, activities (including ship arrivals, quantity and composition of imported LNG, vaporization quantities, boil-off/flash gas, etc.), plant modifications including future plans and progress thereof. Abnormalities shall include, but not be limited to: unloading/shipping problems, potential hazardous conditions from off-site vessels, storage tank stratification or rollover, geysering, storage tank pressure excursions, cold spots on the storage tanks, storage tank vibrations and/or vibrations in associated cryogenic piping, storage tank settlement, significant equipment or instrumentation malfunctions or failures, non-scheduled maintenance or repair (and reasons therefore), relative movement of storage tank

inner vessels, vapor or liquid releases, fires involving natural gas and/or from other sources, negative pressure (vacuum) within a storage tank and higher than predicted boiloff rates. Adverse weather conditions and the effect on the facility also shall be reported. Reports shall be submitted **within 45 days** after each period ending **June 30 and December 31**. In addition to the above items, a section entitled "Significant plant modifications proposed for the next 12 months (dates)" also shall be included in the semi-annual operational reports. Such information would provide the FERC staff with early notice of anticipated future construction/maintenance projects at the LNG facility. (*EIS Section 4.11.2*)

109. In the event the temperature of any region of any secondary containment, including imbedded pipe supports, becomes less than the minimum specified operating temperature for the material, the Commission shall be notified **within 24 hours** and procedures for corrective action shall be specified. (*EIS Section 4.11.2*)
110. Significant non-scheduled events, including safety-related incidents (i.e., LNG or natural gas releases, fires, explosions, mechanical failures, unusual over pressurization, and major injuries) and security related incidents (i.e., attempts to enter site, suspicious activities) shall be reported to the FERC staff. In the event an abnormality is of significant magnitude to threaten public or employee safety, cause significant property damage, or interrupt service, notification shall be made **immediately**, without unduly interfering with any necessary or appropriate emergency repair, alarm, or other emergency procedure. In all instances, notification shall be made to the Commission staff **within 24 hours**. This notification practice shall be incorporated into the LNG facility's emergency plan. Examples of reportable LNG-related incidents include:
 - a. fire;
 - b. explosion;
 - c. estimated property damage of \$50,000 or more;
 - d. death or personal injury necessitating in-patient hospitalization;
 - e. free flow of LNG that results in pooling;
 - f. unintended movement or abnormal loading by environmental causes, such as an earthquake, landslide, or flood, that impairs the serviceability, structural integrity, or reliability of an LNG facility that contains, controls, or processes gas or LNG;
 - g. any crack or other material defect that impairs the structural integrity or reliability of an LNG facility that contains, controls, or processes gas or LNG;
 - h. any malfunction or operating error that causes the pressure of a pipeline or LNG facility that contains or processes gas or LNG to rise above its maximum allowable operating pressure (or working pressure for LNG facilities) plus the build-up allowed for operation of pressure limiting or control devices;
 - i. a leak in an LNG facility that contains or processes gas or LNG that constitutes an emergency;
 - j. inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of an LNG storage tank;
 - k. any condition that could lead to a hazard and cause a 20 percent reduction in operating pressure or shutdown of operation of a pipeline or an LNG facility;
 - l. safety-related incidents to LNG vessels occurring at or en route to and from the LNG facility; or
 - m. an event that is significant in the judgment of the operator and/or management even though it did not meet the above criteria or the guidelines set forth in an LNG facility's incident management plan.

In the event of an incident, the Director of OEP has delegated authority to take whatever steps are necessary to ensure operational reliability and to protect human life, health, property or the environment, including authority to direct the LNG facility to cease operations. Following the initial company notification, Commission staff would determine the need for an on-site inspection by Commission staff, and the timing of an initial incident report (normally within 10 days) and follow-up reports. (*EIS Section 4.11.2*)

APPENDIX A

FINAL EIS DISTRIBUTION LIST FOR THE BRADWOOD LANDING PROJECT

APPENDIX A

Final EIS Distribution List

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US Senator Ron Wyden, OR
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US Senator Patty Murray, WA

Federal Agencies

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Army Corps of Engineers, Chief, Regulatory Branch, DC
Army Corps of Engineers, Office of Environmental Policy, John Furry, DC
Army Corps of Engineers, Sheryl Carrubba, OR
Army Corps of Engineers, Karla Ellis, Regulatory Branch, OR
Army Corps of Engineers, Col. Richard Hobernicht, Dist. Engineer, OR
Army Corps of Engineers, Robert Leitch, OR
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Army Corps of Engineers, Tina Teed, Regulatory Branch, OR
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Army Corps of Engineers, Shawn Zinszer, WA
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Council on Environmental Quality, Edward Boling, DC
Council on Environmental Quality, Horst Greczmiel, Associate Director for NEPA Oversight, DC
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Department of the Army, Office of the Assistant Secretary of the Army, Chip Smith, Assistant for Environment, DC
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Department of Commerce, NOAA, National Marine Fisheries Service, Robert Anderson, OR
Department of Commerce, NOAA, National Marine Fisheries Service, Michael Crouse, Assistant Regional Administrator, OR
Department of Commerce, NOAA, National Marine Fisheries Service, Donna Darm, Assistant Regional Administrator, WA
Department of Commerce, NOAA, National Marine Fisheries Service, Bridgette Lohrman, OR

Department of Commerce, NOAA, National Marine Fisheries Service, Brent Norberg, OR
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Department of Commerce, NOAA, National Marine Fisheries Service, Karen Abrams, Marine Resource Habitat Specialist, MD
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Department of Commerce, NOAA, National Marine Fisheries Service, Dan Guy, Branch Chief, WA
Department of Commerce, NOAA, National Marine Fisheries Service, Steven Landino, Director, WA
Department of Commerce, NOAA, National Marine Fisheries Service, D. Robert Lohn, Regional Administrator, WA
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Department of Defense, Office of the Deputy Under Secretary, IRM, DC
Department of Defense, Defense Logistics Agency, Environmental Safety Policy Office, William Randal, Chief Compliance and Conservation Team, VA
Department of Energy, Harvey Harmon, Director for Import/Export Activities, DC
Department of Energy, Steve Lerner, Office of Intergovernmental Affairs, DC
Department of Energy, Office of NEPA Policy and Compliance, Carol Borgstrom, Director, DC
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Department of Homeland Security, Coast Guard, Kebby Kelley, NEPA & Historic Resources Program Manager, DC
Department of Homeland Security, Coast Guard, Ken Smith, DC
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Department of Homeland Security, Coast Guard, Ed Wandelt, Chief, DC
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Department of Homeland Security, Coast Guard, Captain Patrick Gerrity, OR
Department of Homeland Security, Coast Guard, Christine Holland, OR
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Department of Homeland Security, Coast Guard, Niles Seifert, Chief, Prevention Dept., OR

APPENDIX A (cont'd)

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Department of the Interior, Bureau of Land Management, John Styduhar, OR
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Department of the Interior, Fish and Wildlife Service, Lewis and Clark National Wildlife Refuge, WA
Department of the Interior, Fish and Wildlife Service, Dave Allen, Regional Director, OR
Department of the Interior, Fish and Wildlife Service, Janine Castro, Geomorphologist, OR
Department of the Interior, Fish and Wildlife Service, Tom McDowell, WA
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Department of the Interior, Fish and Wildlife Service, Yvonne Dettaff-Polenz, Biologist, WA
Department of the Interior, Fish and Wildlife Service, Mike Hudson, Biologist, WA
Department of the Interior, Fish and Wildlife Service, Sharon Miller, Supervisor, WA
Department of the Interior, U.S. Fish and Wildlife Service - Oregon Fish and Wildlife Office, Doug Young, OR
Department of the Interior, U.S. Fish and Wildlife Service - Oregon Fish and Wildlife Office, Joe Zisa, OR
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Department of the Marine Corps, Natural Resources Division, John Omans, Chief, DC
Department of the Navy, Office of the Chief of Naval Operations, Karen Foskey, Environmental Planning/NEPA Lead, DC
Department of the Navy, Office of the Assistant Secretary of the Navy, Robert Uhrich, DC
Department of Transportation, Blaine Keener, DC
Department of Transportation, Camille Mittholz, Environmental Policies Team Leader, DC
Department of Transportation, Federal Highway Administration, Office of NEPA Facilitation, Fred Skaer, Director, DC
Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety, Tom Fortner, DC
Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety, Kimbra Davis, CO
Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety, Chris Hoidel, Director, CO
Department of Transportation, Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety, Ross Reineke, CO
Environmental Protection Agency, Anne Norton Miller, Director - Office of Federal Activities, DC
Environmental Protection Agency, Office of Federal Activities, Cliff Rader, DC

Environmental Protection Agency, Socorro Rodriguez, Director, OR
Environmental Protection Agency, Yvonne Vallette, OR
Wetland and Watershed Coord., OR
Environmental Protection Agency, Peter Contreras, WA
Environmental Protection Agency, Christine Reichgott, Manager, WA
Federal Communications Commission, Aliza Katz, NEPA Contact, DC
Federal Energy Regulatory Commission, Paul Friedman, MD
Federal Energy Regulatory Commission, Shannon Jones, DC
Federal Energy Regulatory Commission, James Martin, DC
Federal Maritime Commission, Karen Gregory, Assistant Secretary, DC
Library of Congress, Exchange and Gift Division, Federal Documents Section, DC
Marine Mammal Commission, Michael Gosliner, General Counsel, MD

State Agencies and Representatives

Oregon

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Representative Brad Witt
Senator Betsy Johnson
Building Codes Agency, Dana Roberts
Department of Agriculture, Bob Meinke
Department of Agriculture, Natural Resources Division, Debbie Gorham, Administrator
Department of Agriculture, Natural Resources Division, Jim Johnson, Land Use and Water Planning Coordinator
Department of Energy, Adam Bless
Department of Energy, Michael Grainey, Director
Department of Energy, Susan Hughes
Department of Energy, Ken Niles
Department of Energy, George Pointe
Department of Energy, Tom Stoops
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Department of Environmental Quality, L. Alexandra Cyril
Department of Environmental Quality, Dennis Jurries
Department of Environmental Quality, Neil Mullane
Department of Environmental Quality, Audrey O'Brien
Department of Environmental Quality, Christine Svetkovich
Department of Environmental Quality, Ed Wilson
Department of Environmental Quality, Mike Zollitsch
Department of Fish and Wildlife, Susan Barnes
Department of Fish and Wildlife, Herman Biederbeck
Department of Fish and Wildlife, North Coast Watershed District Office, Keith Braun
Department of Fish and Wildlife, North Coast Watershed District Office, David Nuzum
Department of Fish and Wildlife, Realty Services
Department of Fish and Wildlife, Rose Owens, Habitat Special Projects Coordinator
Department of Fish and Wildlife, Devin Simmons
Department of Fish and Wildlife, Wayne van der Naald
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Department of Forestry, Tom Savage, District Forester
Department of Geology and Mineral Industries, Bill Burns, Engineering Geologist
Department of Geology and Mineral Industries, Dr. Vicki McConnell
Department of Justice, Larry Knudsen, Assistant Attorney General
Department of Land Conservation and Development, Jane Bacchieri, Coastal Permit Specialist

APPENDIX A (cont'd)

Final EIS Distribution List

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Department of Land Conservation and Development, Dale Blanton
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Department of Transportation, Richard Kearns
Department of Transportation, Ed Miller
Department of Transportation, Highway Division
Department of Transportation, Rail Division, Kelly Taylor, Administrator
Department of Veterans Affairs
Deputy State Fire Marshall, Tad Pedersen
Office of State Fire Marshall, Stacy Warner
Public Utility Commission, Bonnie Tatom
Public Utility Commission, Michael Thompson
Public Utility Commission, Electric and Natural Gas Division, Kenneth R. Zimmerman, Senior Analyst
State Historic Preservation Office, Dennis Griffin
State Marine Board, Randy Henry
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Water Resources Department, Jerry Sauter

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Department of Ecology, Dave Howard
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Department of Ecology, Rebecca Post
Department of Ecology, Loree Randal, Policy Lead, 401 and Coastal Zone Management
Department of Ecology, Southwest Regional Office, Annie Szvetcz
Department of Ecology, John Thornton
Department of Ecology, Bob Troyer
Department of Ecology, Kim Van Zwalenburg
Department of Ecology, Southwest Regional Office, Deborah Cornett, Water Quality Supervisor
Department of Ecology, Southwest Regional Office, Kevin Farrell, Floodplain Specialist
Department of Ecology, Southwest Regional Office, Perry Lund, Manager, Shore and Wetlands
Department of Ecology, Southwest Regional Office, Jo Sohneronne, 401 and Coastal Zone Management Certificates
Department of Ecology, Southwest Regional Office, Sally Toteff
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Department of Fish and Wildlife, Tim Rymer, Regional Habitat Biologist
Department of Fish and Wildlife, Gary Sprague, Major Projects Section
Department of Fish and Wildlife, Southwest Regional Office, Guy Norman, Regional Director

Department of Land Conservation and Development, Mitch Rohse
Department of Natural Resources, ZoAnne Aylesworth
Department of Natural Resources, Aquatic Resources Division, Rich Doenges, Division Manager
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Department of Natural Resources, Forest Practices Division, Lenny Young
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Department of Natural Resources, Pacific Cascades Region, Nancy Lopez, Lands Manager
Department of Transportation
Department of Transportation, Mark Henderson, Engineer
Department of Transportation, Darlene Sharar, Utilities Engineer
Department of Transportation, Southwest Regional Office
Division of Emergency Management, Mark Ligman, Haz Mat Coordinator
Energy Facility Site Evaluation Council, Allen Fiksdal, Manager
Governor's Office of Indian Affairs, Kyle Taylor Lucas, Director
State Historic Preservation Office, Office of Archaeology and Historic Preservation, Allyson Brooks
State Historic Preservation Office, Office of Archaeology and Historic Preservation, Rob Whitlam, Archaeologist
State of Washington Citizens Committee on Pipeline Safety, Carl Weimer, Chairman
Utilities and Transportation Commission, David W. Danner, Executive Director
Utilities and Transportation Commission, Tim Sweeney

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Paul Benoit, City Manager, City of Astoria, Astoria
Knappa School District, Astoria
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Clackamas County, PJ Steigleder, Sheriffs Marine Patrol
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City of Clatskanie, Clatskanie
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Clatsop County, Board of Commissioners, Samuel E. Patrick, Commissioner
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Clatsop County, Soil and Water Conservation District, Misty Ogier
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Columbia County, Board of Commissioners, Rita Bernhard, Commissioner
Columbia County, Board of Commissioners, Joe Corsiglia, Chair
Columbia County, County Courthouse, Glen Higgins, Chief Planner
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Columbia County, Road Department
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Multnomah County, Monte Reiser, Sheriffs River Patrol

APPENDIX A (cont'd)

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Properties and Development Services, Port of Portland, Portland
Kevin Miller, Mayor, City of Prescott, Rainier
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Brian Little, City Administrator, City of St. Helens, St. Helens
Robert Keyser, Port of St. Helens
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M. R. Kline, City Administrator, City of Vernonia, Vernonia
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Edward Madere, City Manager, City of Warrenton

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Clark County, Jim Drew, Sheriffs Marine Patrol
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Cowlitz County, Board of Commissioners, Axel Swanson, Commissioner
Cowlitz County, Building and Planning, Mike Wojtowicz
Cowlitz County, Department of Emergency Management, Cathy Batcheur
Cowlitz County, Health Department, Mimi Fields
Cowlitz-Wahkiakum Counties, Steve Harvey, Cowlitz-Wahkiakum Council of Government
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Mark Wilson, Director of Planning, Port of Kalama, Kalama
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Doug Robinson, City Manager, City of Kelso, Kelso
Dennis Weber, Mayor, City of Longview, Longview
Bob Gregory, City Manager, City of Longview, Longview
Christine Whiteside, City of Longview, Longview
Judy Grigg, Environmental Affairs, Port of Longview, Longview
Kenneth O'Hallaren, Executive Director, Port of Longview, Longview
Pacific County, Bryan Harrison, County Administrative Officer
Pacific County, County Commissioners
Wahkiakum County, Dan Bardsley, Sheriff
Wahkiakum County, Chuck Beyer
Wahkiakum County, Board of Commissioners, Blair H. Brady, District 3 Commissioner
Wahkiakum County, Board of Commissioners, Daniel Cothren, Chair
Wahkiakum County, Board of Commissioners, Holly Pfenniger, Clerk
Wahkiakum County, Board of Commissioners, George Trott, District 1 Commissioner
Wahkiakum County, Chamber of Commerce
Wahkiakum County, Department of Emergency Management, Dolly Tawater
Wahkiakum County Port District No 1
Wahkiakum County Port District No. 2, Steve McClain, Port Manager
Michael Bruce, Mayor, City of Westport, Westport
City of Woodland, Woodland
Port of Woodland, Woodland

Intervenors

Lee A. Alexander, Hogan and Hartson, LLP
Bob Bailey, Oregon Department of Land Conservation and Development
Susan B. Bergles, Attorney at Law
Douglas Canter, McCarthy, Sweeny & Harkaway
Julie Carter, Columbia River Inter-Tribal Fish Commission
Lanny Cawley, Port of Kalama
Greg Roy Christison, Sammamish, WA
Roy and Minerva Christison, Longview, WA
Columbia River Estuary Study Taskforce, OR
Daniel L. Cothren, Wahkiakum County Commissioners
Rosemary DeMaio, Southwest Gas Corporation
Lawrence N. and Wanda B. Derby, Clatskanie, OR
William and Doris Dragich Trust, Longview, WA
Taryn Edwards, Greeley, CO
Elizabeth Ellis, Washington Department of Natural Resources
Steve Fick, Salmon For All
Edward A. Finklea, Cable Huston Benedict Haagensen and Lloyd, LLP
Christopher Fontecchio, Seattle, WA
Brent Foster, Columbia Riverkeeper
William C. Frymire, Attorney General of Washington, Fish and Wildlife Division
Steven C. Fulton, Astoria, OR
J. Richard George, Portland General Electric Company
Gilbert Gramson, City of Warrenton
Gary Graves, Washington Department of Natural Resources
Danette Guy, Washington Department of Fish and Wildlife
Sarah Hanson, Columbia County Courthouse
Anthony Hyde, Columbia County Courthouse
R. Scott Jerger, Field Jerger LLP
Fred A. Johnson, Wahkiakum County
E. Andrew Jordan, Jordan Schrader PC
Raymond S. Kindley, Schwabe, Williamson, and Wyatt
Gary K. Kotter, Northwest Pipeline Corporation
Joan M. Marchioro, Office of the Attorney General, Ecology Division, WA
Rob Markle, National Marine Fisheries Service, Protected Resources Division
Ronald S. Marshall, Cowlitz County
Donald McDaniel, Port of Astoria
James H. McGrew, Bruder, Gentile and Marcoux, LLP
Duane Mecham, U.S. Department of the Interior
C. Alex Miller, Northwest Natural Gas Company
Jeff Nuss, Greenwood Resources
Paul Olheiser, Knappa-Sevensen-Burnside RFPD
Lawrence L. Paulson, Port of Vancouver
Dick Pedersen, Oregon Department of Environmental Quality
Samuel M. Penney, Nez Perce - Tribal Executive Committee Chairman, ID
Preston Polasek, Clatskanie City Hall
Robert E. Potter, Portland General Electric Company
Janet L. Prewitt, Oregon Department of Justice - Natural Resources Section
Terence A. Pruitt, Office of the Attorney General, Natural Resources Division
Paul Pulliam, Port of St. Helens
Paula E. Pyron, Northwest Industrial Gas Users
George Raiter, Cowlitz County Board of Commissioners, Commissioner, WA
Robert W. Ramage, Jr., Port Westward LNG, LLC
Stephen E. Rasmussen, Lake Forest, CA
Alan E. Rathbun, Washington Utilities and Transportation Commission

APPENDIX A (cont'd)

Final EIS Distribution List

Intervenors (cont'd)

Heather Reynolds, Attorney at Law
John A. Roscher, Gas Transmission Northwest Corporation
John P. Salisbury, Salisbury and Callahan, LLP
Mike Schiller, Port of Vancouver, Operations Manager, OR
Kathleen Sellman, Clatsop County
Steve Shipsey, Oregon Department of Justice
Mark L. Stermitz, Bullivant Houser Bailey PC
Chad M. Stokes, Cable Huston Benedict Haagensen and Lloyd, LLP
Kenneth C. Stone, Cowlitz County
Ryan Sudbury, Nez Perce Tribe
Charles Thompson, Renewable Resources, LLC
Thane W. Tienison, Landye Bennett Blumstein, LLP
Teresa Silcox Torrey, Northwest Pipeline Corporation
Cathy Tortorici, National Marine Fisheries Service
Willis L. Van Dusen, City of Astoria
Brett Vandenheuvel, Columbia Riverkeeper, Portland Office Staff Attorney, OR
Richard K. Wallace, Washington Department of Ecology
Jim Wells, Salmon For All
Stephen A. Wille, U.S. Fish and Wildlife Service
Peter K. Williamson, Port of St. Helens
Kirk Willis, Washington Department of Natural Resources

Non-government Organizations and Environmental or Public Interest Groups

1000 Friends of Oregon, OR
Captain Paul Amos, Columbia River Pilots Association, OR
Jeffy Auvil, Pacific Northwest Regional Council of Carpenters, WA
Jeremiah Baumann, OSPIRG, OR
Warren Banks, Columbia River Bar Pilots, OR
Todd Bolger, Portland Spirit, OR
Captain Steve Brown, Columbia River Pilots Association, OR
Ted Bryan, Pleasant Hill Grange #101, WA
Nina Carter, Audubon Washington, WA
Kirk Deal, Pacific Northwest Regional Council of Carpenters, OR
Phil Dines, Plumbers and Steam Fitters Local, WA
Earth Share of Oregon, OR
Earth Share of Washington, WA
Richard Erickson, Lower Columbia Economic Development Council, WA
Catie Fernandez, Columbia River Estuary Study Taskforce, OR
Frank Fromherz, Executive Director, Oregon Shores Conservation Coalition, OR
GMO Renewable Resources Forestry Fund, MA
Michael Glick, Captain, Columbia River Bar Pilots, OR
David Halmagyi, Columbia River Pilots Association, OR
David Hathaway, President, River Ranch Homeowners Association, OR
Heidi Heywood, President, St. James Family Center - Board of Directors, WA
Theeme Holznagel, Assistant Director, Columbia River Channel Coalition, OR
Peter Huhtala, Pacific Marine Conservation Council, OR
Shirley Kalkhoven, Chair, Northwest Oregon Regional Partnership, OR
Jeff King, NW Power and Conservation, OR
David Kirschner, Executive Director, Northwest Gas Association, OR
James Kodama, Pacific Northwest Regional Council of Carpenters, WA

Fayette F. Krause, The Nature Conservancy of Washington, WA
Landowners and Citizens for a Safe Community, WA
Rachel Larson, Oregon Physicians for Social Responsibility, OR
Gary Lewin, Columbia River Bar Pilots, OR
Chuck Lobdell, Regional Biologist, Ducks Unlimited, Inc., Vancouver Field Office, WA
Lower Columbia Economic Development Council, WA
Lower Columbia River Estuary Partnership, OR
Gloria G. Mackenzie, Willapa Hills Audubon Society, Director at Large, WA
Steve Manlow, Lower Columbia Fish Recovery Board, WA
Phillip Massey, Captain, Columbia River Pilots, OR
Tammy Maygra, Save Our Columbia River, OR
Deborah McEuen, Pacific Marine Conservation Council, OR
Kristin Meira, Pacific Northwest Waterways Association, OR
Regna Merritt, Executive Director, Oregon Natural Resources Council, OR
Warren Nakkela, Chairman, Association of Lower Columbia River Flood Control Districts, OR
The Nature Conservancy of Oregon, OR
Northwest Environmental Advocates, OR
Jeff Nuss, President, GMO Forestry Fund, MA
Phillip Perkins, River Ranch Homeowners Association, OR
Pipeline Safety Trust, WA
Peg Reagan, Conservation Leaders Network, OR
Bill Rydbloom, Oregon State Marine Board, OR
Bob Saul, GMO Forestry Fund 3, MA
Tom Scoggins, The Rainland Flycasters, President, OR
Daniel Serres, Friends of Living Oregon Waters, OR
Sierra Club - Oregon Chapter, OR
Ian Sinks, Columbia Land Trust, WA
Jim Townley, Columbia River Steamship Operators, OR
Glenn Vanselow, Pacific Northwest Waterways Assoc., OR
Wahkiakum Friends of the River, WA
Oliver Waldman, Salmon For All, OR
Robert Warren, Columbia River Estuary Study Taskforce, OR
Leroy Watson, National Grange of the Order of Patrons of Husbandry, Legislative Director, Washington, D.C.
Brent Way, Clean Rivers Cooperative, OR
Carl Weimer, Pipeline Safety Trust, Executive Director, WA
Stephen P. Wright, Carpenters Local 247, OR

Indian Tribes and Native American Organizations

Affiliated Tribes of NW Indians, Lyn Dennis, OR
Chehalis Confederated Tribes, David Burnett, Chair, WA
Chinook Indian Tribe, Gary Johnson, Chair, WA
Columbia River Inter-Tribal Fish Commission, Patti Howard, OR
Columbia River Inter-Tribal Fish Commission, Rob Lothrop, OR
Columbia River Inter-Tribal Fish Commission, Olney Patt, Jr., Executive Director, OR
Confederated Tribe of Siletz, Robert Kennta, OR
Confederated Tribes of Grand Ronde, Cheryle Kennedy, Chair, OR
Confederated Tribes of Grand Ronde, Khani Schultz, OR
Confederated Tribes of the Umatilla Indian Reservation, Carl Merkle, Salmon Policy Analyst, OR
Confederated Tribes of the Umatilla Indian Reservation, Carey Miller, THPO, OR
Confederated Tribes of the Umatilla Indian Reservation, Antone Minthorn, Chair Board of Trustees, OR
Confederated Tribes of the Warm Springs, Sally Bird, OR
Confederated Tribes of the Warm Springs, Olney Patt, OR

APPENDIX A (cont'd)

Final EIS Distribution List

Indian Tribes and Native American Organizations **(cont'd)**

Confederated Tribes of the Warm Springs, Ron Suppah, OR
Cowlitz Indian Tribe, John Barnett, Chair, WA
Cowlitz Indian Tribe, Mike Iyall, Natural Resources Director, WA
Legislative Commission on Indian Services, Jeana Harrington, Commission Assistant, OR
Legislative Commission on Indian Services, Karen Quigley, Executive Director, OR
| Nez Perce Tribal Executive Committee, Gary Green, ID
| Nez Perce Tribal Executive Committee, Rebecca Miles, Chair, ID
| Nez Perce Tribal Executive Committee, Randall Minthorn, ID
| Nisqually Tribe, Thor Hoyte, WA
| Nisqually Tribe, Dorian Sanchez, Chair, WA
| Shoalwater Bay Tribe, Charlene Nelson, Chair, WA
| Siletz Confederated Tribes, Delores Pigsley, Chair, OR
| Umatilla Indian Reservation, Bruce Zimmerman, OR
| Washington Governor's Office of Indian Affairs, WA
| Yakama Nation, Jerry Meninick, Chair, WA

Newspapers and Libraries

Astoria Public Library, Astoria, OR
Cathlamet Public Library, Cathlamet, WA
Central Library, Portland, OR
Chinook Observer, Long Beach, WA
Clatskanie Library, Clatskanie, OR
| Dow Jones News Service, Paula Stephankowsky, Longview, WA
| Ilwaco Timberland Library, Ilwaco, WA
| Kalama Public Library, Kalama, WA
| KAST-AM Radio, Michael Desmond, Astoria, OR
| KDCG 92-9 FM Radio, Rick Elliot, Coos Bay, OR
| Kelso Public Library, Kelso, WA
| KMUN Radio, Joanne Rideout, Astoria, OR
| Longview Daily News, Longview, WA
| Longview Public Library, Karl Marcuson, Longview, WA
| Mill Creek Library, Mill Creek, WA
| NPR Radio, Tom Banse, Olympia, WA
| Oregon State Library, Salem, OR
| Seaside Public Library, Seaside, OR
| Seaside Signal, John Yoakum, Seaside, OR
| St. Helens Public Library, St. Helens, OR
| The Clatskanie Chief, Debora Hazen, Clatskanie, OR
| The Columbian, Kathie Durban, Vancouver, WA
| The Daily Astorian, Cassandra Profita, Astoria, OR
| The Daily Astorian, Kate Ramsayer, Astoria, OR
| The Daily News, Tony Lystra, Longview, WA
| The Oregonian, Matt Pruesch, Bend, OR
| Vernonia Public Library, Vernonia, OR
| Wahkiakum County Eagle, Rick Nelsen, Cathlamet, WA
| Warrenton Community Library, Warrenton, OR
| Washington State Library, Olympia, WA
| Willamette Week, Portland, OR
| Woodland Community Library, Woodland, WA

Landowners and Other Interested Public

| Marvin Abbott, IAM, OR
| Abernathy Assembly of God Church, WA
| Don Abrahams, OR
| Daniel Acosta c/o Betty Aanerud, WA
| Dean and Frances Adams, WA
| Sandra Adams, WA
| Colleen Adirim, WA

Vincent Aiken, WA
John Alden, WA
Tiffany Alderman, WA
Paul Aldinger, WA
Cheryl Ann Aldrich, WA
Donna Alija, WA
Gary and Pam Allen, WA
Larry and Delores Allen, WA
Leonard J. Allen, OR
Connie Allison, WA
David Ambrose, OR
Anita Amick, OR
James H. Ammons, WA
Douglas and Susan Anderson, WA
James Anderson, WA
Scott A. Anderson, WA
John Anttila, WA
Frank and Laura Aquesto, OR
Joel Archibald, OR
L. G. Ashenbrenner, WA
Jack and Edythe Athey (alternate address), WA
Jack and Edythe Athey, WA
Frank and Vicki Austin, OR
Carla Avery Todd, WA
Henry Balensifer III, OR
David and Leslie Ball, OR
Clarence Ballard and Linda Rheaume, WA
Larry and Mary Ballentine, WA
William and Beverly Bangs, WA
Jack Barfield, WA
Sherry L. Barry, WA
Ben Bartlett, OR
Carl and Patricia Bartruff, OR
Bud Bartunek, OR
Scott Basuka, OR
Benjamin and Raelene Baum, WA
Beverly Beal, WA
Gary Beam, WA
Karen Beattie, URS, OR
Richard Beck, WA
Jimmy Beckwith, OR
Barbara Belgeries, OR
Marie Begleries, et al., CA
Tom Bender, OR
Anne Berblinger, Gales Meadow Farm, OR
Linda Bereta, CA
Diane Bergman-Vernon and Nadine Kurtti, OR
Len Bergstein, OR
James and Edna Best, OR
Tim Beyer, Foss Maritime, OR
Bernard Bjork, OR
Robert Black, OR
Bruce Blackstone, WA
Jeffrey Blackwood, OR
Audrey Blewett, WA
Burlington Northern Santa Fe Railroad, WA
Christian and Erika Bock, WA
Maureen Zacher-Bockius, WA
Steven and Tracie Boehland, WA
Robert and Leslie Boehm, OR
Geoffrey and Roxana Bohannon, WA
James Bohnen, WA
Mel Bollom, Cardinal Glass Industries, Inc., WI
Daniel Bonham, OR
Collin Booth, WA
Ellen Borneman, OR
J.B. Bouchard, WA
Michael I. Bouse, OR

APPENDIX A (cont'd)

Final EIS Distribution List

Landowners and Other Interested Public (cont'd)

Bradley Bowden, OR
Larry Bowen, Brand Scaffold, CA
James and Kathryn Bowers, WA
Bonneville Power Administration, Realty Property Services,
OR
Robert Braddock, Project Manager, Jordon Cove Energy
Project, OR
Jeremy and Leslie Bradfield, WA
Charles and Maria Brandenburg, WA
John Brickey, WA
Leonard and Leila Brickey Trust, WA
Deborah Brink, WA
Travis and Jodi Brinkman, WA
Leonard and Vonda Kay Brock, WA
Nelson Brock, WA
Craig Brown, WA
Molly Brown, WA
Rocky and Angela Brown, OR
Jean Bruner, WA
Delbert and Patricia Brush Trust, WA
Marti A. Bryan, WA
Lacey A. Bryant, WA
John Buckovecky, VanNess Feldman, DC
Dwain R. Buck, WA
Garland Budd, WA
Eric Burnette, Port of Portland, OR
Amy Busack, WA
Larry and Kay Busack, WA
David Buzza, Personal Protective Services, OR
Anne Byers c/o Brian and Wynell Chafe, WA
Edward Byers, WA
Margaret Byrons, WA
Clark Caffall, Combined Forestry and Marine Services, WA
Candace Cahill, Rayonier Forest Operations LLC, WA
Donald and Koleen Calvert, OR
Jean Cameron, Pacific States BC Oil Spill Task Force, OR
Shel Cantor, OR
Laurie Caplan, OR
Thomas Carey, WA
Paula and Gregg Carlson, WA
Patricia Carpenter, OR
Tim Carrier, OR
James and Caroline Carson, OR
James Carson, Jr., OR
Gerald and Donna Carver, OR
Mickey and Carol Carver, WA
Mary E. Casper, OR
Cynthia Caster, WA
Anna Castle, OR
Marjorie A. Castle, WA
William Castle, OR
William P. and Marjorie A. Castle, WA
Rick Cavilee, MS
Brian and Wynell Chafe, WA
Philip L. Chamberlain, OR
James Chambers and V. Thamer, WA
R.L. and D.C. Chevron, OR
Rebecca and Scott Child, WA
Church of Latter Day Saints, UT
Patricia and Andrew Cink, CA
Cynthia Clark, WA
Kenneth Clark, WA
Richard Clark, WA
Curt Clumpuu, OR
Jeanette Cole, WA
Michael and Ava Cole, WA

Columbia-Cowlitz Railway, c/o Weyerhaeuser Company-
Guiffoil, Attn Ellie Lathrop, WA
John Compere, OR
Joyce Compere, ASM, OR
Karen Cook and Timothy Grauman, WA
Curtiss and Judith Cooley, OR
Bill Coons, WA
Erle Cooper, WA
Karen M. Cooper Trust, WA
Gary Coppedge, Vice President, NorthernStar Natural Gas
LLC, OR
Troy Corbin, Marine Chemist, OR
Lee Coteley, OR
Dan and Robyn Cothren, WA
Cowlitz County Public Works, WA
Judy Crafton, OR
Barb Craig, Stoel Rives, OR
Dana Crane, OR
Linda Crane, OR
Dwight Cranston, WA
Karen and Jerry Cressa, OR
Peggy Crisp, OR
Shan and Maribeth Crites, WA
Robert and Ruby Cross, WA
C. B. Crouse, URS Corp., WA
Trudy Crouse, WA
Larry and Rebecca Cunningham, WA
Thomas G. Cunningham Sr., WA
Alan and Denise Cutler, WA
Roy Czech, WA
Cressie Dahlquist Trust, CA
Eric and Carmela Dalinger, WA
Charlene and Richard Damito, WA
Reed F. Daugherty, OR
Edward and Karyl Davies, WA
Benjamin and Jacqueline Davis, WA
Chrys and Brenda Davis, WA
Leo Davis, et ux, WA
Noel Davis and Jeanette Frances, WA
Robert and Sandra Davis, WA
Ruth Deery, WA
John Dees, WA
William and Linda DeGandi, OR
Leslie Degner, WA
Charles Deister, OR
Clarence and Hazel Demase, Clifton Fisheries, Inc., OR
Marcia Denison, OR
Richard and Darlene Derosier, WA
Duane and Vicki Dietz, Contract Sellers, WA
Doyle Dillehay, WA
Dale Dimmick, WA
Dog Beach, OR
Brian Doherty, OR
Ronald and Ruth Doiron, WA
Jean M. Dominey, OR
Jean M. and Carl A. Dominey, OR
Tammy Dowling, OR
Ron Drelleshak, OR
J. Jeffrey Dudley, Portland General Electric Company, Vice
President, OR
Thomas S. Duncan, OR
Thomas Duncan, WA (alternate address)
Thomas Duncan, WA
John Dunzer, OR
Ted Thomas and Lori Durheim, OR
Ray and Thorine Dykes, OR
Carolyn Eady, OR
Chad and Trina Earhart, WA

APPENDIX A (cont'd)

Final EIS Distribution List

Landowners and Other Interested Public (cont'd)

Brett Earnest and Tanya Maxey, WA
Meg Eastman, OR
William and Taryn Edwards, CO
Yvonne Edwards, OR
David and Bonnie Eichentopf, WA (alternate address)
David and Bonnie Eichentopf, WA
Edwin and Eleanor Eichentopf Trust, WA
Karen Elder, OR
Ben Embree, WA
James Erickson, OR
Dan Evans, Dan Evans Consulting, WA
Erick Evenson, Evenson Logging Company, OR
Dave Every, URS, WA
Expedient Enterprises LLC, WA
George Exum, WA
Frans Eykel, WA
Family Tree Farms LLC, WA
David and Sally Feigert, OR
RJ Feigert, WA
David Filer, OR
Fiorito Bros, Inc., WA
Hal Flake, WA
Elizabeth Flatt, WA
Doug and Karen Fleming, OR
Bradley Floyd, Atlanta, GA
Richard Forsman, BNSF Rail Road, WA
Earl and Cathy Foytack, WA
Kathy Fransen, OR
Peter Fraser, Portland, OR
Scott and Vance Fraser, OR
Vance Fraser, OR
Larry Fuhrman, WA
Stephen Fulton, Container Service Company, OR
Steve Fulton, OR
Mack Funk, Port of Ilwaco, WA
Lavona Gaffney, OR
Rocky and Cindy Gambrel, WA
Bennett and Patricia Garner, OR
William Garrett, Pres., NorthernStar Natural Gas LLC, OR
GDP Properties, Inc., WA
Pat and Julie George, OR
Tom Gibson, Port of Vancouver, WA
Chuck Gilbert, Portland and Western Railroad, Inc., OR
Andrea Gilbertson, WA
John Gizdavich, OR
David Glessner, NorthernStar Natural Gas LLC, OR
Alan and Helen Godfrey, Trustees, WA
Arthur Godfrey, WA
James Godfrey, WA
William Goeres, WA
Bob Goldberg, OR
Terry Golden, WA
Good Construction Company, WA
James and Loreen Goodwin, WA
Howard Gordon, WA
Neva Grauman Trust c/o Deborah Grauman, WA
Richard and Gayle Gray, WA
Kevin and Marisa Greear, WA
John and Margaret Green, WA
Rueben and Pamela Grendahl, WA
Don Gribbling, Portland Spirit, OR
Bob Griffith, WA
David and Kathleen Grimm, WA
Mellicent Grocott, WA
Jerry Grossnickle, Bernert Barge Lines, OR
David R. Grumbois, WA

Rick Gwinn and Suzanne Glenna, OR
Pete Hackett, NorthernStar Natural Gas LLC, OR
Mary Haggerty and Michael Oldenburg, WA
Gary Haines, Lasco Shipping Company, OR
Ronald and Cherilyn Halbeib, WA
Thomas I. Hall, WA
Todd E. Hall, WA
Bob Halsan, OR
Travis and Angelle Ham, WA
Jan Hamer, Jantzen Beach Moorage, Inc., OR
Neal and Laurie Hammond, WA
Kevin and Dena Hampton, WA
George F. Hanigan, WSBA No 3417, WA
Donald Barr and Susan M. Hansen, WA
Glen Hansen, WA
James Hansen, Finland
Kara Hansen, OR
Karl and Diane Hansen, OR
Don Hanseth, OR
Pati Ann Hanson, WA
Captain Fred Harding, Shaver Transportation, OR
J.R. Hardy, WA
Jim and Karen Harris, WA
Art and Marie Hauge, WA
Linda Haynes, WA
William Haynes, WA
Mike Hayword, Northwest Natural Gas Company, OR
Ginny Hazen, WA
Roger and Theresa Hefley, WA
Kim Heinesh, OR
Clinton and Janice Heinz, WA
Gary and Donna Herber, OR
Gary Herold, WA
Leslie Hildula, OR
Dave Hill, OR
Pastor Phil Hines, Abernathy Assembly of God Church, WA
John and Lolita Hill, WA
Mari Hodges, WA
Chris Holmes, WA
Nancy A. Holmes, OR
Floyd Holzory, OR
Dale Hoogestratt, Coyote Point LLC, OR
Rob Horgan, Washington State Grange, WA
Ted and Diana Hostetter, WA
Household Realty Corporation, CA
John and Christine Hulon, OR
Corrinne Humphrey, HDR Engineering, OR
Brandy Humphreys, OR
Kevin and Elaine Hunt, WA
Patsy Huson, WA
John Iani, VanNess Feldman, WA
McLaren Innes, OR
Walter R. and Janet A. Ivanoff, Trustees, OR
J and S Reserve L.L.C. c/o Sam Karamanos, OR
Richard Jackson, WA
Roland and Eva Jackson Trust, WA
Robert and Rhea Jacobs, OR
James River II Inc. d/b/a Fort James Corp., AR
Roy D. James, WA
Daniel Janisch and Ida Ratih, WA
Jerry Janssen, WA
Deborah Jaques, Pacific Eco Logic, OR
Clark and Shirley Jarvis, WA
Bonnie Jaspers, WA
Brian and Cary Jo Jaspers Trust, OR
Sage Jensen, OR
Wilson Johns, OR
Arthur Johnson, WA

APPENDIX A (cont'd)

Final EIS Distribution List

Landowners and Other Interested Public (cont'd)

Casey L. Johnson, WA
Charles E. Johnson, WA
Cheryl Johnson and Ted Messing, OR
Gus Johnson, WA
JoJo Johnson, WA
LaRee Johnson, OR
Victor and Linda Johnston, WA
Jessie Jones, CA
Lewis Jones, WA
Ronald and Toni Jones, WA
Kelley Jorgensen, OR
Kevin and Patricia Jorgenson, WA
John Kaakinen, OR
John Kallunki, OR
John Karamanos III, OR
Jerome R and Cheryl L. Kazeck Trust, WA
Patricia and John Kazeck, WA
Robert and Sally Keeler, WA
Casey Kegg, OR
Delia Kelly, OR
Fern A. Kelly, WA
Linda Sue Kendall, c/o the Estate of Fred L. Reid, WA
Ben Kennedy, WA
Carrie Kennedy, WA
Kenneth and Julie Kernodle, WA
Leo Kesler, WA
Leo K. Kesler, Jr., WA
Kesler/Smith Inc., WA
Charity Keuter, U.S. Coast Guard, OR
Jay Kiddle, OR
Pete Kiefer, OR
Kirk S. Kightlinger, WA
Jess W. Killett, WA
Kevin Kilpatrick, OR
Christopher Kirby, WA
C. Joan Kirk, WA
Kirkland Family Partnership, WA
Hedwig J. Kiser, et al., trustees, WA
Robert Kiser, WA
Robert L. Kiser, Jr., Trustee, WA
R. Klemenhausen, OR
DiAnne Knudsen, WA
Mr. and Mrs. Robert W. Knudsen, WA
Werner T. Knudsen, WA
Mike Kocher, OR
Jim Kodama, WA
John Koehler, WA
Michael Koler, IBEW 48, OR
Kendall D. and Sandra J. Kramer, WA
Jeffrey D. and Amber S. Krause, OR
Robert and Jodi Krause, WA
Harold and Carol Kriesel, WA
Chester Len Krushel, OR
George G. Kurtti, OR
Ana Lafever, WA
David Lake, WA
Paul Langner, Teevin Bros. Land and Timber Co., OR
William Lantiegne, WA
Bob Larson, WA
Theresa Laskiewicz and Stan Gibson, WA
Tevis and Gwen Laspa, WA
Ellie Lathrop, Weyerhaeuser Company, WA
Gerald Lattig, WA
Mirjami Laukkanen, WA
Gene Lawhorn, OR
Troy and Debbie Laws, OR

Kenneth C. Leahy, OR
Mary Ann Leavitt c/o Betty Hudson, OR
Captain Warren G. Leback, NJ
John Leber, WA
Linda M. Ledgerwood, WA
Nancy Ledgerwood, OR
Daniel and Laurie Lee, WA
Herbert and Shirley Lee, WA
Kristin Lee and Mike Duley, OR
Mike Lewis, WA
Matthew and Susan Lien, WA
Merle and Romy Lien, WA
Charles Lincoln, WA
Jeffrey and Vicki Lindeman, WA
Jon Lingel, OR
Shawn Lixey, AMEC-Paragon, TX
Michael Locke, WA
Carl Loehr, Port of Vancouver, OR
Frank W. and Donna K. Lopardi, OR
Jeff Lovingfoss, OR
George Lowe, WA
Winifred Lowsma, WA
Loyal Hulme, Kirtan and McConkie, UT
Mary Ludwiczak, WA
Jann Luesse and Jim Scheller, OR
Scott H. Macgregor, OR
R. Duncan and Gloria G. MacKenzie, OR
Catherine MacLeod and Mark Gossage, OR
Gene Malizia, OR
Elizabeth Mannarino, OR
Ray Manning, Church of Jesus Christ of Latter Day Sts, UT
Rudy Marchesi, Montinore Vineyards, President, OR
Donald E. Marcy, Cairncross and Hempelmann, P.S., WA
Jack and Georgia Marincovich, OR
Ron Mark, OR
Don Marquardt Properties, LLC, WA
Susan Marshall, Emerald Heights Apartments, LLC, OR
Irene Martin, WA
Randy G. Martin, OR
Bert and Laura M. Martineau, WA
Gary Marzolino, WA
Chuck Adams, Green Crow Management Services, LLC,
Matoaka Forests, LLC, WA
Michael Hart, Forest Investment Associates, Matoaka
Forests L.L.C., GA
Hazel Matson, WA
Roger Matson, WA
Eric and Holly Ann Mattison, WA
Matt Mattson, WA
Todd Mattson, HDR, MN
Cathy Maxwell, WA
Paul Maynard, Whesoe Oil and Gas LTD., United Kingdom
Michael McAvoy, WA
Margaret C. and Stewart K. McClellan, OR
Brian McCollister, OR
June McCollister, OR
Cathy McDonald, WA
Melissa McElreath, WA
Bradley A. and Kelly A. McKay, OR
Ralph McKee, WA
Gary and Gail McKennett, WA
Timothy McMahan, Stoel Rives, OR
Loren McNair, WA
Hans Meere, Merchants Exchange, OR
Howard Meharg, WA
Frank and Kristen Mendez, WA
Noel and Julie Merkley Jr, WA
Chris Michel and Linda Kaiser, OR

APPENDIX A (cont'd)

Final EIS Distribution List

Landowners and Other Interested Public (cont'd)

William and Dana Middleton, WA
Midland Drainage Improvement Co, OR
Steven and Erika Miller, OR
Steven R. Miller and Leslie Hildula, OR
Millwrights and Machinery Erectors Local No. 711, OR
Duke Minium, AK
Judith Diane Miollis, OR
Phillip Miollis, WA
James N and Marianne Mitchell LTD, CT
James N and Marianne Mitchell LTD, WA
Jan Mitchell, OR
Oscar L. Mitchell, WA
Cleon and Michelle Moen, WA
Jerry Molin, OR
Elizabeth A. Molt, WA
Norm and Nancy Monroe, OR
Colleen Olive Moore, OR
Dennis J. Moore, WA
Larry D. Moore, OR
Otto Moosburner, WA
Peter Mostow, Stoel Rives, OR
Walter L. and Carol A. Multanen, OR
Audrey Munk, WA
Merrill and Audrey Munk Trust, WA
Nancy Munk Christie, OR
Danella Murray, WA
Merianne Myers, OR
Ronald G. and Lana Sue Myers, OR
Jeannette Nachbar, OR
Warren W. Nakkela, OR
Richard Nau, WA
Gene W. Nazelrod, WA
Carol Newman, OR
Jonathan E. and Marjorie R. Nichols, WA
Alice Nielsen, OR
Glen James Norgard, OR
Gerald and Laura Norton, WA
Emil E. Nyberg, Chairman, Democratic Party of Clatsop
County, Oregon, OR
Jack and Barbara Oakes, WA
Steve Oakes, Vice President of Operations, Kalama Export
Company, WA
Francisco and Holly Ojeda, WA
Annie Oliver, OR
Elvin and Lillie Oliver, OR
Kimberly Olson, OR
Ann O'Roke, OR
Wallace E and Joyce E. Overlund, OR
Pacific West Timber Co (Washington) LLC, OR
Christopher Paddon, OR
Laura Panagioteres, OR
Rose A and LeeRoy H. Parcel, WA
Douglas H. Parker, WA
Joy Parker, WA
Richard Parker, OR
David L. Parsons, OR
John and Joyce Patten Trust, WA
Chris Payne, Inspector, Portland Harbormaster, OR
William W. and Angela L. Peak, WA
Herbert F. and Yvonna M. Pecha Trust, WA
Shawn Pence, WA
Barbara Pereira, OR
Phillip L. and Lillian M. Perkins, OR
Jack Perrine, WA
Charlotte Persons, Willapa Hills Audubon Society, WA
John and Jennifer Peters, WA

Richard and Judith Peters Trust, WA
Doyle Petersen, WA
Chris Peterson, WA
Scott Peterson, OR
Gary L. Petty, OR
Portland General Electric, OR
Deborah Fiscus Philbrook and Perry Fiscus, OR
Anne Phillips, OR
Donna J. and Harold D. Phillips, WA
Page Phillips, WA
Brian M. Phok, WA
Joe Pierre, Pier E Heating and Cooling, OR
John Pigott, Tidewater Barge, WA
James R. Pollock, WA
Paul D. Poole, OR
Larry D. Poor, OR
Lori Porter, WA
Scott and Jill Pospichal, WA
Glendon and Gretchen Potschka, WA
Robert and Judy Pounders, OR
Joanna and Ralph E. Powell, WA
George Poysky and Karen Poysky, WA
George J. Poysky, Jr. and Karen Poysky, WA
George Poysky and Gary Viuhkola, OR
Ray Pratt, Portland Assistant Harbormaster, OR
Rev. JoAnne Prestegard, St. James Episcopal Church, WA
Mike and Linda Pribbanow, WA
George T. and Roberta Price, Trustees, OR
Jim Proulx, OR
Sally J. Purschell, Trustee, CA
Paul Putkey, OR
Dr. Robert M. and Thea L. Pile, WA
Donna Quinn, OR
Robert Quoidbach Trust, WA
Glenn Ramsey, WA
Robert Randolph, OR
Daniel Ransbottom, AMEC-Paragon, TX
Becky Read, OR
James Reed, WA
James N. Reed, OR
Joe and Patricia Reed, WA
Mike and Jane Rees, WA
Norma Reeves and Betty Sweeney, OR
Allen and Carrolene Reid, WA
Burt W. Reid, WA
Fred and Linda Sue Reid, WA
S.C. Reid Daughters Trust, WA
Renaud Trust, WA
Lee Rene, OR
Alison Rhea, Rhea Environmental Consulting, OR
Donald and Frances Rice, OR
Robert D. Rich, OR
Alan Richards, WA
Carole Richardson, OR
Julia Richardson, VanNess Feldman, DC
Edwin O. Richey, WA
Janelle Rieland, Natural Resource Group LLC, MN
Judy and Marvin Rinard, WA
John L. and Deanna L. Robedeau, WA
Milton S. Roberts, WA
Matt Robinson, OR
Roger Rocka, OR
Jared Ross, WA
Bob Roth, Longview Fibre Company, WA
Blake Rowe, Longview Fibre Company, WA
Michelle Rudd, Stoel Rives, OR
Michael and Emilee Rugh, FL
Elton Russeff, WA

APPENDIX A (cont'd)

Final EIS Distribution List

Landowners and Other Interested Public (cont'd)

Micah Russell, CREST, OR
Robert and Glenda Sandberg, WA
Paul Sansone and Susan Vosburg, OR
Jim Santee, OR
Jane M. Schaaf, WA
Kathy Schamp, Portland and Western Railroad, Inc., OR
Gary D. Schauble and Joyce C. Schauble, WA
Patricia Schauer, WA
Darrell and Tammie Schill, WA
James T. and Pearl Schraeder, WA
Mike Schroeder, OR
Don Schwendiman, Rayonier Forest Operations LLC, WA
Art Schwinof, BNSF Rail Road, WA
Steven O. Schwirse, OR
Benjamin and Brenda Scott, WA
Brenda Scott, WA
George Scouten, OR
Pamela Jo and Eric Sellix, OR
Tom Serres, OR
Paul and Jeanette Severson, WA
Dixon Shaver, OR
J.R. Shear, OR
Jerry Sheldon, WA
David Shelton, WA
Rose Mary Shoptaw, WA
Justin Shulke, WA
Scott and Stephanie Shulke Trust, WA
Kim Sibley, WA
Russ Sill, OR
Tyler and Peny Silva, WA
Susan L. Skinner, OR
Raymond Slake and Teresa Wright, WA
Charles L. and Dawn M. Smith, OR
Darwin Smith, Kesler/Smith, Inc., WA
Jennefer Smith, OR
Michael E. and Elizabeth A. Smith, WA
Veronica Smith, NorthernStar Natural Gas LLC, OR
Robert L. Smithson, OR
Delores Snider, WA
Marvin and Delores Snider, WA
Rodney and Heather Snyder, WA
Paul Soanes, President, NorthernStar Natural Gas LLC, OR
Gary Soderstrom, OR
Agung and Onuma Soetamin, WA
Roger L. and Joan E. Sonneland, Trustees, OR
Dale H Sorenson, WA
Olaf and Joanne Sorenson, WA
Jamie Sowers, Port of Ilwaco Harbor Master, WA
Bob Speaker, OR
Terrie Spindle, WA
Ernest St Louis, WA
H.R. Stange, WA
Daniel Stanley, WA
Murray E. Stanley, OR
Lawson and Pamela Starnes Trust, OR
Verna L. Steele, OR
William Steiner, URS, OR
Cleve Steward, Steward and Associates, WA
Bob and Shirley Stevens, WA
Robert E. and Shirley Stevens Trust, HI
Freda Stevenson, WA
Robert Stratton, WA
Charles and Cynthia Straughan, OR
Robert A. Strom, WA
Ken Stroup, OR
Lon Sudar, WA
Robert and Lisa Sudar, WA
WM Sudar, WA
Paul Sullivan, Whessoe, TX
Paul Sunde, Mid Ohio Securities Corp, OH
Paul Sunde, Mid Ohio Securities Corp, WA
Sharron and Jasmine Swank, OR
Gregory and Peggy Swanson, WA
Norma Sweeney and Betty Reeves (alternate address), OR
Norma Sweeney and Betty Reeves, OR
Dave Swiderski, WA
Julie Synder, OR
Lee Talbot, OR
Lee and Judy Talbot, OR
Elizabeth Tagg, OR
Rick Brown and Estrella Tamayo, OR
Marcia E. Tappan, OR
ChrisLynn Taylor, OR
Richard Teela, U.S. Customs, OR
Karin Temple, OR
Robert E. and Kay Templeton, WA
Pat Terhaar, Natural Resource Group LLC, MN
Cliff Tetrgault, OR
Nicki Thomas, WA
Rodger Thompson, OR
Vern and Danielle Thompson, WA
Thomas Tolla, CT
James and Kathryn Tomlinson, WA
Mr. and Mrs. D L Tomlinson, WA
Anne Torget, WA
Dale H. Treusdell, WA
Deb Treusdell, OR
Keith Underwood, HDR, WA
Vance Van Dan Driessche, Jr., WA
Brett Vandenheuvel, OR
Judy Vander Maten, WA
Gail and Sompas Varner, WA
Sterling Vasquez, WA
Connie Veenendahl, OR
John Veenendahl, OR
Jeffrey M. Veys Trust, WA
James Vickaryous, WA
David E. Victor, OR
Gilbert Vik, WA
Paul Vik, WA
John Vlastelicia, OR
Roseann Volk, OR
Suzanna Von Reibold, Trustee, OR
Liz Wainwright, Merchants Exchange, OR
Bill Walden, OR
Daniel and Shiena Walker, WA
Mike Walker, FOSS Maritime, OR
Willard Walker, WA
Betty Jean Wall, WA
Bill and Kathi Wallace, WA
Gary S. and Evelyn J. Waltenbaugh, OR
Ronald Wastradowski, WA
Donna Waterman, WA
Waterway Simulation Technology, Inc., MS
Michal Watts, WA
Timothy and Tania Webb, WA
Carol Webster, OR
Jack Weedman, WA
Robert Wegdahl, WA
Rocky Wegdahl, WA
Ed Wegner, OR
Monte and Caroline Wenger, WA
Westward Electric, LLC., WA
Weyerhaeuser Company Attn: Ellie Lathrop, WA

APPENDIX A (cont'd)

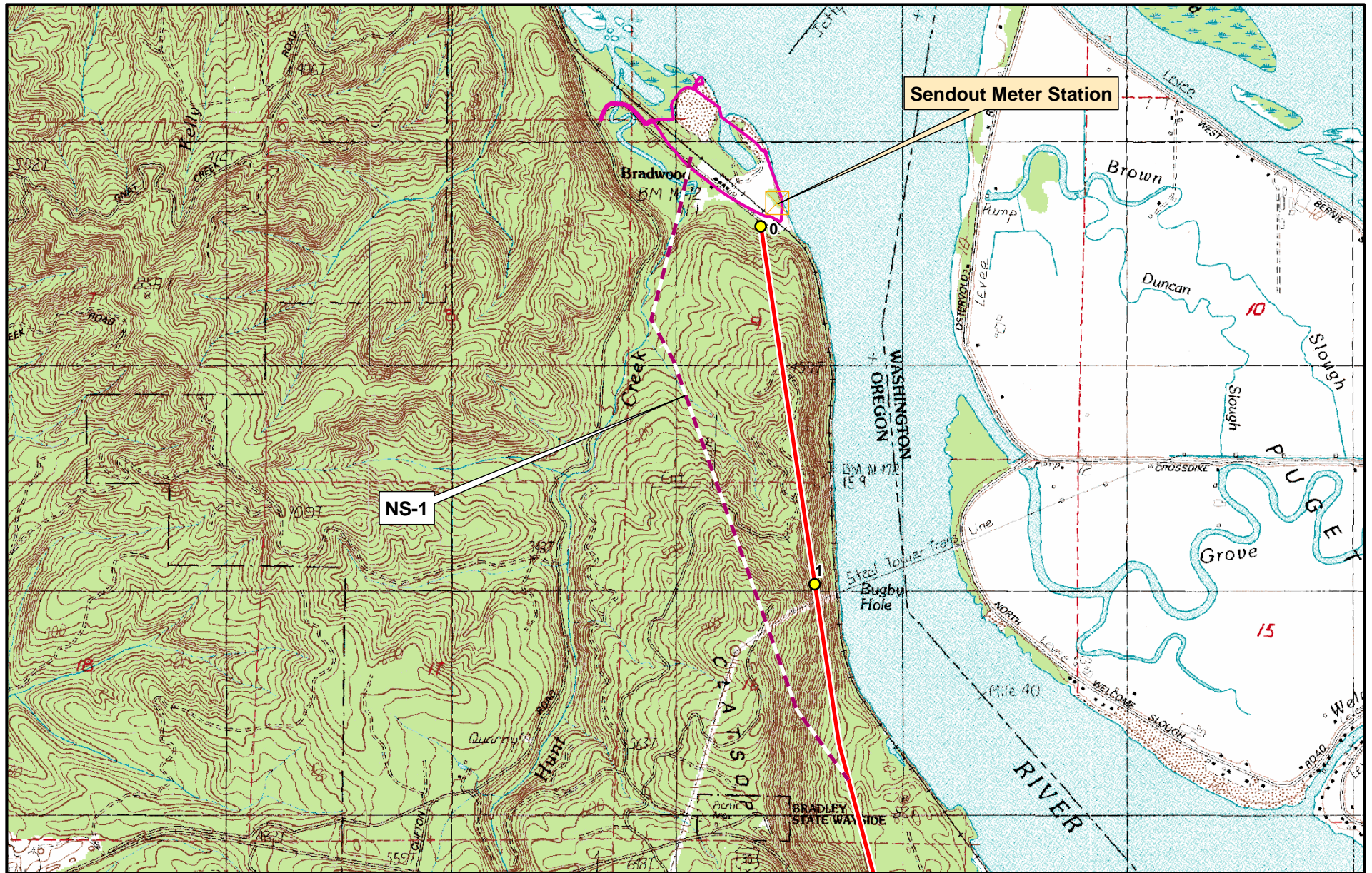
Final EIS Distribution List

Landowners and Other Interested Public (cont'd)

Patrick Wheary, OR
Michael and Rita Wheeler, WA
Carol Whitaker, Georgia-Pacific Corp., WA
Frederick White, OR
Thomas and Lois White, WA
Larry and Christine Whiteside, WA
| Milton and Patti Whiteside, OR
Joe Whitnot, OR
Jeffrey L. Whittaker, WA
Clarence and Sharon Williams, WA
Forrest Williams, OR
Robert and Tammy Williams, WA
J. R. Williamson Estate, WA
| Glenn Willman, WA
Donald C. Wilson, WA
Bruce and Delaura Wirkkala, WA
Rick and Sandra Wirkkala, WA
Wise Homes, Inc., WA
Steven and Virginia Wisuri, WA
Gene Witham, WA
| Pamela Wright, WA
Markus and Susan Wuerth, WA
Wayne and Carrie Yeager, WA
Felix Yokel, MD
Laque and Betty Youngblood, WA
| Stephanie Zakrewski, OR
| Denniss E. Zinser, WA
Linda E. Zommers, WA
| David and Carol Zylstra, WA

APPENDIX B

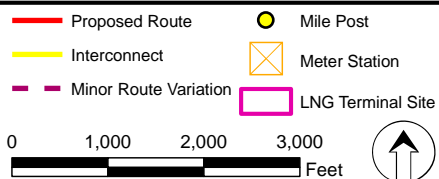
PIPELINE LOCATION MAPS

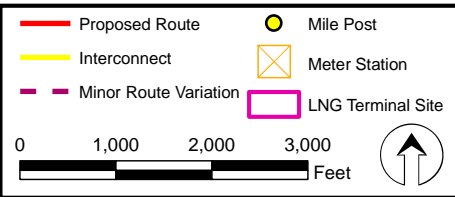
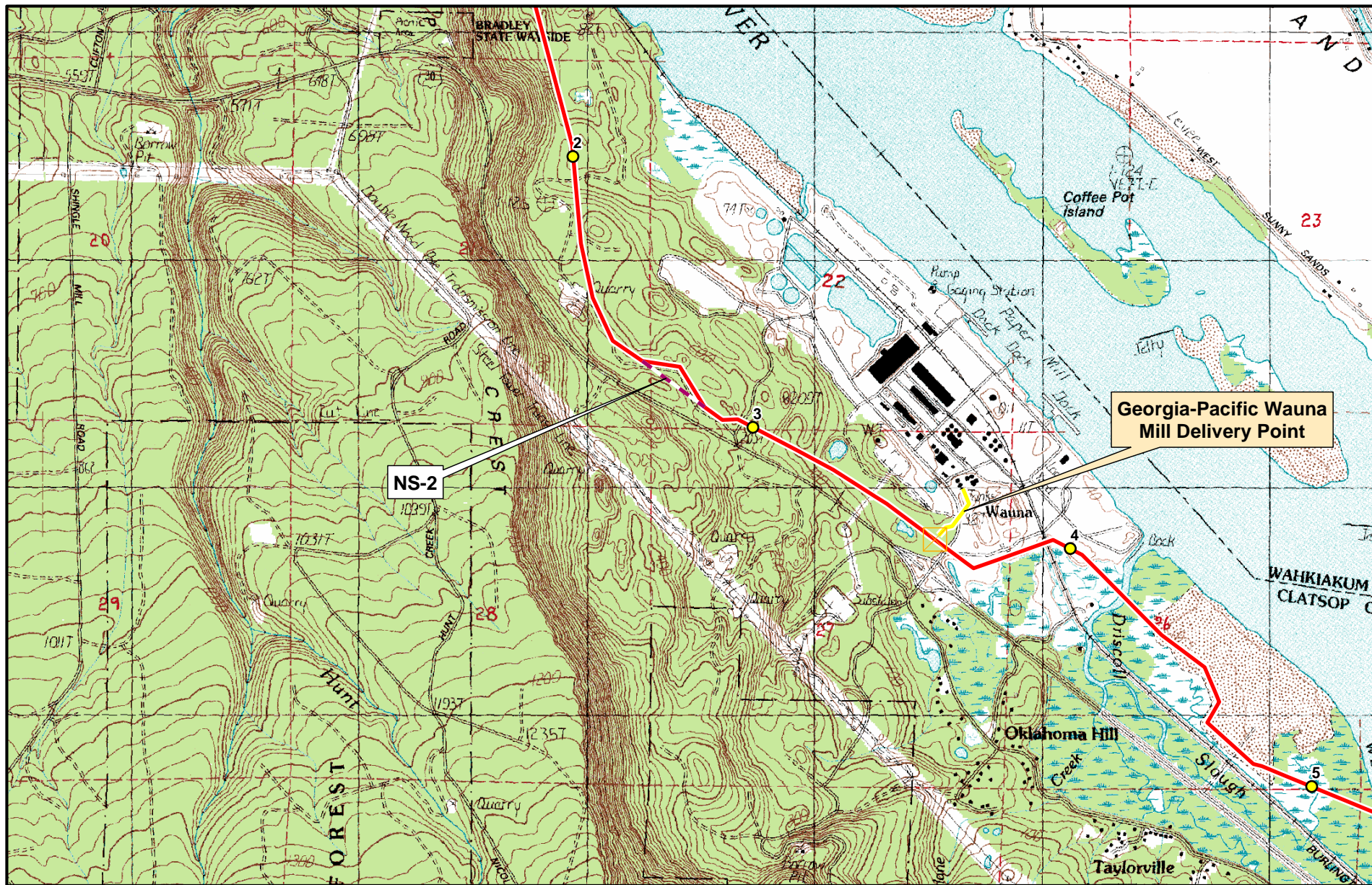


Appendix B

Bradwood Landing Project

Pipeline Location Map

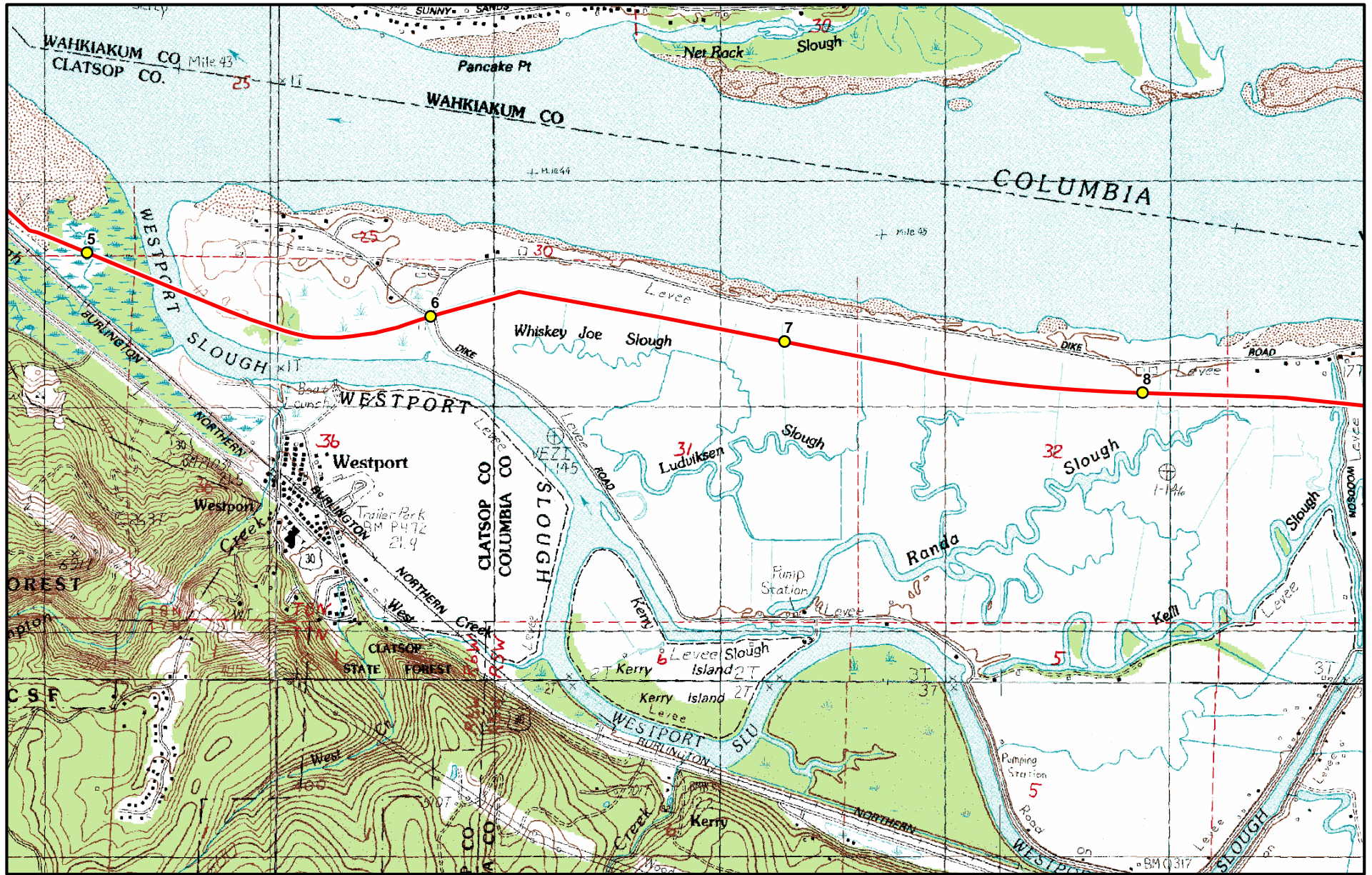




Appendix B

Bradwood Landing Project

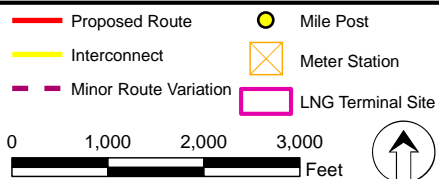
Pipeline Location Map

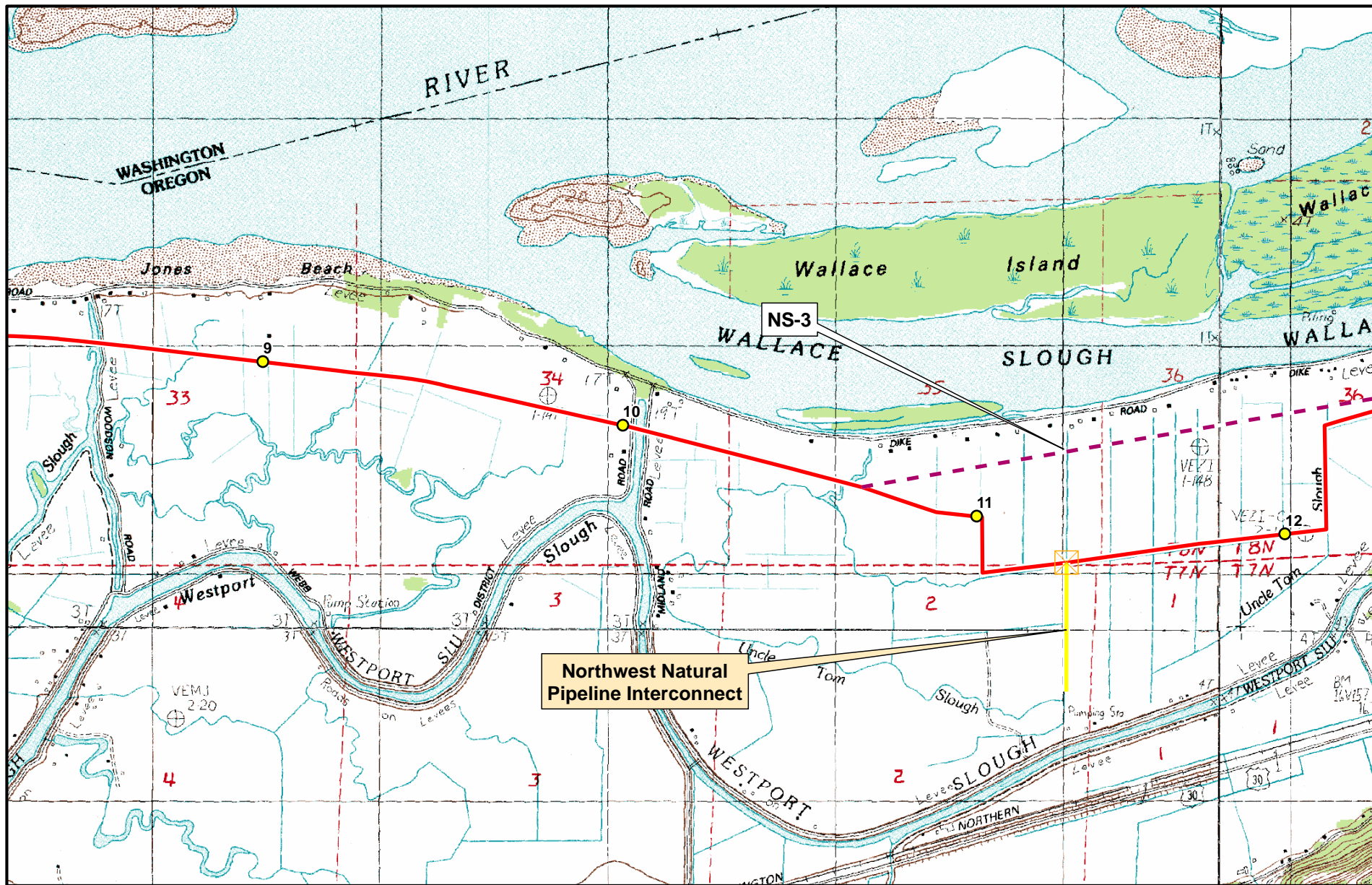


Appendix B

Bradwood Landing Project

Pipeline Location Map

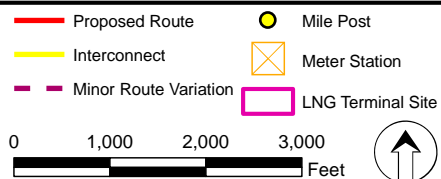


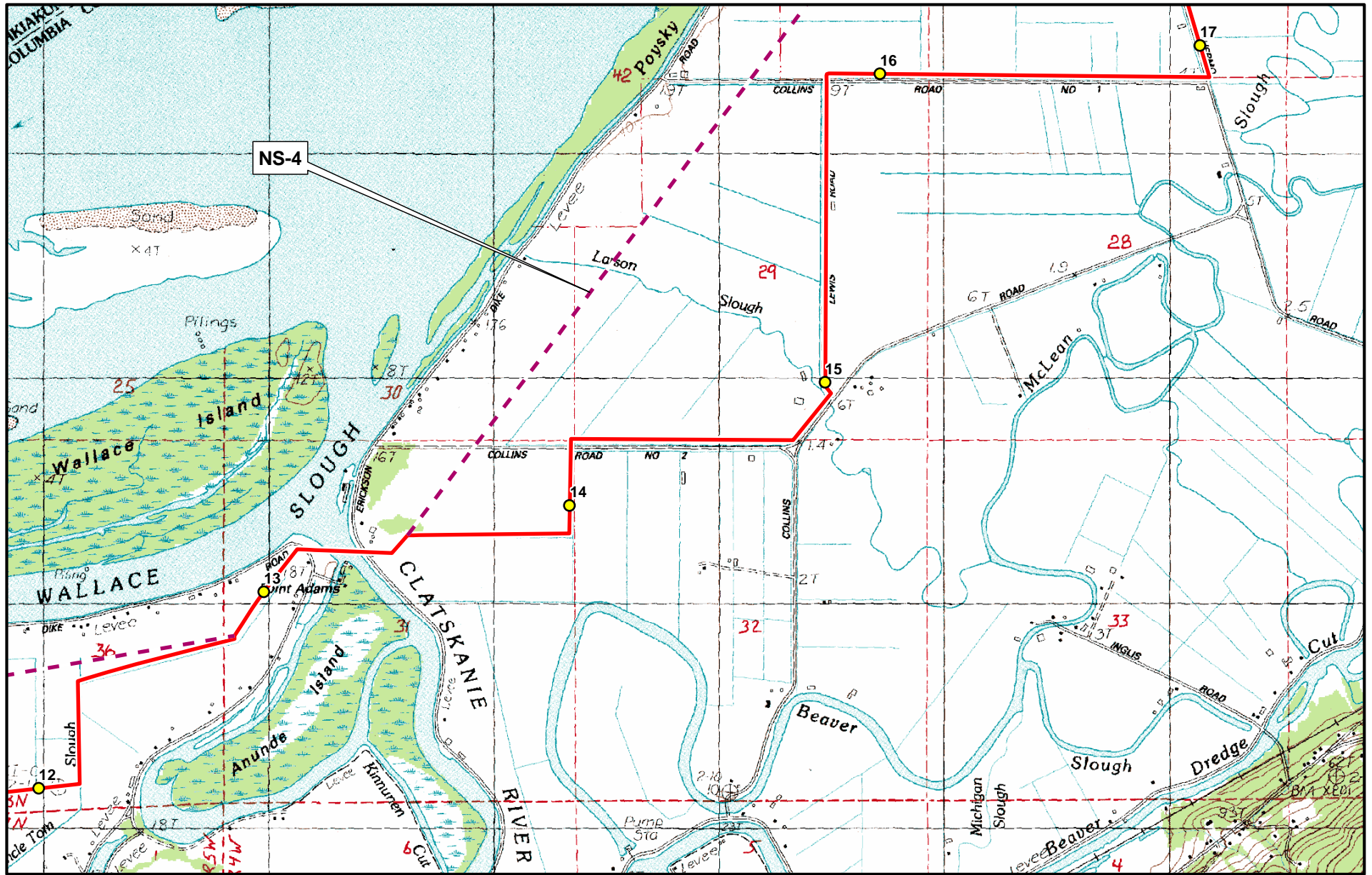


Appendix B

Bradwood Landing Project

Pipeline Location Map

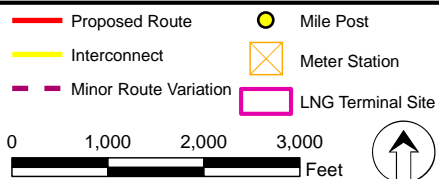


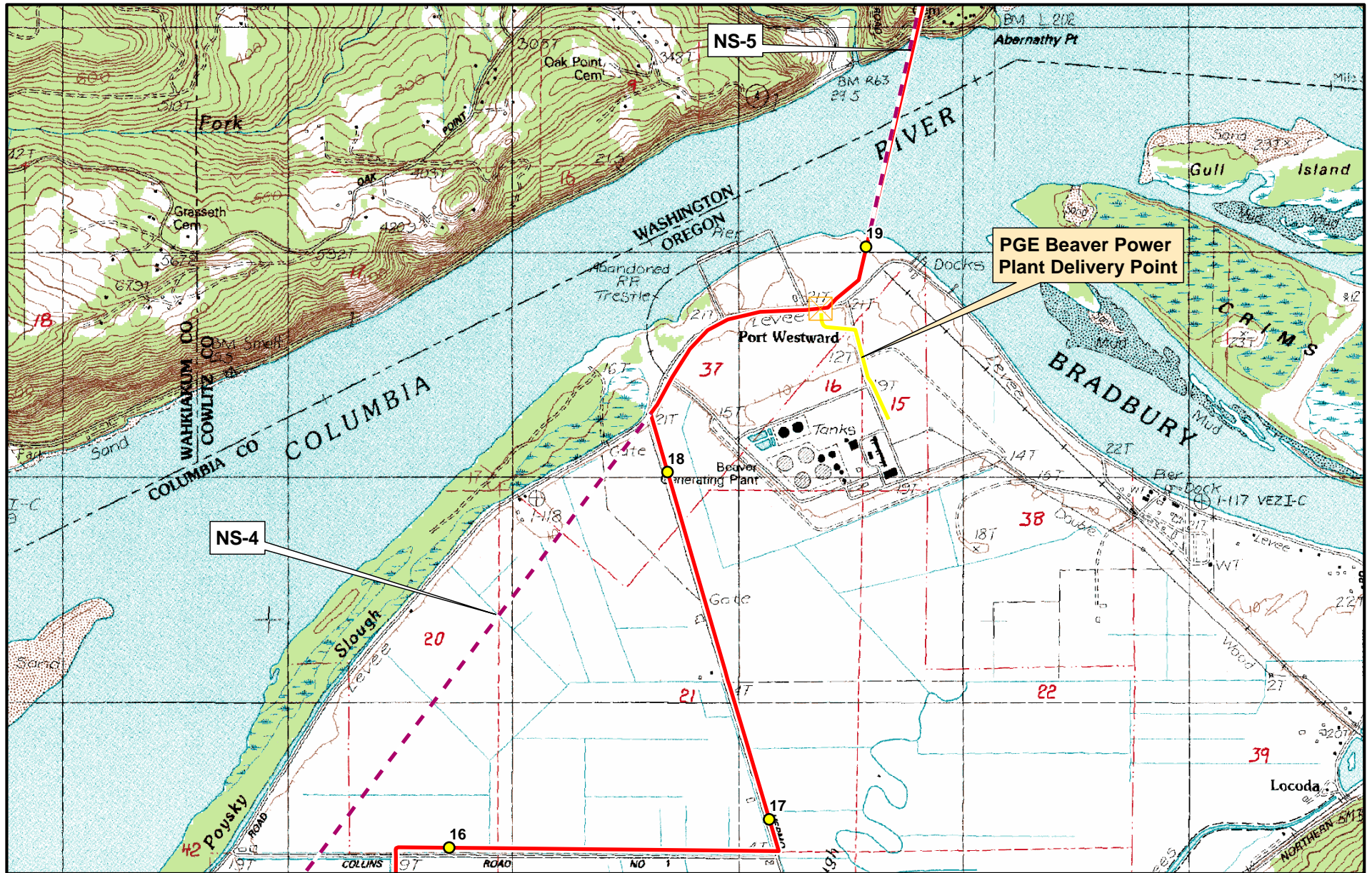


Appendix B

Bradwood Landing Project

Pipeline Location Map

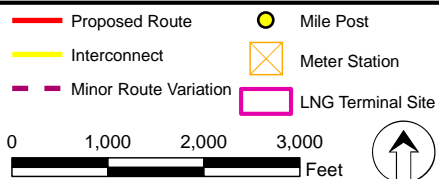


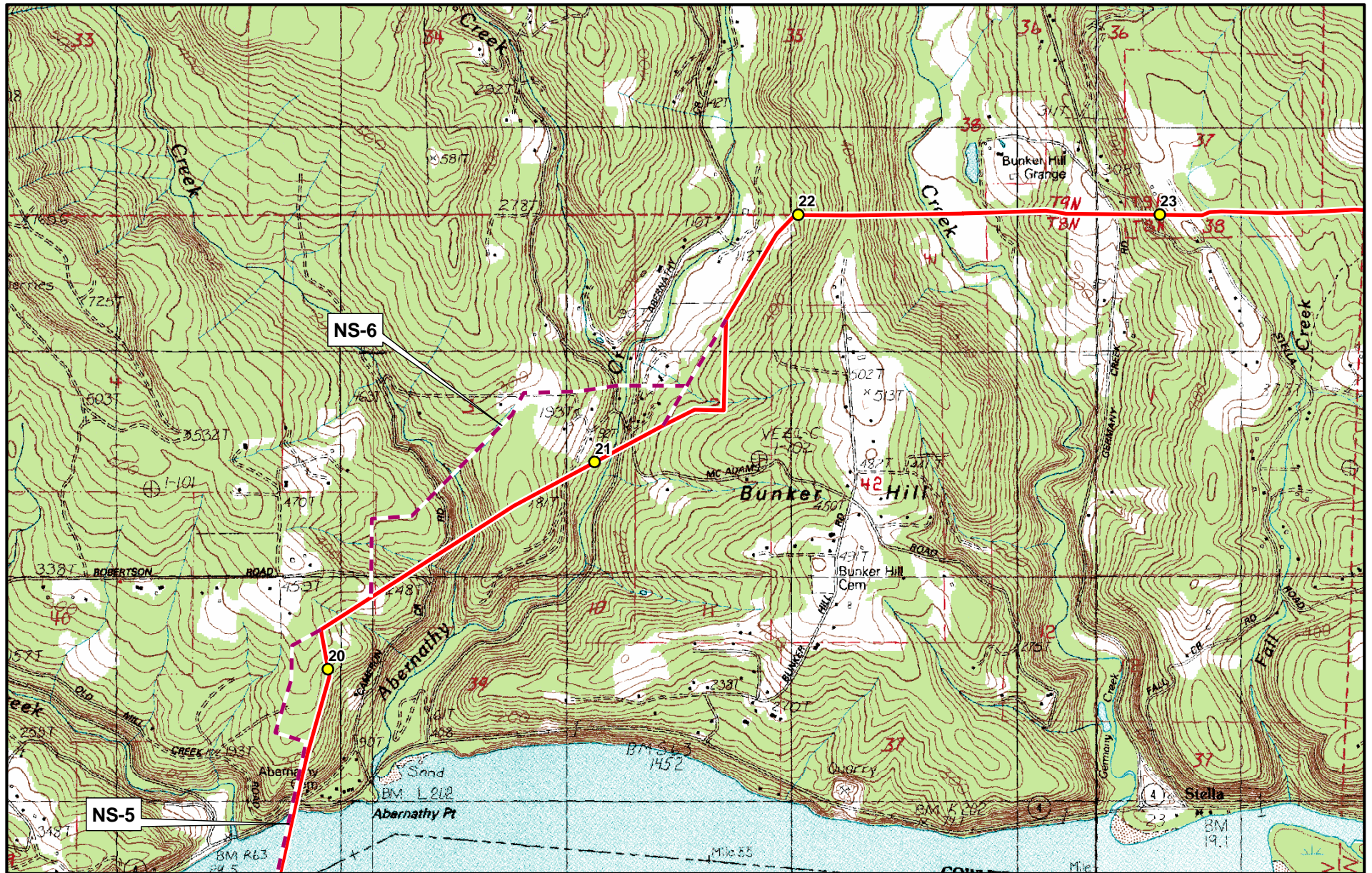


Appendix B

Bradwood Landing Project

Pipeline Location Map

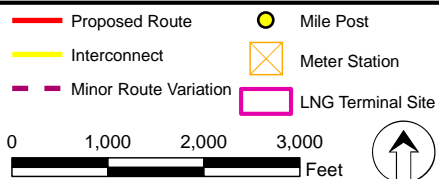


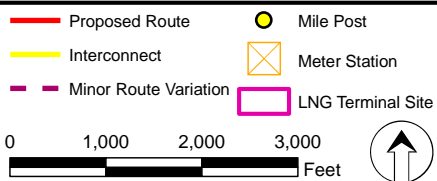
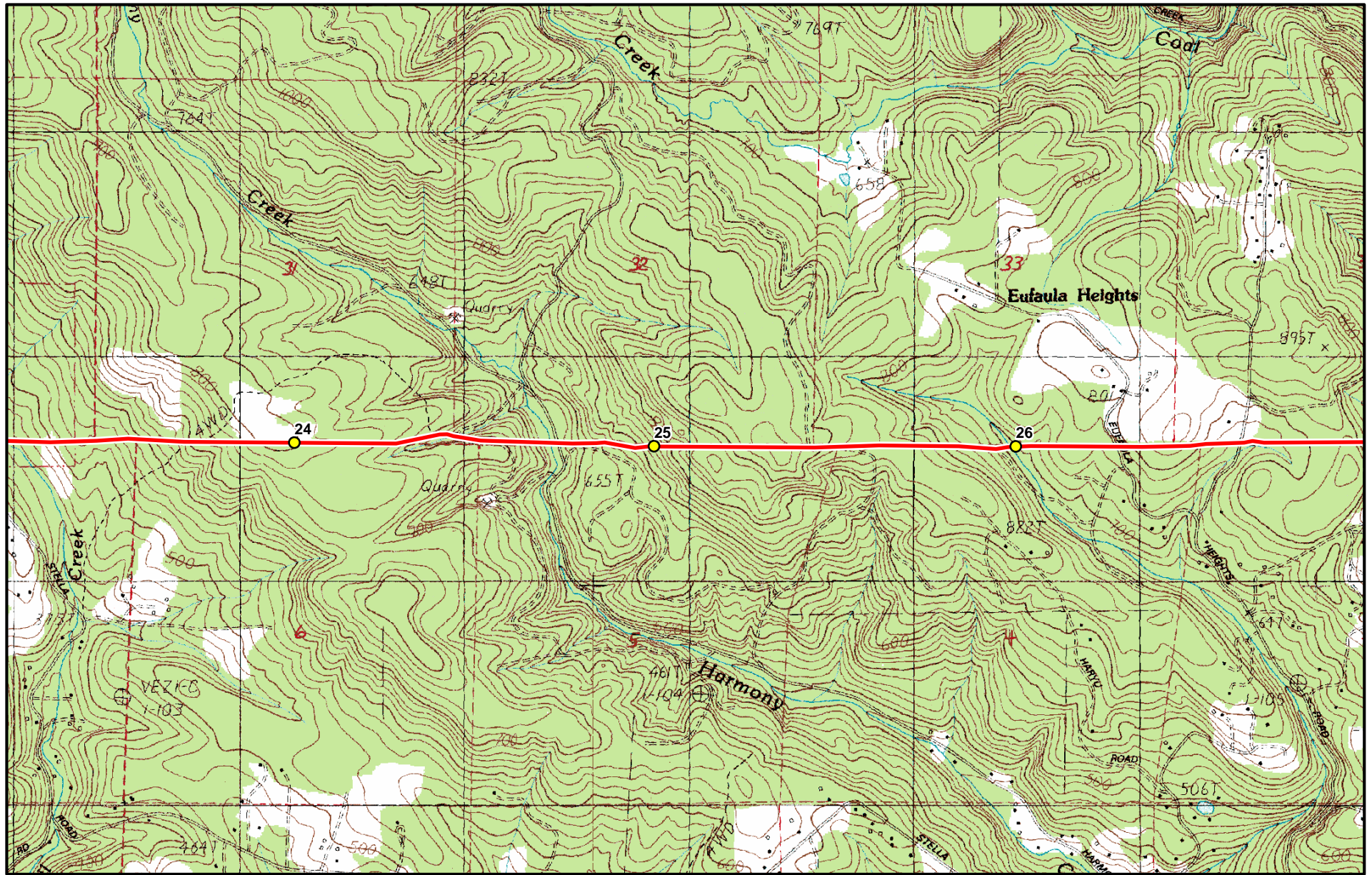


Appendix B

Bradwood Landing Project

Pipeline Location Map

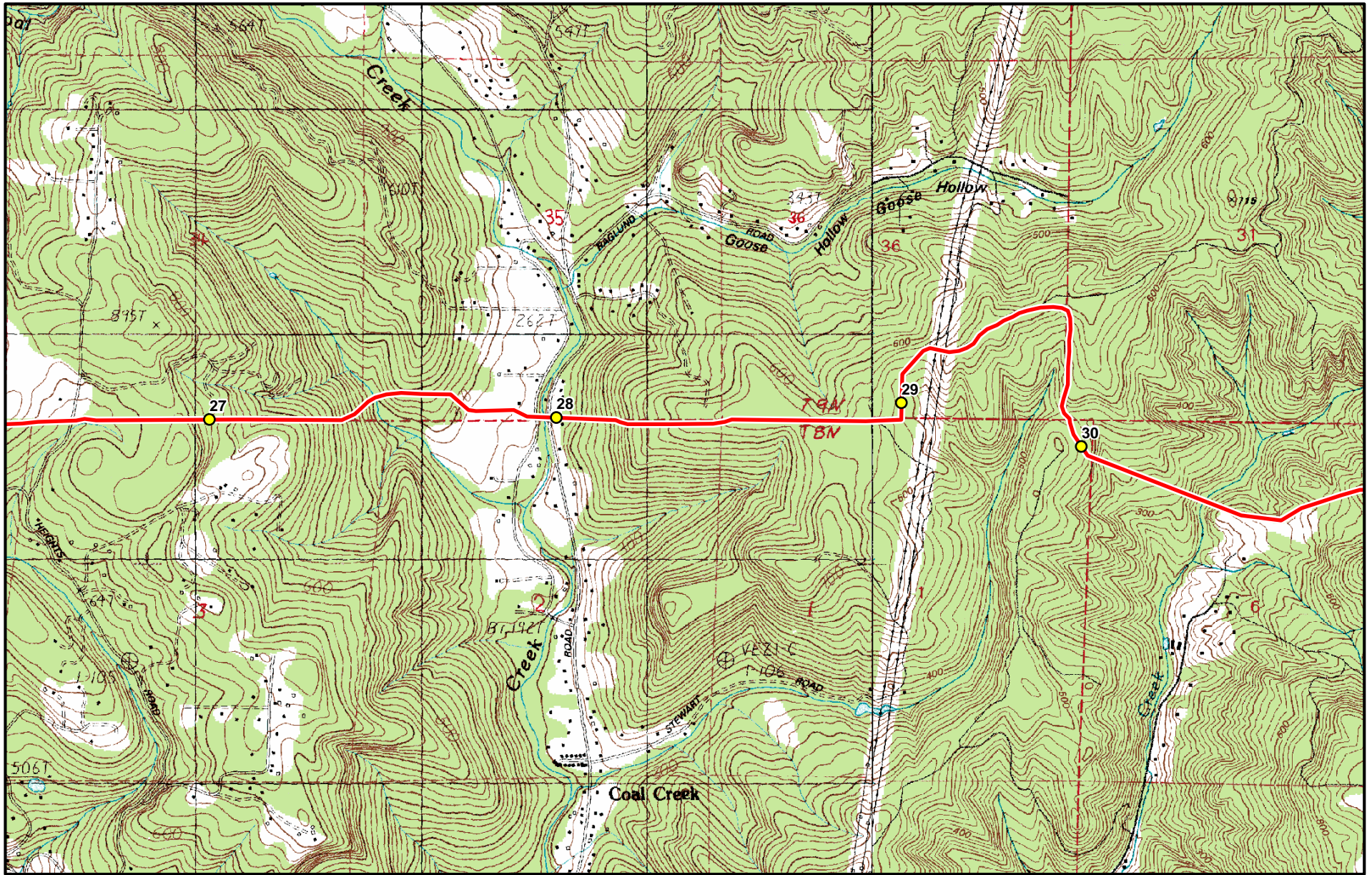




Appendix B

Bradwood Landing Project

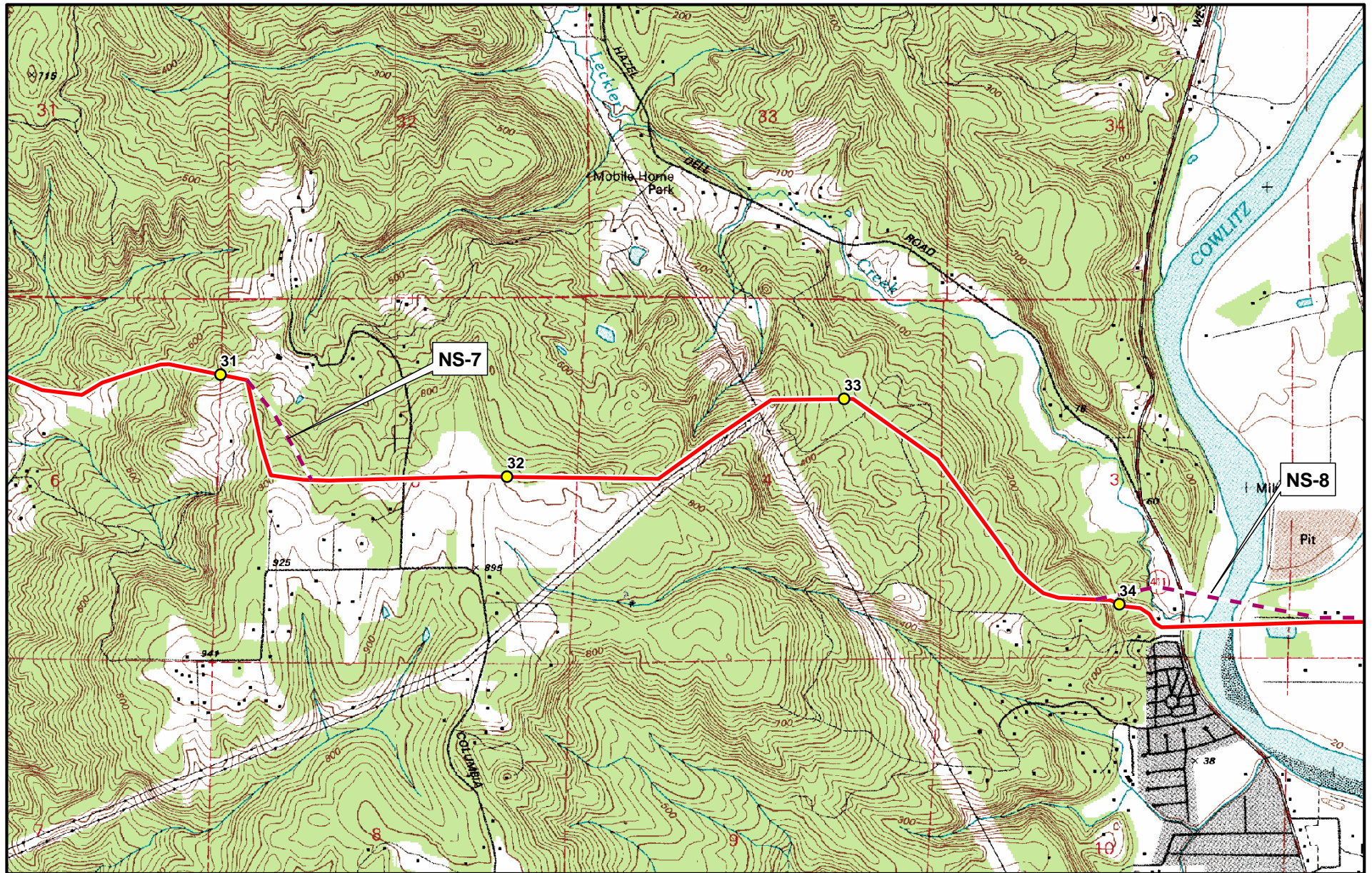
Pipeline Location Map



Appendix B

Bradwood Landing Project

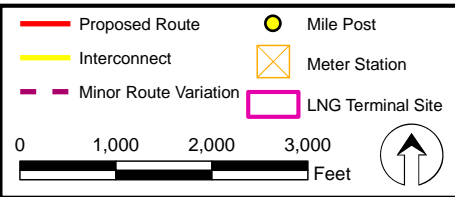
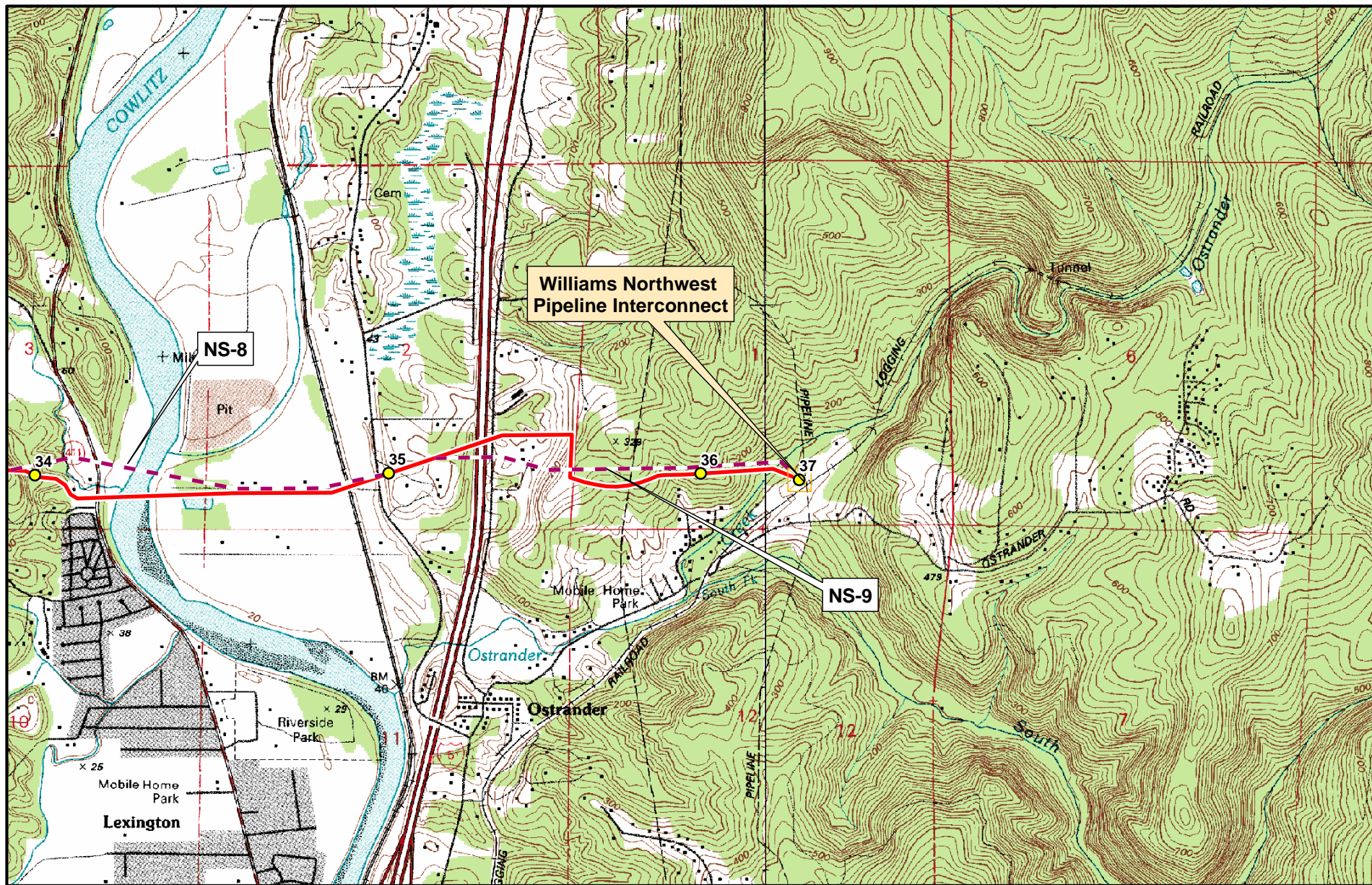
Pipeline Location Map



Appendix B

Bradwood Landing Project

Pipeline Location Map



Appendix B

Bradwood Landing Project

Pipeline Location Map

APPENDIX C

SHORELINE MAPS INCLUDING PINNIPED HAULOUT SITES

Atlas of Seal and Sea Lion Haulout Sites in Washington. Jeffries, S.J., P.J. Gearin, H.R. Huber, D.L. Saul, and D.A. Pruett. Washington Department of Fish and Wildlife, Wildlife Science Division, Olympia, Washington. 2000.

Astoria MAP

Shoreline Classifications

November, 2003

Lower Columbia River GRP

MAP # 2

0 0.5 1 2 Miles



Shore Classifications

7 - Exposed Tidal Flats

10 - Marshes

1 - Exposed Rocky Shores

3 - Fine/Medium Sand Beaches

5 - Sand and Gravel Beaches

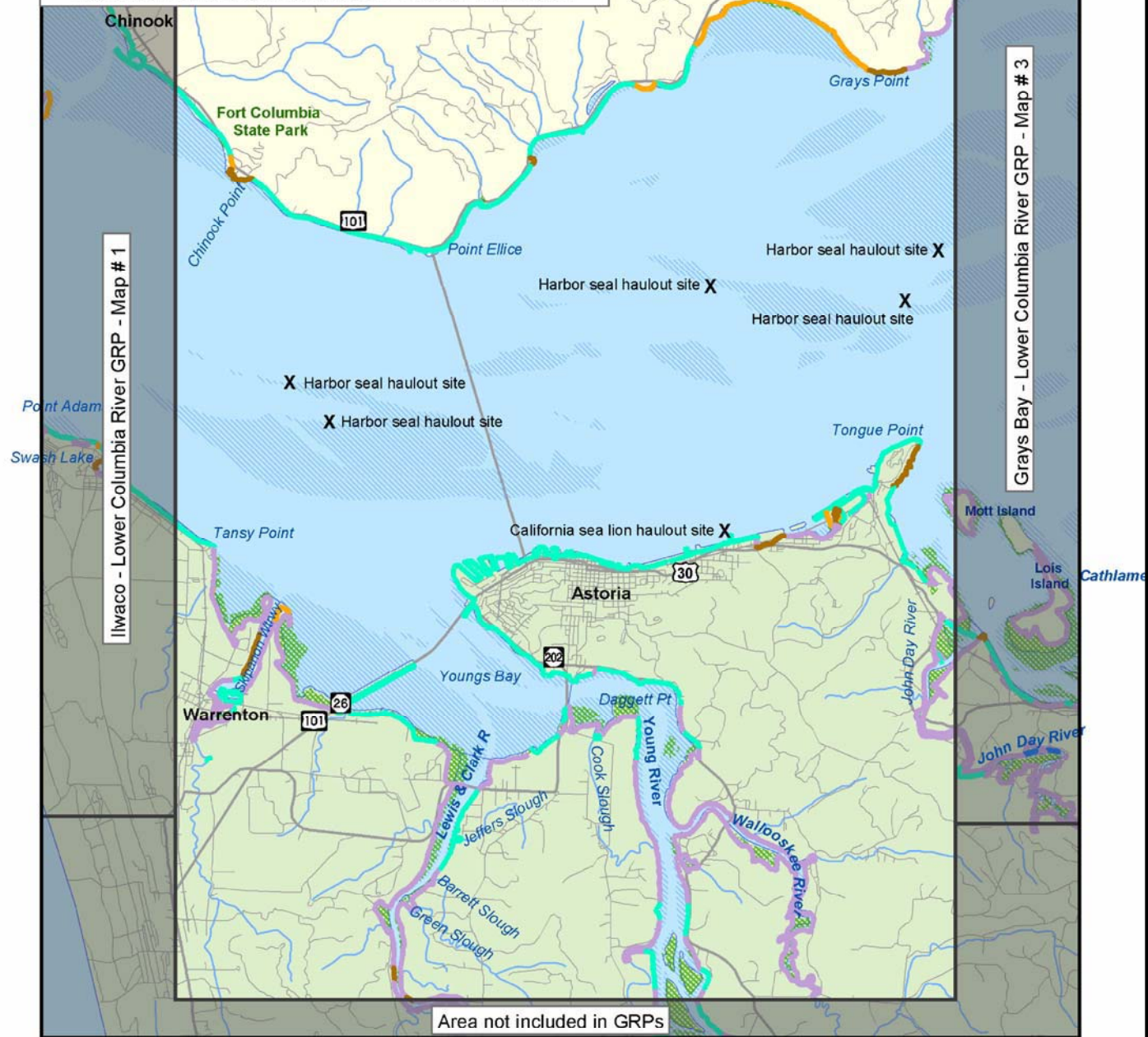
6 - Gravel/Cobble/Riprap

7 - Exposed Tidal Flats

9 - Sheltered Sandy Shores

Only shoreline classifications found in this GRP are shown on the Legend

Area not included in GRPs



Area not included in GRPs



Appendix C

Shoreline Maps Including Pinniped Haulout Sites (Map 2 of 4)

Sources: Lower Columbia River Geographic Response Plan (GRP). Washington State Department of Ecology Publication No. 95-258. Revised November 2003

Atlas of Seal and Sea Lion Haulout Sites in Washington. Jeffries, S.J., P.J. Gearin, H.R. Huber, D.L. Saul, and D.A. Pruett. Washington Department of Fish and Wildlife, Wildlife Science Division, Olympia, Washington. 2000.

Grays Bay MAP

Shoreline Classifications

November, 2003

Lower Columbia River GRP

MAP # 3

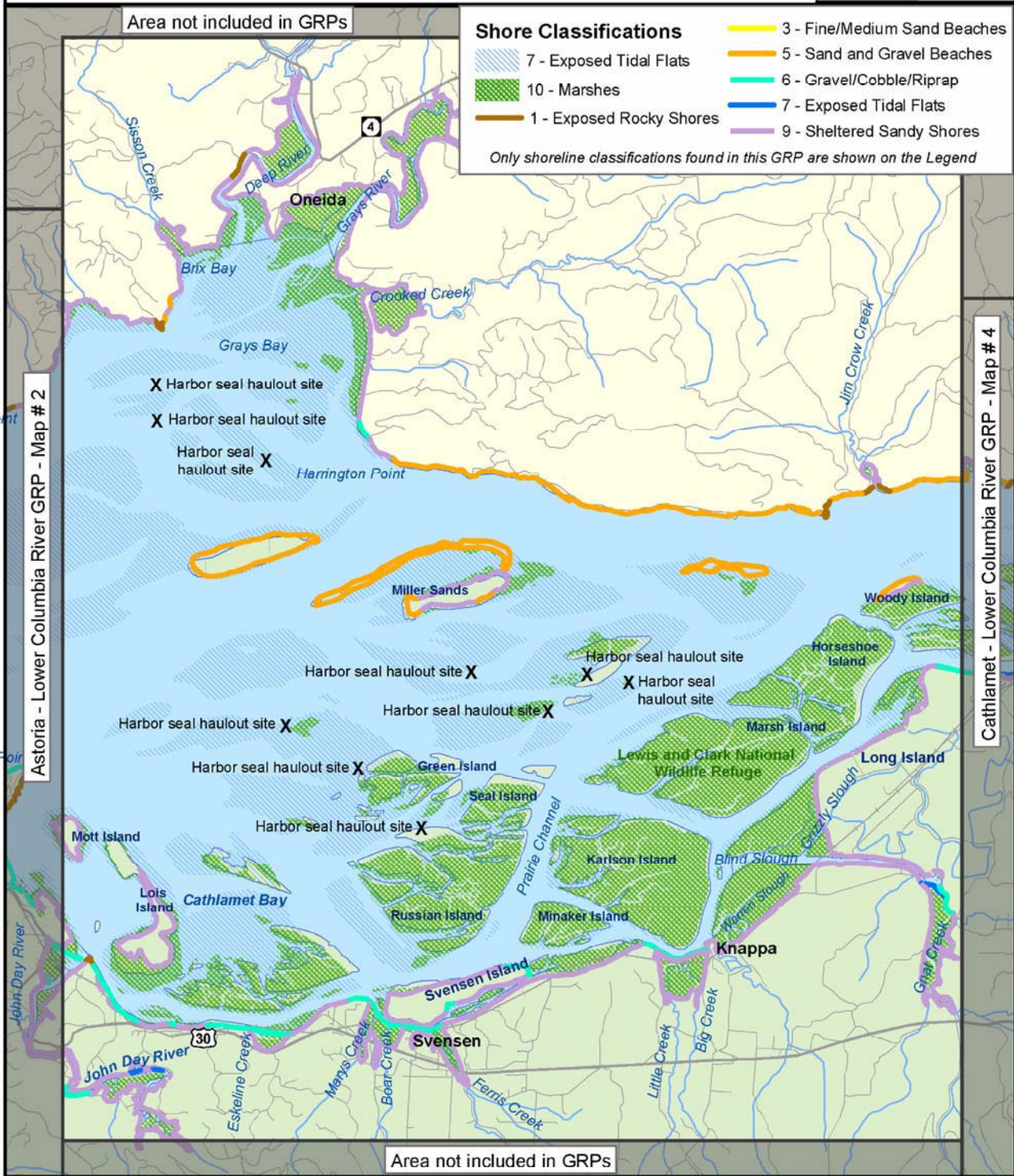
0 0.5 1 2 Miles



Area not included in GRPs

Shore Classifications

- 7 - Exposed Tidal Flats
 - 10 - Marshes
 - 1 - Exposed Rocky Shores
 - 3 - Fine/Medium Sand Beaches
 - 5 - Sand and Gravel Beaches
 - 6 - Gravel/Cobble/Riprap
 - 7 - Exposed Tidal Flats
 - 9 - Sheltered Sandy Shores
- Only shoreline classifications found in this GRP are shown on the Legend



Astoria - Lower Columbia River GRP - Map # 2

Cathlamet - Lower Columbia River GRP - Map # 4

Area not included in GRPs



Appendix C

Shoreline Maps Including Pinniped Haulout Sites (Map 3 of 4)

Sources: Lower Columbia River Geographic Response Plan (GRP). Washington State Department of Ecology Publication No. 95-258. Revised November 2003

Atlas of Seal and Sea Lion Haulout Sites in Washington. Jeffries, S.J., P.J. Gearin, H.R. Huber, D.L. Saul, and D.A. Pruett. Washington Department of Fish and Wildlife, Wildlife Science Division, Olympia, Washington. 2000.

Cathlamet MAP

Shoreline Classifications

November, 2003

Lower Columbia River GRP

MAP # 4

0 0.5 1 2 Miles



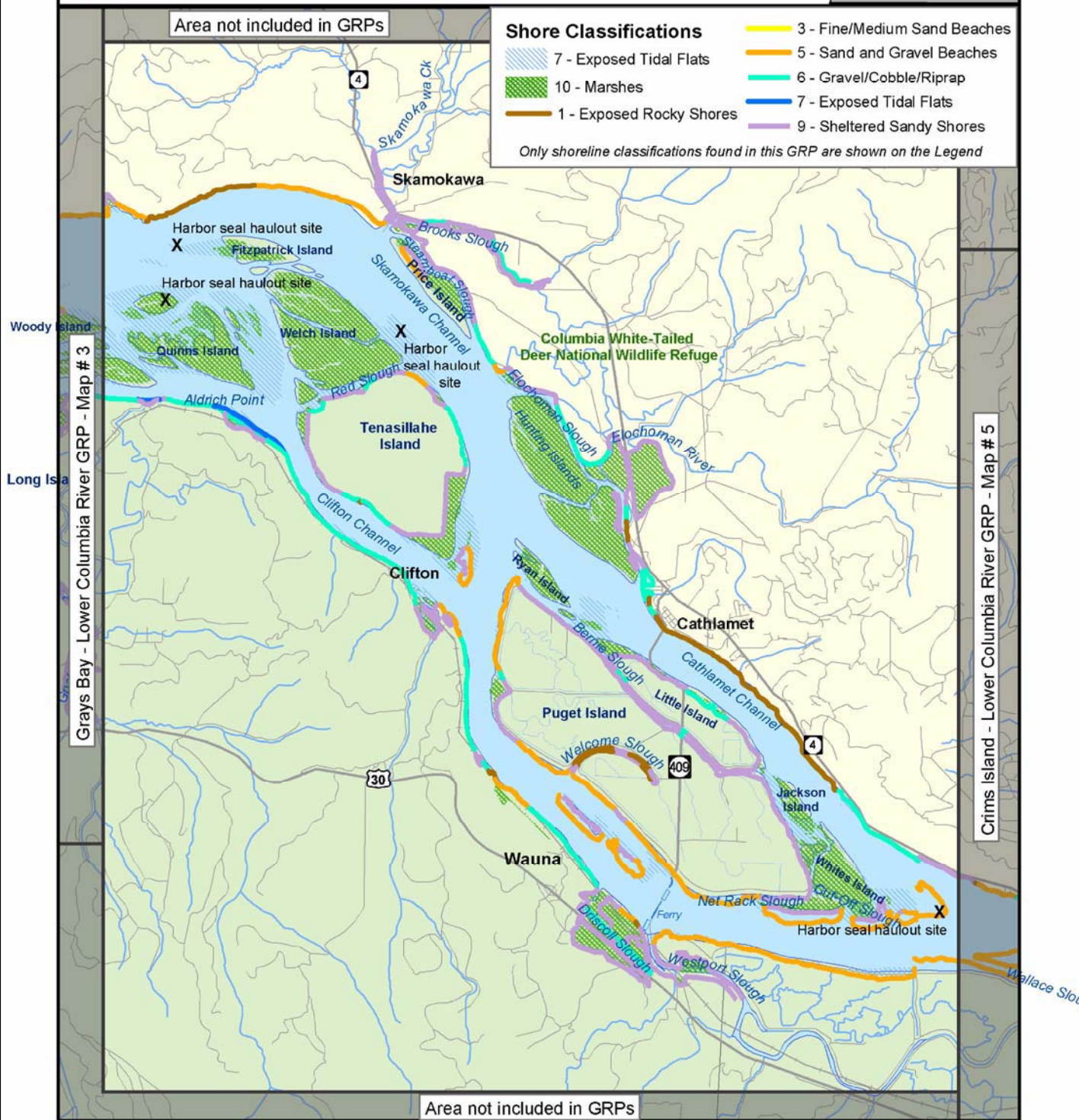
Area not included in GRPs

Shore Classifications

- 7 - Exposed Tidal Flats
- 10 - Marshes
- 1 - Exposed Rocky Shores

- 3 - Fine/Medium Sand Beaches
- 5 - Sand and Gravel Beaches
- 6 - Gravel/Cobble/Riprap
- 7 - Exposed Tidal Flats
- 9 - Sheltered Sandy Shores

Only shoreline classifications found in this GRP are shown on the Legend



Appendix C

Shoreline Maps Including Pinniped Haulout Sites (Map 4 of 4)

Sources: Lower Columbia River Geographic Response Plan (GRP). Washington State Department of Ecology Publication No. 95-258. Revised November 2003

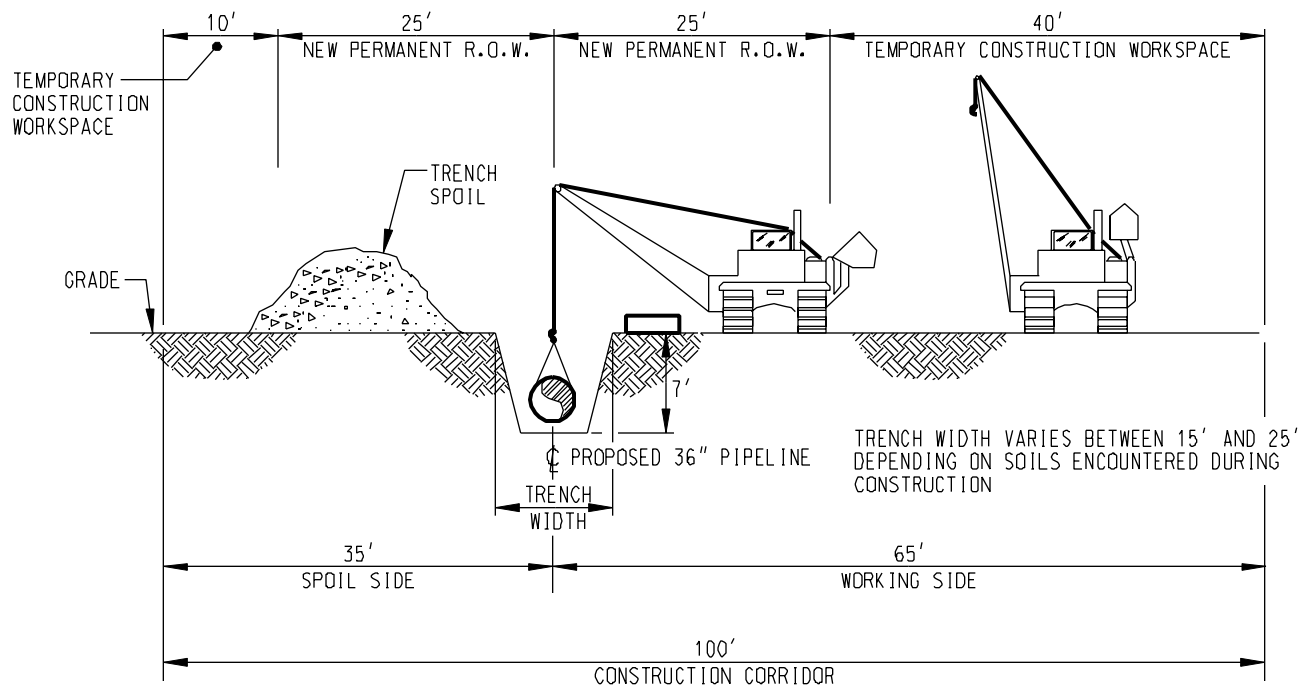
Atlas of Seal and Sea Lion Haulout Sites in Washington. Jeffries, S.J., P.J. Gearin, H.R. Huber, D.L. Saul, and D.A. Pruett. Washington Department of Fish and Wildlife, Wildlife Science Division, Olympia, Washington. 2000.

APPENDIX D

PROPOSED RIGHT-OF-WAY CONFIGURATIONS ASSOCIATED WITH THE BRADWOOD LANDING PROJECT



PUBLIC							DRAWN: PES	DATE: 09/19/2005		TYPICAL UPLAND CROSS-SECTION WITH DITCH PLUS SPOIL SIDE TOPSOIL SEGREGATION
							CHECKED:	DATE:		
							ENGINEER:	DATE:		
							APPROVED:	DATE:		
							REVIEW:	DATE:		
							SCALE: N.T.S.	SHEET 1 OF 1		
							JOB NO.: A-5015			
	A	ISSUED FOR INFORMATION ONLY	09/19/2005	GMR	JW	DR	CLIENT/ CLIENT JOB NO.			
NO.	REVISION	DATE	DRAWN	CHKD	APPD	DOCUMENT NO.	DRAWING NO	A5015-00-051307-9201	REV	A

**PUBLIC**

						DRAWN: PEB	DATE: 08/18/2005
						CHECKED:	DATE:
						ENGINEER:	DATE:
						APPROVED:	DATE:
						REVIEW:	DATE:
						SCALE: N.T.S.	SHEET 1 OF 1
						JOB NO.: A-5015	
						CLIENT/JOB NO.	
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NO	REVISION	DATE	DRAWN	CHKD	APPD		

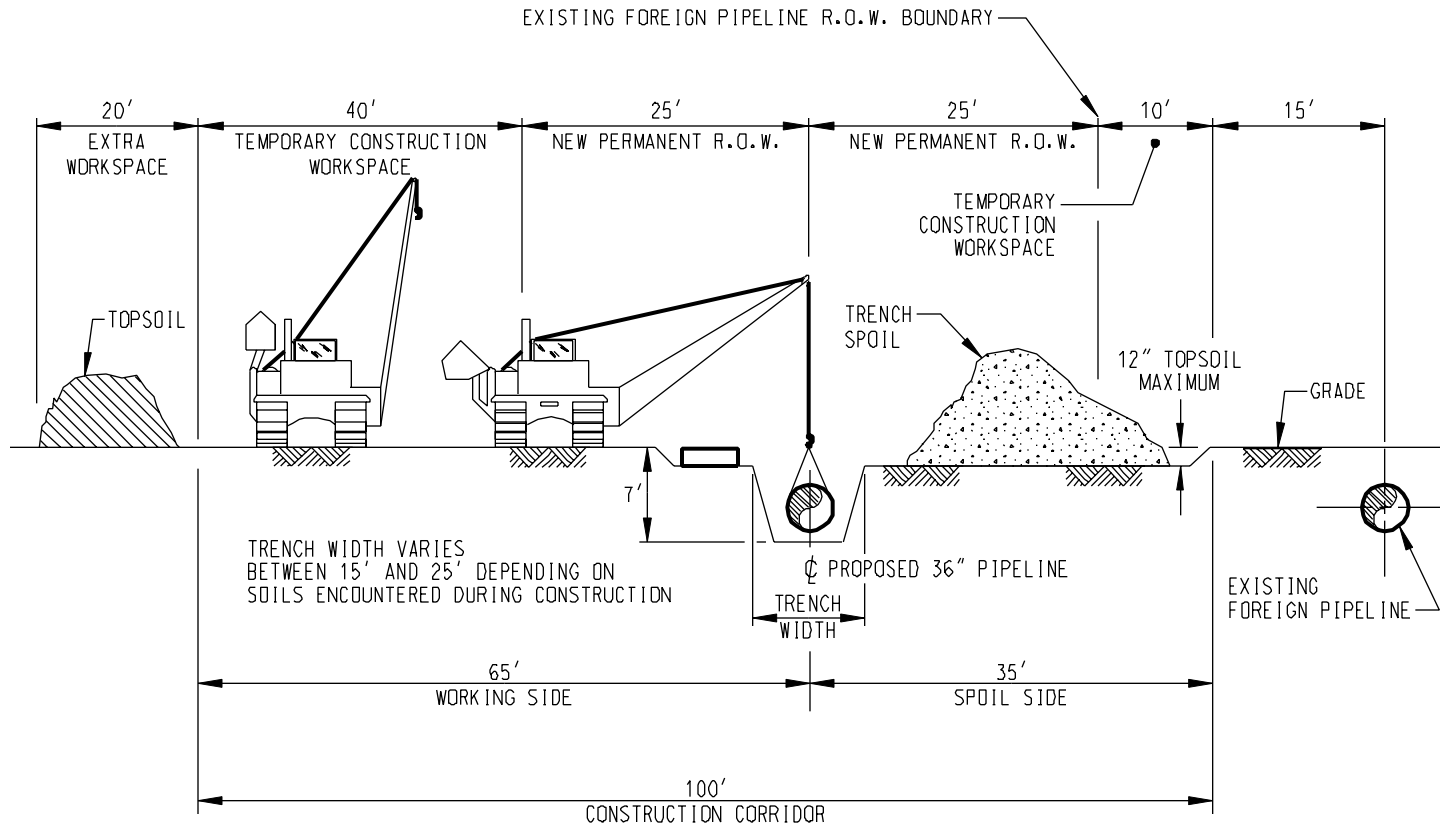
DRAWING NO.

**TYPICAL UPLAND CROSS SECTION
WITHOUT TOPSOIL SEGREGATION
CONSTRUCTION METHOD 29**

A5015-00-051307-9116

REV

A



PROFILE

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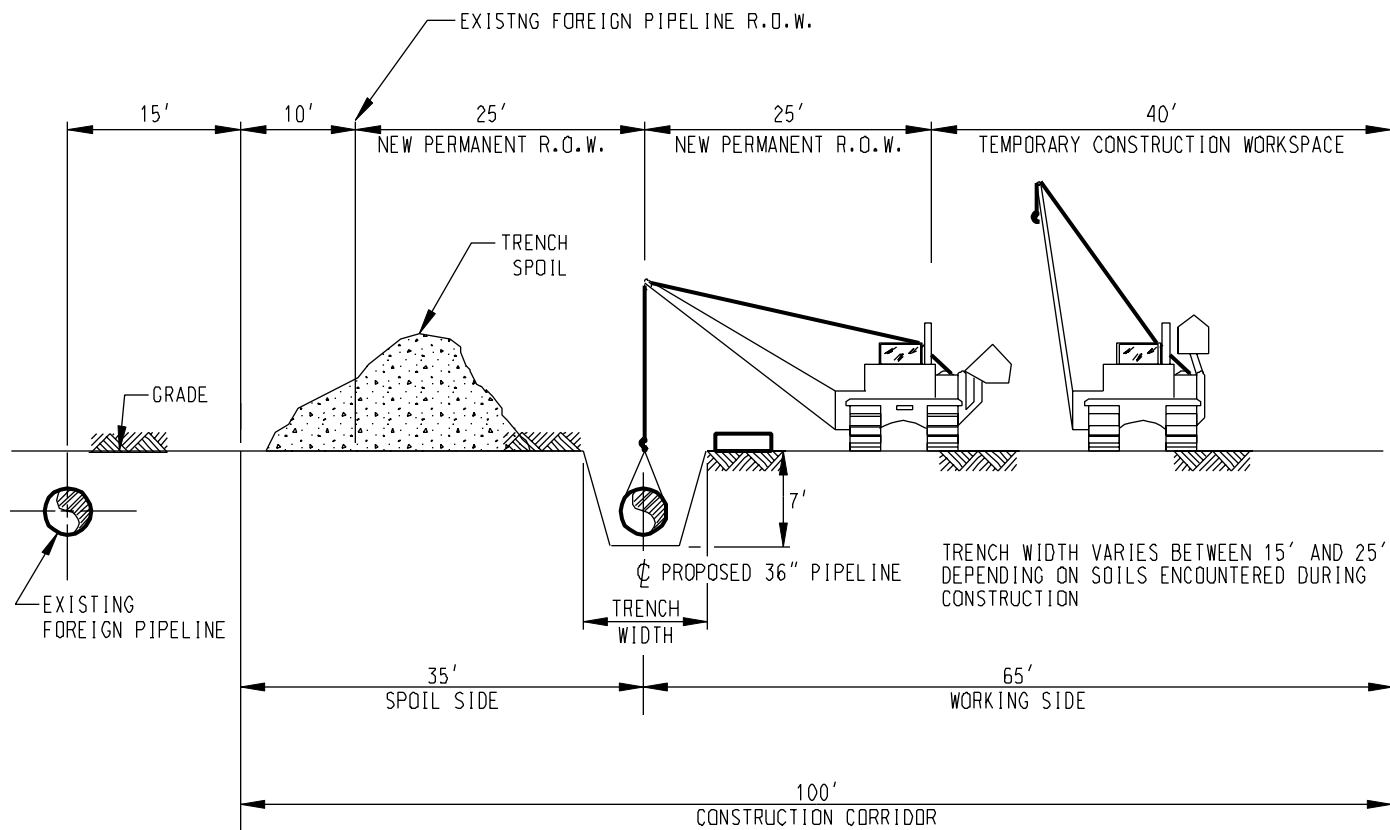
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						JOB NO.: A-5015	
						CLIENT/	
						CLIENT JOB NO.	
						DOCUMENT NO.	
A	ISSUED FOR INFORMATION ONLY	09/19/2005	CMR	JW	FMS		
NO.	REVISION	DATE	DRAWN	CHKD	APPD		

TYPICAL UPLAND CROSS-SECTION WITH PIPELINE ADJACENT TO FOREIGN PIPELINE WITH DITCH PLUS SPOIL SIDE TOPSOIL SEGREGATION

DRAWING NO.

A5015-00-051307-9200

REV A

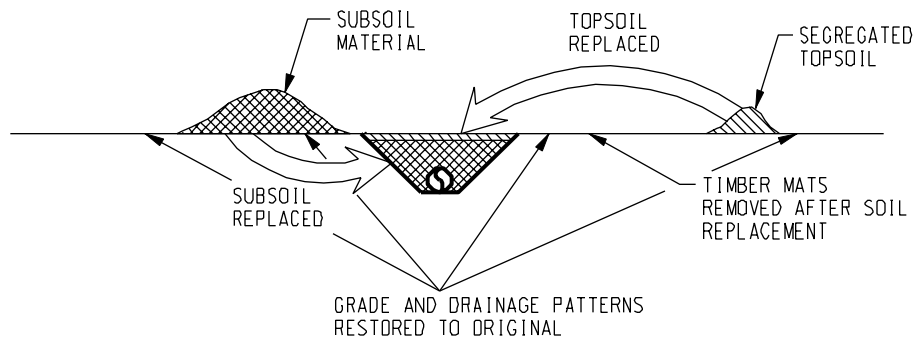


PROFILE

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						CHECKED: DATE:		
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						APPROVED: DATE:		
						REVIEW: DATE:		
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CROSS SECTION

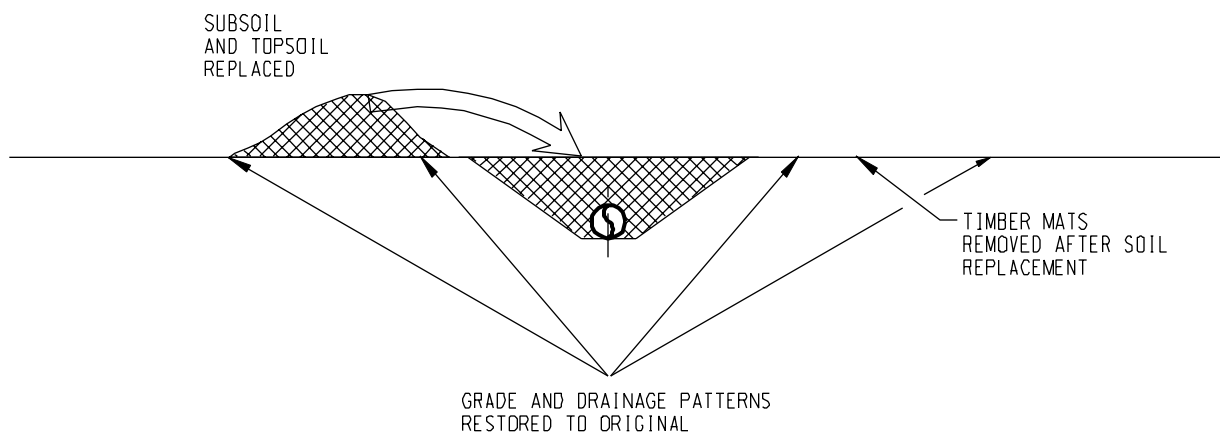


WETLAND RESTORATION

PUBLIC[illegible]



CROSS SECTION



WETLAND RESTORATION

PUBLIC

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						ENGINEER:	DATE:
						APPROVED:	DATE:
						REVIEW:	DATE:
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						JOB NO.: A-5015	
						CLIENT/	
A	ISSUED FOR INFORMATION ONLY	09/19/2008	CHR	JW	DR	CLIENT JOB NO.	
NQ	BY DATE DRAWN CHECK APPROV					DOCUMENT NO.	

**SATURATED WETLAND
WITHOUT TOPSOIL SEGREGATION
SINGLE PIPELINE CROSSING
CONSTRUCTION METHOD 34**

A5015-00-051307-9049

REV	A
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APPENDIX E

SOIL MAP UNITS CROSSED BY MILEPOST

APPENDIX E

SOIL MAP UNITS BY MILEPOST SEGMENT ALONG THE PROPOSED PIPELINE ROUTE

Beginning MP	Ending MP	Crossing Length (miles)	Map Unit Symbol	Map Unit Name
Clatsop County				
0	0.03	0.03	69	Udipsamments, 0 to 15 percent slopes
0.03	0.06	0.03	22F	Harslow-Kilchis very gravelly loam, 60 to 90 percent slopes
0.06	0.43	0.37	7D	Braun-Scaponia silt loam, 3 to 30 percent slopes
0.43	0.56	0.13	57E	Scaponia-Braun silt loam, 30 to 60 percent slopes
0.56	0.89	0.33	7D	Braun-Scaponia silt loam, 3 to 30 percent slopes
0.89	1.21	0.32	22F	Harslow-Kilchis very gravelly loam, 60 to 90 percent slopes
1.21	1.55	0.34	1E	Alstony gravelly loam, 30 to 60 percent slopes
1.55	3.39	1.84	1D	Alstony gravelly loam, 3 to 30 percent slopes
3.39	3.52	0.13	39A	Locoda silt loam, 0 to 3 percent slopes
3.52	3.62	0.10	1D	Alstony gravelly loam, 3 to 30 percent slopes
3.62	4.06	0.44	69	Udipsamments, 0 to 15 percent slopes
4.06	4.19	0.13	39A	Locoda silt loam, 0 to 3 percent slopes
4.19	4.21	0.02	W	Water
4.21	4.3	0.09	39A	Locoda silt loam, 0 to 3 percent slopes
4.3	4.39	0.09	69	Udipsamments, 0 to 15 percent slopes
4.39	4.42	0.03	39A	Locoda silt loam, 0 to 3 percent slopes
4.42	4.47	0.05	69	Udipsamments, 0 to 15 percent slopes
4.47	4.86	0.39	39A	Locoda silt loam, 0 to 3 percent slopes
4.86	4.87	0.01	69	Udipsamments, 0 to 15 percent slopes
4.87	5.19	0.32	39A	Locoda silt loam, 0 to 3 percent slopes
5.19	5.3	0.11	W	Water
5.3	5.96	0.66	39A	Locoda silt loam, 0 to 3 percent slopes
5.96	6.17	0.21	40A	Locoda silt loam, protected, 0 to 3 percent slopes
Columbia County				
6.17	8.48	2.31	29	Locoda silt loam, protected, 0 to 3 percent slopes
8.48	8.53	0.05	66	Wauna silt loam, protected
8.53	10.02	1.49	29	Locoda silt loam, protected, 0 to 3 percent slopes
10.02	10.06	0.04	W	Water
10.06	10.42	0.36	29	Locoda silt loam, protected, 0 to 3 percent slopes
10.42	10.69	0.27	66	Wauna silt loam, protected
10.69	10.9	0.21	68	Wauna-Locoda silt loam, protected
10.9	11.98	1.08	15	Crims silt loam, protected
11.98	12.24	0.26	68	Wauna-Locoda silt loam, protected

APPENDIX E (cont'd)

SOIL MAP UNITS BY MILEPOST SEGMENT ALONG THE PROPOSED PIPELINE ROUTE

Beginning MP	Ending MP	Crossing Length (miles)	Map Unit Symbol	Map Unit Name
12.24	12.27	0.03	15	Crims silt loam, protected
12.27	12.38	0.11	68	Wauna-Locoda silt loam, protected
12.38	12.39	0.01	15	Crims silt loam, protected
12.39	12.53	0.14	68	Wauna-Locoda silt loam, protected
12.53	12.57	0.04	15	Crims silt loam, protected
12.57	13.08	0.51	68	Wauna-Locoda silt loam, protected
13.08	13.18	0.10	66	Wauna silt loam, protected
13.18	13.24	0.06	67	Wauna-Locoda silt loam
13.24	13.33	0.09	W	Water
13.33	13.38	0.05	66	Wauna silt loam, protected
13.38	13.46	0.08	29	Locoda silt loam, protected, 0 to 3 percent slopes
13.46	13.92	0.46	68	Wauna-Locoda silt loam, protected
13.92	14.01	0.09	15	Crims silt loam, protected
14.01	14.1	0.09	68	Wauna-Locoda silt loam, protected
14.1	14.15	0.05	29	Locoda silt loam, protected, 0 to 3 percent slopes
14.15	14.36	0.21	68	Wauna-Locoda silt loam, protected
14.36	14.56	0.20	66	Wauna silt loam, protected
14.56	14.93	0.37	15	Crims silt loam, protected
14.93	15.19	0.26	66	Wauna silt loam, protected
15.19	15.24	0.05	29	Locoda silt loam, protected, 0 to 3 percent slopes
15.24	15.28	0.04	66	Wauna silt loam, protected
15.28	15.34	0.06	29	Locoda silt loam, protected, 0 to 3 percent slopes
15.34	15.66	0.32	66	Wauna silt loam, protected
15.66	15.7	0.04	68	Wauna-Locoda silt loam, protected
15.7	16.02	0.32	66	Wauna silt loam, protected
16.02	16.83	0.81	68	Wauna-Locoda silt loam, protected
16.83	17.01	0.18	66	Wauna silt loam, protected
17.01	17.43	0.42	68	Wauna-Locoda silt loam, protected
17.43	17.87	0.44	66	Wauna silt loam, protected
17.87	18.15	0.28	29	Locoda silt loam, protected, 0 to 3 percent slopes
18.15	18.25	0.10	66	Wauna silt loam, protected
18.25	18.8	0.55	61	Udipsamments, nearly level, protected
18.8	18.92	0.12	61	Udipsamments, nearly level, protected
18.92	19.04	0.12	60	Udipsamments, nearly level
19.04	19.38	0.34	W	Water

APPENDIX E (cont'd)

SOIL MAP UNITS BY MILEPOST SEGMENT ALONG THE PROPOSED PIPELINE ROUTE

Beginning MP	Ending MP	Crossing Length (miles)	Map Unit Symbol	Map Unit Name
Cowlitz County				
19.38	19.61	0.23	263	Water
19.61	19.73	0.12	109	Lithic Haplumbrepts, 50 to 100 percent slopes
19.73	19.96	0.23	146	Olympic silt loam, 2 to 8 percent slopes
19.96	20.13	0.17	148	Olympic silt loam, 20 to 30 percent slopes
20.13	20.16	0.03	147	Olympic silt loam, 8 to 20 percent slopes
20.16	20.27	0.11	148	Olympic silt loam, 20 to 30 percent slopes
20.27	20.37	0.10	147	Olympic silt loam, 8 to 20 percent slopes
20.37	20.47	0.10	148	Olympic silt loam, 20 to 30 percent slopes
20.47	20.71	0.24	78	Hazeldell gravelly silt loam, 30 to 65 percent slopes
20.71	20.77	0.06	147	Olympic silt loam, 8 to 20 percent slopes
20.77	20.79	0.02	146	Olympic silt loam, 2 to 8 percent slopes
20.79	20.83	0.04	147	Olympic silt loam, 8 to 20 percent slopes
20.83	20.95	0.12	148	Olympic silt loam, 20 to 30 percent slopes
20.95	20.97	0.02	147	Olympic silt loam, 8 to 20 percent slopes
20.97	21.05	0.08	148	Olympic silt loam, 20 to 30 percent slopes
21.05	21.11	0.06	78	Hazeldell gravelly silt loam, 30 to 65 percent slopes
21.11	21.14	0.03	149	Olympic silt loam, 30 to 65 percent slopes
21.14	21.17	0.03	148	Olympic silt loam, 20 to 30 percent slopes
21.17	21.29	0.12	56	Germany silt loam, 20 to 30 percent slopes
21.29	21.56	0.27	55	Germany silt loam, 8 to 20 percent slopes
21.56	21.57	0.01	56	Germany silt loam, 20 to 30 percent slopes
21.57	21.62	0.05	55	Germany silt loam, 8 to 20 percent slopes
21.62	21.67	0.05	56	Germany silt loam, 20 to 30 percent slopes
21.67	21.78	0.11	55	Germany silt loam, 8 to 20 percent slopes
21.78	22.06	0.28	56	Germany silt loam, 20 to 30 percent slopes
22.06	22.15	0.09	57	Germany silt loam, 30 to 65 percent slopes
22.15	22.26	0.11	148	Olympic silt loam, 20 to 30 percent slopes
22.26	22.32	0.06	149	Olympic silt loam, 30 to 65 percent slopes
22.32	22.37	0.05	148	Olympic silt loam, 20 to 30 percent slopes
22.37	22.53	0.16	47	Edgewick silt loam, 0 to 3 percent slopes
22.53	22.71	0.18	148	Olympic silt loam, 20 to 30 percent slopes
22.71	22.87	0.16	146	Olympic silt loam, 2 to 8 percent slopes
22.87	22.92	0.05	147	Olympic silt loam, 8 to 20 percent slopes
22.92	22.96	0.04	148	Olympic silt loam, 20 to 30 percent slopes
22.96	23.05	0.09	149	Olympic silt loam, 30 to 65 percent slopes

APPENDIX E (cont'd)

SOIL MAP UNITS BY MILEPOST SEGMENT ALONG THE PROPOSED PIPELINE ROUTE

Beginning MP	Ending MP	Crossing Length (miles)	Map Unit Symbol	Map Unit Name
23.05	23.11	0.06	54	Germany silt loam, 0 to 8 percent slopes
23.11	23.14	0.03	55	Germany silt loam, 8 to 20 percent slopes
23.14	23.15	0.01	56	Germany silt loam, 20 to 30 percent slopes
23.15	23.25	0.10	54	Germany silt loam, 0 to 8 percent slopes
23.25	23.35	0.10	56	Germany silt loam, 20 to 30 percent slopes
23.35	23.48	0.13	55	Germany silt loam, 8 to 20 percent slopes
23.48	23.7	0.22	56	Germany silt loam, 20 to 30 percent slopes
23.7	23.93	0.23	55	Germany silt loam, 8 to 20 percent slopes
23.93	24.26	0.33	54	Germany silt loam, 0 to 8 percent slopes
24.26	24.4	0.14	55	Germany silt loam, 8 to 20 percent slopes
24.4	24.5	0.10	56	Germany silt loam, 20 to 30 percent slopes
24.5	24.59	0.09	55	Germany silt loam, 8 to 20 percent slopes
24.59	24.67	0.08	56	Germany silt loam, 20 to 30 percent slopes
24.67	24.77	0.10	47	Edgewick silt loam, 0 to 3 percent slopes
24.77	25.04	0.27	56	Germany silt loam, 20 to 30 percent slopes
25.04	25.14	0.10	57	Germany silt loam, 30 to 65 percent slopes
25.14	25.33	0.19	56	Germany silt loam, 20 to 30 percent slopes
25.33	25.43	0.10	54	Germany silt loam, 0 to 8 percent slopes
25.43	25.56	0.13	56	Germany silt loam, 20 to 30 percent slopes
25.56	25.78	0.22	54	Germany silt loam, 0 to 8 percent slopes
25.78	26.13	0.35	56	Germany silt loam, 20 to 30 percent slopes
26.13	26.21	0.08	54	Germany silt loam, 0 to 8 percent slopes
26.21	26.28	0.07	56	Germany silt loam, 20 to 30 percent slopes
26.28	26.34	0.06	54	Germany silt loam, 0 to 8 percent slopes
26.34	26.59	0.25	55	Germany silt loam, 8 to 20 percent slopes
26.59	26.63	0.04	56	Germany silt loam, 20 to 30 percent slopes
26.63	26.93	0.30	55	Germany silt loam, 8 to 20 percent slopes
26.93	26.94	0.01	54	Germany silt loam, 0 to 8 percent slopes
26.94	27.7	0.76	148	Olympic silt loam, 20 to 30 percent slopes
27.7	27.73	0.03	147	Olympic silt loam, 8 to 20 percent slopes
27.73	27.88	0.15	142	Olequa silt loam, 0 to 8 percent slopes
27.88	27.92	0.04	147	Olympic silt loam, 8 to 20 percent slopes
27.92	27.95	0.03	32	Clato silt loam, 0 to 3 percent slopes
27.95	28.08	0.13	23	Centralia silt loam, 20 to 30 percent slopes
28.08	28.14	0.06	13	Buckpeak silt loam, 65 to 90 percent slopes
28.14	28.2	0.06	22	Centralia silt loam, 8 to 20 percent slopes

APPENDIX E (cont'd)

SOIL MAP UNITS BY MILEPOST SEGMENT ALONG THE PROPOSED PIPELINE ROUTE

Beginning MP	Ending MP	Crossing Length (miles)	Map Unit Symbol	Map Unit Name
28.2	28.24	0.04	23	Centralia silt loam, 20 to 30 percent slopes
28.24	28.44	0.20	22	Centralia silt loam, 8 to 20 percent slopes
28.44	28.76	0.32	23	Centralia silt loam, 20 to 30 percent slopes
28.76	28.89	0.13	22	Centralia silt loam, 8 to 20 percent slopes
28.89	29.23	0.34	23	Centralia silt loam, 20 to 30 percent slopes
29.23	29.29	0.06	22	Centralia silt loam, 8 to 20 percent slopes
29.29	29.33	0.04	23	Centralia silt loam, 20 to 30 percent slopes
29.33	29.58	0.25	22	Centralia silt loam, 8 to 20 percent slopes
29.58	30.58	1.00	23	Centralia silt loam, 20 to 30 percent slopes
30.58	30.66	0.08	22	Centralia silt loam, 8 to 20 percent slopes
30.66	31.21	0.55	23	Centralia silt loam, 20 to 30 percent slopes
31.21	31.46	0.25	147	Olympic silt loam, 8 to 20 percent slopes
31.46	31.72	0.26	23	Centralia silt loam, 20 to 30 percent slopes
31.72	31.87	0.15	147	Olympic silt loam, 8 to 20 percent slopes
31.87	32.02	0.15	146	Olympic silt loam, 2 to 8 percent slopes
32.02	32.15	0.13	23	Centralia silt loam, 20 to 30 percent slopes
32.15	32.2	0.05	147	Olympic silt loam, 8 to 20 percent slopes
32.2	32.67	0.47	23	Centralia silt loam, 20 to 30 percent slopes
32.67	32.82	0.15	12	Buckpeak silt loam, 30 to 65 percent slopes
32.82	33.19	0.37	23	Centralia silt loam, 20 to 30 percent slopes
33.19	33.84	0.65	148	Olympic silt loam, 20 to 30 percent slopes
33.84	33.92	0.08	100	Kelso silt loam, 0 to 8 percent slopes
33.92	34.12	0.20	102	Kelso silt loam, 15 to 30 percent slopes
34.12	34.25	0.13	32	Clato silt loam, 0 to 3 percent slopes
34.25	34.27	0.02	172	Riverwash
34.27	34.35	0.08	263	Water
34.35	34.43	0.08	36	Cowlitz extremely gravelly sand, disturbed, 0 to 5 percent slopes
34.43	34.61	0.18	141	Newberg fine sandy loam, 0 to 3 percent slopes
34.61	34.81	0.20	32	Clato silt loam, 0 to 3 percent slopes
34.81	34.87	0.06	19	Carrolls loamy sand, 0 to 2 percent slopes
34.87	34.95	0.08	32	Clato silt loam, 0 to 3 percent slopes
34.95	34.97	0.02	19	Carrolls loamy sand, 0 to 2 percent slopes
34.97	34.98	0.01	32	Clato silt loam, 0 to 3 percent slopes
34.98	35.09	0.11	101	Kelso silt loam, 8 to 15 percent slopes
35.09	35.18	0.09	100	Kelso silt loam, 0 to 8 percent slopes
35.18	35.29	0.11	102	Kelso silt loam, 15 to 30 percent slopes

APPENDIX E (cont'd)

SOIL MAP UNITS BY MILEPOST SEGMENT ALONG THE PROPOSED PIPELINE ROUTE

Beginning MP	Ending MP	Crossing Length (miles)	Map Unit Symbol	Map Unit Name
35.29	35.36	0.07	100	Kelso silt loam, 0 to 8 percent slopes
35.36	35.38	0.02	102	Kelso silt loam, 15 to 30 percent slopes
35.38	35.41	0.03	100	Kelso silt loam, 0 to 8 percent slopes
35.41	35.42	0.01	102	Kelso silt loam, 15 to 30 percent slopes
35.42	35.47	0.05	186	Sauvola loam, 8 to 15 percent slopes
35.47	35.57	0.10	181	Sara silt loam, 15 to 40 percent slopes
35.57	35.8	0.23	93	Kalama gravelly loam, 8 to 15 percent slopes
35.8	36.08	0.28	181	Sara silt loam, 15 to 40 percent slopes
36.08	36.17	0.09	78	Hazeldell gravelly silt loam, 30 to 65 percent slopes
36.17	36.28	0.11	16	Camas cobbly loam, 0 to 3 percent slopes
36.28	36.29	0.01	174	Rose valley silt loam, 0 to 8 percent slopes

APPENDIX F

RIGHT-OF-WAY WIDTHS BY MILEPOST ALONG THE PROPOSED BRADWOOD LANDING PIPELINE ROUTE

APPENDIX F

RIGHT-OF-WAY WIDTHS BY MILEPOST ALONG THE PROPOSED BRADWOOD LANDING PIPELINE ROUTE

Begin Milepost	End Milepost	Length (miles)	Construction Method	Right-of-Way Width (feet)
0.0	1.4	1.4	Horizontal Directional Drill (HDD)	100
1.4	3.3	2.0	Trenching	100
3.3	3.7	0.4	HDD	100
3.7	3.8	0.1	Trenching	100
3.8	3.8	<0.1	Trenching through Wetlands	100
3.8	3.8	<0.1	Trenching	100
3.8	3.9	0.1	Trenching through Wetlands	100
3.9	4.0	0.2	Trenching	100
4.0	4.4	0.3	HDD	100
4.4	4.5	0.1	Trenching	100
4.5	4.6	0.1	Trenching through Wetlands	100
4.6	4.9	0.3	Trenching	100
4.9	5.4	0.6	HDD	100
5.4	6.0	0.5	Trenching	100
6.0	6.0	<0.1	Trenching through Wetlands	100
6.0	6.0	<0.1	Trenching	100
6.0	7.0	0.9	Trenching through Wetlands	100
7.0	7.9	1.0	Trenching/Topsoil	120
7.9	8.0	0.1	Trenching through Wetlands	100
8.0	8.2	0.1	Trenching	100
8.2	8.2	<0.1	Trenching through Wetlands	85
8.2	8.4	0.2	Trenching	100
8.4	8.4	<0.1	Trenching through Wetlands	100
8.4	8.4	<0.1	Trenching/Topsoil	120
8.4	8.6	0.2	HDD	100
8.6	8.7	<0.1	Trenching through Wetlands	100
8.7	8.7	<0.1	Trenching/Topsoil	120
8.7	8.8	0.1	Trenching through Wetlands	100
8.8	8.8	0.1	Trenching/Topsoil	120
8.8	8.9	0.1	Trenching through Wetlands	100
8.9	8.9	<0.1	Trenching/Topsoil	120
8.9	8.9	<0.1	Trenching through Wetlands	100
8.9	9.0	<0.1	Trenching/Topsoil	120
9.0	9.0	<0.1	Trenching through Wetlands	100
9.0	9.0	<0.1	Trenching/Topsoil	120
9.0	9.0	<0.1	Trenching through Wetlands	85
9.0	9.1	0.1	Trenching/Topsoil	120
9.1	9.1	<0.1	Trenching through Wetlands	85
9.1	9.1	<0.1	Trenching/Topsoil	120
9.1	9.1	<0.1	Trenching through Wetlands	85
9.1	9.1	<0.1	Trenching/Topsoil	120
9.1	9.2	<0.1	Trenching through Wetlands	85
9.2	9.2	<0.1	Trenching/Topsoil	120
9.2	9.2	<0.1	Trenching through Wetlands	100
9.2	9.2	<0.1	Trenching/Topsoil	120
9.2	9.2	<0.1	Trenching through Wetlands	85
9.2	9.2	<0.1	Trenching/Topsoil	120

APPENDIX F (cont'd)

**RIGHT-OF-WAY WIDTHS BY MILEPOST ALONG THE PROPOSED BRADWOOD
LANDING PIPELINE ROUTE**

Begin Milepost	End Milepost	Length (miles)	Construction Method	Right-of-Way Width (feet)
9.2	9.2	<0.1	Trenching through Wetlands	100
9.2	9.4	0.2	Trenching/Topsoil	120
9.4	9.5	<0.1	Trenching through Wetlands	85
9.5	9.5	<0.1	Trenching/Topsoil	120
9.5	9.5	0.1	Trenching through Wetlands	100
9.5	9.7	0.2	Trenching/Topsoil	120
9.7	9.7	<0.1	Trenching through Wetlands	85
9.7	9.7	<0.1	Trenching/Topsoil	120
9.7	9.7	<0.1	Trenching through Wetlands	85
9.7	9.8	0.1	Trenching/Topsoil	120
9.8	9.8	<0.1	Trenching through Wetlands	85
9.8	9.8	<0.1	Trenching/Topsoil	120
9.8	9.8	<0.1	Trenching through Wetlands	120
9.8	9.8	0.1	Trenching/Topsoil	120
9.8	9.9	<0.1	Trenching through Wetlands	85
9.9	9.9	<0.1	Trenching through Wetlands	100
9.9	9.9	<0.1	Trenching/Topsoil	120
9.9	10.0	0.1	Trenching through Wetlands	100
10.0	10.1	0.2	HDD	100
10.1	10.5	0.3	Trenching/Topsoil	120
10.5	10.5	<0.1	Trenching through Wetlands	100
10.5	10.8	0.3	Trenching/Topsoil	120
10.8	10.8	0.1	Trenching through Wetlands	100
10.8	11.0	0.2	Trenching/Topsoil	120
11.0	12.6	1.6	Trenching	100
12.6	12.7	0.2	Trenching/Topsoil	120
12.7	12.7	<0.1	Trenching through Wetlands	85
12.7	12.8	<0.1	Trenching/Topsoil	120
12.8	12.8	<0.1	Trenching through Wetlands	100
12.8	12.8	0.1	Trenching/Topsoil	120
12.8	12.8	<0.1	Trenching through Wetlands	100
12.8	12.9	<0.1	Trenching/Topsoil	120
12.9	13.0	0.1	Trenching through Wetlands	100
13.0	13.1	0.1	Trenching/Topsoil	120
13.1	13.2	0.1	Trenching through Wetlands	100
13.2	13.4	0.3	HDD	100
13.4	13.5	0.1	Trenching	100
13.5	13.5	<0.1	Trenching through Wetlands	85
13.5	18.1	4.6	Trenching	100
18.1	18.1	<0.1	Trenching through Wetlands	85
18.1	18.2	<0.1	Trenching	100
18.2	18.2	<0.1	Trenching through Wetlands	85
18.2	18.2	<0.1	Trenching through Wetlands	100
18.2	18.2	<0.1	Trenching through Wetlands	85
18.2	18.3	0.1	Trenching through Wetlands	100
18.3	18.4	0.1	Trenching	100

APPENDIX F (cont'd)

**RIGHT-OF-WAY WIDTHS BY MILEPOST ALONG THE PROPOSED BRADWOOD
LANDING PIPELINE ROUTE**

Begin Milepost	End Milepost	Length (miles)	Construction Method	Right-of-Way Width (feet)
18.4	18.6	0.3	Trenching through Wetlands	100
18.6	18.6	<0.1	Trenching	100
18.6	18.8	0.2	Trenching through Wetlands	100
18.8	18.8	0.1	Slick Bore	100
18.8	19.0	0.1	Trenching	100
19.0	19.8	0.8	HDD	100
19.8	20.3	0.5	Trenching	100
20.3	20.8	0.5	HDD	100
20.8	21.2	0.4	HDD	100
21.2	22.3	1.1	Trenching	100
22.3	22.4	0.1	HDD	100
22.4	22.5	0.1	Trenching/Topsoil	120
22.5	22.8	0.2	Trenching	100
22.8	22.9	0.1	Trenching/Topsoil	120
22.9	23.0	0.2	Trenching	100
23.0	23.1	0.1	Trenching/Topsoil	120
23.1	27.7	4.6	Trenching	100
27.7	28.0	0.3	Trenching/Topsoil	120
28.0	31.8	3.8	Trenching	100
31.8	32.2	0.4	Trenching/Topsoil	120
32.2	34.2	2.0	Trenching	100
34.2	34.6	0.4	HDD	100
34.6	34.9	0.2	Trenching/Topsoil	120
34.9	35.3	0.5	HDD	100
35.3	36.3	0.9	Trenching	100

APPENDIX G

U.S. Coast Guard Letter of Intent and Waterway
Suitability Report Letter for the Bradwood Landing
Project

NORTHERN STAR NATURAL GAS LLC

Captain Paul D. Jewell, Commanding Officer
US Coast Guard Marine Safety Office Portland
6767 North Basin Avenue
Portland, OR 97217

January 18, 2005

Dear Captain Jewell,

As required under US Title 33 Code of Federal Regulations § 127.007 (a), Northern Star Natural Gas LLC ("NSNG") herein submits a Letter of Intent to build a new Waterfront Facility Handling Liquefied Natural Gas Facility within the Portland, Oregon US Coast Guard Captain of the Port Zone. NSNG recognizes that submission of this Letter of Intent significantly predates the planned construction and start-up milestones discussed below and I feel that this early involvement of your office merits brief discussion.

The Federal Energy Regulatory Commission ("FERC") has issued Guidance¹ which provides a mechanism for National Environmental Policy Act ("NEPA") pre-filing activities. This Guidance, which provides an option for NEPA pre-filing on interstate natural gas projects, "...encourage(s) ... industry to engage in early project-development involvement with the public and agencies." NSNG will soon initiate the Pre-Filing Process encouraged under FERC Guidance and, in the spirit of that Guidance, is submitting for your consideration this Letter of Intent well ahead of the minimum timelines set forth in Subpart A of Part 127 of Title 33 CFR. In keeping with the intent of the Guidance, it is hoped that this approach serves in support of the:

- 1) initiation of an early review of the environmental documentation required under NEPA; and,
- 2) start of a stakeholder outreach program so as to promote and facilitate the early identification and resolution of issues.

It is our hope that the NEPA Pre-Filing will support the Project's receiving an expeditious review and approval, allowing for the meeting of the proposed construction schedule and targeted in-service date. We are mindful of the critical role that the Captain of the Port holds in the development of a project of this nature and look forward to working closely together with your staff as the Project matures.

Overview

NSNG proposes to construct a Liquid Natural Gas (LNG) Receiving Terminal ("Terminal") to be located in Bradwood, Oregon. The Terminal will be located on roughly 55 acres within an approximate 450 acre parcel of land, controlled by NSNG, which lies on the southern shore of the Columbia River approximately 38 miles from the

¹ Guidance: FERC Staff NEPA Pre-Filing Process For Natural Gas Projects, February 10, 2004; *Federal Energy Regulatory Commission* - (see http://www.ferc.gov/industries/gas/enviro/gas_pre-filing.pdf)

NORTHERN STAR NATURAL GAS, LLC
Bradwood, Oregon Letter of Intent

January 18, 2005

Pacific shoreline. The Terminal is planned to be built in a phased construction schedule, with 1.0 billion standard cubic feet per day (BCFD) sendout capacity in the first phase, and a provision for expansion to satisfy follow-on attendant market demand thereafter. The Terminal shall consist of the following major components:

- *Marine terminal and LNG transfer lines* – Proposed infrastructure shall include a single berth to receive LNG Tank Vessels ranging from 100,000 cubic meters (“m³”) up to 250,000 m³ (~629,000 bbls to ~1,570,000 bbls) in capacity with an unloading rate of 12,000 m³/hr (~75,700 bbls/hr). The LNG will be transferred from the Tank Vessels through three 16-inch diameter liquid unloading arms at the berth and transferred to storage tanks through dual 30-inch diameter liquid unloading lines. It is envisioned that some moderate dredging will be required to access the berth and dredge the turning basin.
- *Two LNG storage tanks* – The Proposal provides for the initial construction of two full-containment LNG storage tanks, each having a net capacity of 165,000 m³ (~1,038,000 bbls). Permitting for a third LNG storage tank will be sought with the initial application, with plans for its actual construction in the future.
- *LNG vaporization and send out system* – Proposed process equipment shall include a vaporization system. This vaporization system that may be either Shell and Tube Vaporizers equipped with water/glycol heaters or, alternately, Submerged Combustion Vaporizers fitted with In-Tank Low Pressure LNG pumps that feed High Pressure LNG booster pumps.
- *Vapor Handling System* – Proposed vapor handling equipment includes two 50% capacity cryogenic blowers to remove a portion of the vapor generated in the storage tanks during ship unloading, and two 50% capacity oil-free reciprocating compressors to discharge the balance of the vapors generated in the tank.
- *Utilities and infrastructure* – Proposed facilities infrastructure shall include, but not be limited to, roads, fences, dikes, buildings, pipe racks, utilities, power distribution system, and a fire protection system.
- *Natural Gas Sendout Pipeline* – A new 36-inch-diameter natural gas pipeline of approximately 35 miles in length will be constructed to interconnect to the Williams Northwest Pipeline system.

In addition, it is of note that associated non-jurisdictional facilities may include upgrades to short sections of public road or extensions of utilities to the site.

Title 33, Part 127, Subpart A Particulars

In addition to the physical location and description of the proposed facility discussed above, the following additional information required by 33 CFR § 127.007 (d)(1) – (d)(6) is provided.

NORTHERN STAR NATURAL GAS, LLC
Bradwood, Oregon Letter of Intent

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I. General Information

The Owner and Operator of the NSNG LNG Facility is:

Mr. William "Si" Garrett
President
Northern Star Natural Gas LLC
5501 Tilbury Drive
Houston, TX 77056-2017

Mr. Garrett may be contacted at phone number 713-817-2416

The telephone number and proper physical address of the NSNG Facility will be provided at a later date and as soon as this information becomes available.

II. Liquefied Natural Gas Carrier Information

It is envisioned that NSNG will receive approximately 125 LNG Tank Vessels per year. A listing of potential LNG Tank Vessels, selected characteristics, and general trading routes is provided in Enclosure 1 to this Letter.

III. Environmental Information

This section focuses on environmentally sensitive areas from Mile 38 seaward to Mile 18. In particular, these areas include:

- *Clatsop County Net Pen Fisheries Project located at two sites, the first in Cathlamet Bay in the approximate area of Mile 19 – Mile 18, and the second in the approximate area of Mile 27 near Blind Slough. Both sites are associated with the release of Coho smolts;*
- *Lewis & Clark National Wildlife Refuge (NWR), which includes twenty-three named and charted islands adjacent to Cathlamet Bay, Calendar Slough, Brownsmead Flats, Blind Slough, and Clifton Channel, in the area of Mile 38 – Mile 20;*
- *Big Creek Fish Hatchery, in the approximate area of Mile 26, associated with the release Coho smolts;*
- *Gnat Creek Hatchery, in the approximate area of Mile 27, associated with the release of Spring Chinook and Winter Steelhead smolts;*
- *Corps Channel Improvement Project includes mitigation for dredging, Lois Island Embayment (Mile 20-Mile 18), Miller - Pillar Islands (Mile 26- Mile 25) and Tenasillahe Island (Mile 37- Mile 36) and are designated areas for restoration projects; and,*
- *The Nicholai – Wickiup Watershed, as depicted in Figure 1, which has three business entities with National Pollution Discharge Elimination System Permits (NPDES) and eight with Water Pollution Control Facility Permits (WPCF). These activities are mentioned herein because their activities have impacts to water quality and temperature affecting salmonids in the area of Mile 38 – Mile 20.*

NORTHERN STAR NATURAL GAS, LLC
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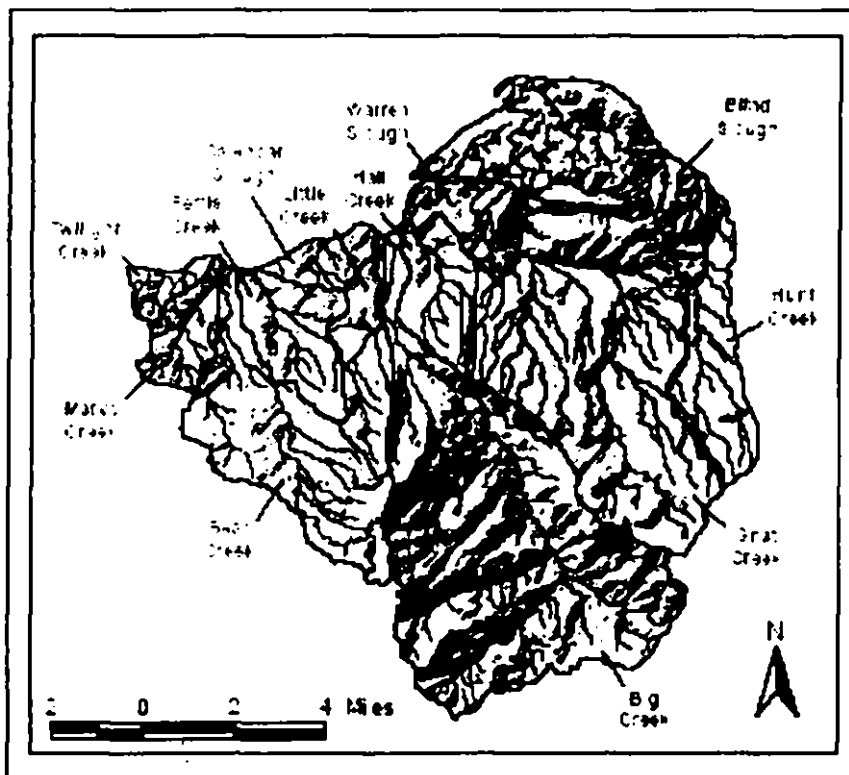


Figure 1 Nicolai-Wickiup Watershed

IV. Residential Information

This section discusses residential areas from Mile 38 seaward to Mile 18. The area immediately surrounding the proposed site is shown in the aerial photograph presented in Figure 2. In particular, the residential areas in consideration include:

- *a very small pocket of residential zoned land at the end of the Bradwood Clifton road, at the approximate area of Mile 37 – Mile 36;*
- *a small number (approximately ten) of residential addresses in the area of Ostervold Road on Puget Island, at the approximate area of Mile 37 – Mile 36; and,*
- *Burnside, primarily a pocket of residential zoned land high on a bluff, at the approximate area of Mile 23 – Mile 22.*

With respect to Clatsop County on the “Oregon Side”, given the range of zoning that applies to cities, unincorporated rural communities, rural communities, residential zoned land, and residential uses that occur on resource land, e.g. farm and forest lands, these two areas were regarded as “residential” within the areas seaward of Mile 30.

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Figure 2 Aerial Photograph of Immediate Area (top is North)

In Pacific and Wahkiakum Counties on the “Washington side”, the zoning regulations are very different from those of Oregon. Development along the north side of the Columbia River is closely stewarded by the Washington State Department of Ecology. In our area of concern of Mile 38 to Mile 20, orthophotography shows little development on the Columbia River's north side with the exception of:

- *Skamokawa, WA, which is not incorporated, but has two commercial uses and a small number of residential uses in the approximate area of Mile 34; and,*
- *A number of aged or former residential areas, characterized in some cases as “ghost towns”, reflecting old fishing villages, lumber/mill-towns, and the like. These locations are depicted as Red Dots on Enclosure 2.*

Security Issues

NSNG is particularly sensitive to the scope and nature of the security issues which must be considered by your office in the development of the Letter of Recommendation. We further recognize that efforts are currently underway by staff elements on behalf of Admiral Gilmore at US Coast Guard Headquarters (G-M) in the development of a common, cohesive approach regarding submission and review of security assessments

NORTHERN STAR NATURAL GAS, LLC
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and risk analyses surrounding infrastructure and operations of "127 Facilities" such as herein proposed. NSNG has been in discussion with Chief, G-MSO-2 about the ongoing efforts in this regard and the predicted timing of submission of security-related materials as effects the processing of the Letter of Recommendation. We have reviewed Navigation, Vessel and Inspection Circular ("NVIC") 9-02, Change 1, in particular Enclosure 3², and suggest initiating staff discussions centered on incorporation of the general approach of the NVIC in conducting an Area/Port Security Assessment as relates to the construction and operation of the proposed facility.

Additionally, we recognize our obligation to provide a Facility Security Plan as required by Title 33 CFR §105 and look forward to working with your staff in the development and review of the Security Plan. It is envisioned that development of the Plan under §105, in conjunction with NVIC 11-02³, Change 1, and NVIC 03-03⁴ will occur later in the planning and design process as the project matures.

I look forward to answering any questions that may arise out of your Staff's review of this Letter of Intent and its supporting documentation and am eager to provide amplifying information that may be required to support your Staff's efforts in the development of the Letter of Recommendation under 33 CFR § 127.009. In this regard, I urge you or your Staff to please feel free to contact me as required.

The proposed project promises to deliver to not only the region, but the nation, much needed energy resources. I feel strongly that project maturity is in the national and public interest and that approach to the project merits consideration under Executive Order 13212. I look forward to working with you in the development of this exciting project.

Sincerely,



William "Si" Garrett, President
NORTHERN STAR NATURAL GAS LLC

CC w/encl: Federal Energy Regulatory Commission, Washington, DC
 Commandant, US Coast Guard, (G-MSO-2), Washington, DC

Enclosure 1: Potential LNG Tank Vessels, Selected Characteristics, and General Trading Routes

Enclosure 2: Annotated Northwest Power and Conservation Chart with Supplemental Information

² CH-1 TO NVIC 09-02, *Guidelines For Development Of Area Maritime Security Committees And Area Maritime Security Plans Required For U.S. Ports*

³ CH-1 TO NVIC 11-02, *Recommended Security Guidelines For Facilities*

⁴ CH-1 TO NVIC 03-03, *Implementation Guidance For The Regulations Mandated By The Maritime Transportation Security Act Of 2002 (MTSA) For Facilities*

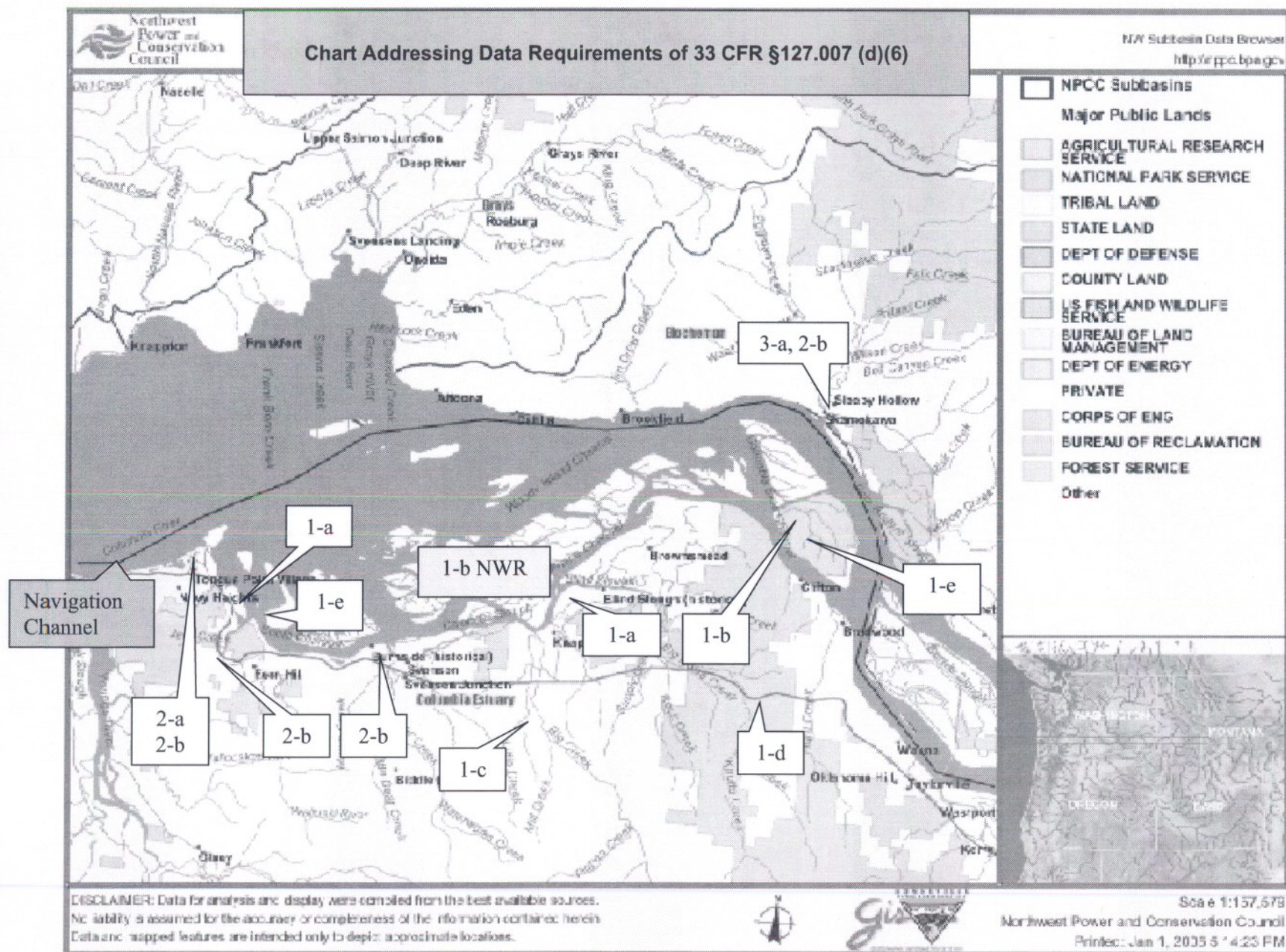
List of Potential Trading LNG Tank Vessel for Northern Star Natural Gas Proposed Bradwood Facility

Vessel Name	Year Built	Owner	Operator	Capacity	Shipyard	Trade Route
Al Bida	1999	NYK, Mitsui O.S.K. Lines Ltd., K Line Corp., and Iino KK Ltd.	Mitsui O.S.K. Lines	138,000	Kawasaki Heavy Industries	Qatar/Japan
Al Jasra	2000	NYK, Mitsui O.S.K. Lines Ltd., K Line Corp., and Iino KK Ltd.	NYK	138,000	Mitsubishi Heavy Industries	Qatar/Japan
Al Khor	1997	NYK, Mitsui O.S.K. Lines Ltd., K Line Corp., and Iino KK Ltd.	NYK	138,000	Mitsubishi Heavy Industries	Qatar/Japan
Al Rayyan	1997	NYK, Mitsui O.S.K. Lines Ltd., K Line Corp., and Iino KK Ltd.	K Line Corp.	138,000	Kawasaki Heavy Industries	Qatar/Japan
Al Wajbah	1997	NYK, Mitsui O.S.K. Lines Ltd., K Line Corp., and Iino KK Ltd.	Mitsui O.S.K. Lines	138,000	Mitsubishi Heavy Industries	Qatar/Japan
Al Wakrah	1998	NYK, Mitsui O.S.K. Lines Ltd., K Line Corp., and Iino KK Ltd.	Mitsui O.S.K. Lines	138,000		Qatar/Japan
Al Zubarah	1996	NYK, Mitsui O.S.K. Lines Ltd., K Line Corp., and Iino KK Ltd.	Mitsui O.S.K. Lines	138,000	Mitsui Engineering and Shipbuilding	Qatar/Japan
Broog	1998	NYK, Mitsui O.S.K. Lines Ltd., K Line Corp., and Iino KK Ltd.	NYK	138,000	Mitsui Engineering and Shipbuilding	Qatar/Japan
Doha	1999	NYK, Mitsui O.S.K. Lines Ltd., K Line Corp., and Iino KK Ltd.	NYK	138,000	Mitsubishi Heavy Industries	Qatar/Japan
Hanjin Sur	2000	Hanjin Shipping	Hanjin Shipping	138,000	Hanjin Heavy Industries	Oman/Korea
Hyundai Oceanpia	2000	Hyundai Merchant Marine	Hyundai Merchant Marine	138,000	Hyundai Heavy Industries	Indonesia/Korea
K. Acacia	2000	Horizon Maritime Shipholding SA	Korea Line Corp.	138,000	Daewoo Heavy Industries	Oman/Korea
K. Freesia	2000	Horizon Maritime Shipholding SA	Korea Line Corp.	138,000	Daewoo Heavy Industries	Qatar/Korea
SK Splendor	2000	SK Shipping Co. Ltd.	SK Shipping Co. Ltd.	138,000	Samsung Heavy Industries	Oman/Korea
SK Stella	2000	SK Shipping Co. Ltd.	SK Shipping Co. Ltd.	138,000	Samsung Heavy Industries	
SK Summit	1999	Omnia Enterprises SA	SK Shipping Co. Ltd.	138,000	Daewoo Heavy Industries	Qatar/Korea
SK Supreme	2000	SK Shipping Co. Ltd.	SK Shipping Co. Ltd.	138,000	Samsung Heavy Industries	Qatar/Korea
Zekreet	1998	NYK, Mitsui O.S.K. Lines Ltd., K Line Corp., and Iino KK Ltd.	K Line	138,000	Mitsui Engineering and Shipbuilding	Qatar/Japan
Ekaputra	1990	Cometco Shipping Inc.	HUMOLCO	137,000	Mitsubishi Heavy Industries	Indonesia/Taiwan
Golar Mazo	2000	Faraway Maritime	Gotaas Larsen (Osprey)	137,000	Mitsubishi Heavy Industries	Indonesia/Taiwan
Ish	1995	Abu Dhabi National Oil Co.	BP Shipping	137,000	Mitsubishi Heavy Industries	Abu Dhabi/Japan
Mra Weh	1996	Abu Dhabi National Oil Co.	Gotaas Larsen	137,000	Kvaerner Masa Yards	Abu Dhabi/Japan
Mubaraz	1995	Abu Dhabi National Oil Co.	Gotaas Larsen	137,000	Mitsubishi Heavy Industries	Abu Dhabi/Japan
Shah Amah	1994	Abu Dhabi National Oil Co.	BP Shipping	137,000	Kawasaki Heavy Industries	Abu Dhabi/Japan
Umm Alashtan	1997	Abu Dhabi National Oil Co.	Gotaas Larsen	137,000	Kvaerner Masa Yards	Abu Dhabi/Japan
Al Hamra	1996	Abu Dhabi National Oil Co.	Gotaas Larsen	135,000	Kvaerner Masa Yards	Abu Dhabi/Japan
Al Khaznah	1994	Abu Dhabi National Oil Co.	BP Shipping	135,000	Mitsui Engineering and Shipbuilding	Abu Dhabi/Japan
Ghasha	1995	Abu Dhabi National Oil Co.	BP Shipping	135,000	Mitsui Engineering and Shipbuilding	Abu Dhabi/Japan
Hanjin Muscat	2000	Hanjin Shipping	Hanjin Shipping	135,000		Oman/Korea
Hanjin Ras Laffan	2000	Hanjin Shipping	Hanjin Shipping	135,000		Qatar/Korea
Hyundai Aquapia	2000	Hyundai Merchant Marine	Hyundai Merchant Marine	135,000	Hyundai Heavy Industries	Oman/Korea
Hyundai Cosmopia	2000	Hyundai Merchant Marine	Hyundai Merchant Marine	135,000	Hyundai Heavy Industries	Qatar/Korea
Hyundai Technopia	1999	Hyundai Merchant Marine	Hyundai Merchant Marine	135,000	Hyundai Heavy Industries	Qatar/Korea
LNG Jamal	2000	Osaka Gas, NYK, Mitsui O.S.K. Lines, K Line	NYK	135,000		Oman/Japan
LNG Bonny	1981	Bonny Gas Transport	Shell International Trading & Shipping	132,500	Kockums Shipyards	Nigeria/Europe
LNG Finima	1984	Bonny Gas Transport	Shell International Trading & Shipping	132,500	Kockums Shipyards	Nigeria/Europe
Edouard L.D.	1977	Dreyfus/Gaz de France	L. Dreyfus	130,000	Constructions Navales et Industrielles de la Mediterranee	Algeria/France

Methania	1978	Methania	CMB (Exmar NV)	130,000	Boelwerf-Temse	Algeria/Belgium
Puteri Delima	1994	Petronas Marine	Petronas Marine	130,000	Chantiers de l'Atlantique	Malaysia/Japan
Puteri Firus	1997	Petronas Marine	Petronas Marine	130,000	Chantiers de l'Atlantique	Malaysia/Japan
Puteri Intan	1994	Petronas Marine	Petronas Marine	130,000	Chantiers de l'Atlantique	Malaysia/Japan
Puteri Nilam	1995	Petronas Marine	Petronas Marine	130,000	Chantiers de l'Atlantique	Malaysia/Japan
Puteri Zamrud	1996	Petronas Marine	Petronas Marine	130,000	Chantiers de l'Atlantique	Malaysia/Japan
Tenaga Dua	1981	Malaysian International Shipping Corp.	Malaysian International Shipping	130,000	Constructions Navales et Industrielles de la Mediterranee	Malaysia/Japan
Tenaga Empat	1981	Malaysian International Shipping Corp.	Malaysian International Shipping	130,000		Malaysia/Japan
Tenaga Lima	1981	Malaysian International Shipping Corp.	Malaysian International Shipping	130,000	Constructions Navales et Industrielles de la Mediterranee	Malaysia/Japan
Tenaga Satu	1979	Malaysian International Shipping Corp.	Malaysian International Shipping	130,000	Constructions Navales et Industrielles de la Mediterranee	Malaysia/Japan
Tenaga Tiga	1981	Malaysian International Shipping Corp.	Malaysian International Shipping	130,000	Constructions Navales et Industrielles de la Mediterranee	Malaysia/Japan
Larbi Ben M'Hidi	1977	SNTM-HYPROC	SNTM-HYPROC	129,500	Constructions Navales et Industrielles de la Mediterranee	Algeria/USA-Turkey
Dwiputra	1994	Mitsui O.S.K. Lines, NYK, NIC, Humpus	HUMOLCO	127,000	Mitsubishi Heavy Industries	Indonesia/Japan
LNG Vesta	1994	Gas Co., Mitsui O.S.K. Lines, NYK, Iino	Mitsui O.S.K. Lines	127,000	Mitsubishi Heavy Industries	Indonesia/Japan
Northwest Sanderling	1989	North West Shelf Venture	ALSOC	127,000	Mitsubishi Heavy Industries	Australia/Japan
Northwest Seaeagle	1991	North West Shelf Venture	Shell International Trading & Shipping	127,000	Mitsubishi Heavy Industries	Australia/Japan
Northwest Stormpetrel	1994	North West Shelf Venture	ALSOC	127,000	Mitsubishi Heavy Industries	Australia/Japan
Northwest Swift	1989	NYK, Mitsui O.S.K. Lines, K Line Corp.	NYK	127,000	Mitsubishi Heavy Industries	Australia/Japan
Galeomma	1975	Argent Marine Services	Argent Marine Services	126,540		Oman/USA
LNG Delta (ex-Southern)	1975	Argent Marine Services	Argent Marine Services	126,450		Nigeria/Europe
Golar Freeze	1977	Golar Gas Operations	Gotaas Larsen (Osprey)	126,000		
Golar Spirit	1982	Golar Gas Cryogenics	Gotaas Larsen (Osprey)	126,000	Kawasaki Heavy Industries	Indonesia/Korea
Hoegh Gandria	1977	Liquimarine Gandria	Leif Hoegh	126,000	Howaldtswerke	Indonesia/Korea
Banshu Maru	1983	NYK, Mitsui O.S.K. Lines, K Line Corp.	NYK	125,000	Mitsubishi Heavy Industries	Indonesia/Japan
Bishu Maru	1983	K Line Corp., Mitsui O.S.K. Lines, NYK	K Line Corp.	125,000	Kawasaki Heavy Industries	Indonesia/Japan
Dewa Maru	1984	K Line Corp., NYK, Mitsui O.S.K. Lines,	K Line Corp.	125,000	Mitsubishi Heavy Industries	Indonesia/Japan
Echigo Maru	1983	NYK, Mitsui O.S.K. Lines, K Line Corp.	NYK	125,000	Mitsubishi Heavy Industries	Indonesia/Japan
Gimi	1976	Golar Gas Tankers	Gotaas Larsen (Osprey)	125,000	Howaldtswerke	
Hilli	1975	Golar Gas Carriers	Gotaas Larsen (Osprey)	125,000	Moss Rosenberg	
Hyundai Greenpia	1996	Hyundai, other Korean companies	Hyundai Merchant Marine	125,000	Hyundai Heavy Industries	Malaysia/Korea
Hyundai Utopia	1994	Hyundai, Yukong, others	Hyundai Merchant Marine	125,000	Hyundai Heavy Industries	Indonesia/Korea
Khannur	1977	Golar Gas Transport	Gotaas Larsen (Osprey)	125,000		Trinidad/USA
Kotowaka Maru	1984	NYK, Mitsui O.S.K. Lines, K Line Corp.	NYK	125,000	Kawasaki Heavy Industries	Indonesia/Japan
LNG Abuja	1980	Lachmar	Ahrenkiel	125,000		Nigeria/Europe
LNG Aquarius	1977	Wilmington Trust	Pronav Schiffahrtskontor	125,000	General Dynamics	Qatar/USA
LNG Aries	1977	Wilmington Trust	Pronav Schiffahrtskontor	125,000	General Dynamics	Brunei/Korea
LNG Capricorn	1978	Wilmington Trust	Pronav Schiffahrtskontor	125,000	General Dynamics	Indonesia/Japan
LNG Edo	1980	Lachmar	Ahrenkiel	125,000		Nigeria/Europe
LNG Flora	1993	Gas Co., Mitsui O.S.K. Lines, NYK, K Line	NYK	125,000	Kawasaki Heavy Industries	Indonesia/Japan

Enclosure 1

LNG Gemini	1978	Patriot I Shipping	Pronav Schiffahrtskontor	125,000	General Dynamics	Indonesia/Japan
LNG Leo	1978	Patriot II Shipping	Pronav Schiffahrtskontor	125,000	General Dynamics	Indonesia/Japan
LNG Libra	1979	Hull Fifty	Pronav Schiffahrtskontor	125,000	General Dynamics	Indonesia/Japan
LNG Taurus	1979	U.S. Trust of New York	Pronav Schiffahrtskontor	125,000	General Dynamics	Indonesia/Japan
LNG Virgo	1979	Patriot IV Shipping	Pronav Schiffahrtskontor	125,000	General Dynamics	Indonesia/Japan
Matthew	1979	Cabot (Distrigas)	Gotaas Larsen (Osprey)	125,000		Trinidad/USA
Northwest Sandpiper	1993	North West Shelf Venture	Shell International Trading & Shipping	125,000	Mitsui Engineering and Shipbuilding	Australia/Japan
Northwest Shearwater	1991	North West Shelf Venture	BP Shipping	125,000	Kawasaki Heavy Industries	Australia/Japan
Northwest Snipe	1990	North West Shelf Venture	ALSOC	125,000	Mitsui Engineering and Shipbuilding	Australia/Japan
Northwest Swallow	1989	Mitsui O.S.K. Lines, NYK, K Line Corp.	Mitsui O.S.K. Lines	125,000	Mitsui Engineering and Shipbuilding	Australia/Japan
Senshu Maru	1984	Mitsui O.S.K. Lines, K Line, NYK	Mitsui O.S.K. Lines	125,000	Mitsui Engineering and Shipbuilding	Indonesia/Japan
Wakaba Maru	1985	Mitsui O.S.K. Lines, NYK, K Line Corp.	Mitsui O.S.K. Lines	125,000	Mitsui Engineering and Shipbuilding	Indonesia/Japan
YK Sovereign	1994	SK and other Korean companies	SK Shipping	125,000	Hyundai Heavy Industries	Malaysia/Korea
LNG Lagos	1978	Bonny Gas Transport	Shell International Trading & Shipping	122,255		Nigeria/Europe
LNG Port Harcourt	1977	Bonny Gas Transport	Shell International Trading & Shipping	122,255	Chantiers de l'Atlantique	Nigeria/Europe



MAP KEY

Refer to Chart that identifies No.1-a thru 3-a

1.		<i>Environmentally sensitive areas within the impacted area</i>
	1-a	Clatsop County Net Pen Fisheries Project (Coho smolts) located in Cathlamet Bay, (RM18 – RM19) and Blind Slough (RM27). ¹ .
	1-b	The Lewis & Clark National Wildlife Refuge (NWR) includes twenty-three named and charted islands adjacent to Cathlamet Bay, Calendar Slough, Brownsmead Flats, Blind Slough and Clifton Channel. These lands are owned by the Oregon Division of State Lands and are managed cooperatively with the Julia Butler Hansen NWR Columbia White-tailed Deer, Cathlamet, WA , the Oregon Department of Fish and Wildlife and U.S. Fish and Wildlife. ² The map depicts the Julia Butler Hansen NWR in purple. State owned forest lands, shown in teal color, are not environmentally sensitive.
	1-c	Big Creek Fish Hatchery (release Coho smolts) ³ , (RM26).
	1-d	Gnat Creek Fish Hatchery (release Spring Chinook and Winter Steelhead smolts) ⁴ , (RM27).
	1-e	Corps Channel Improvement Project includes mitigation for dredging; Lois Island Embayment (RM 18-RM20), Miller- Pillar Islands (RM25-RM26) and Tenasillahe Island (RM36-RM37) are designated areas for restoration projects. ⁵
2.		<i>All businesses/facilities positioned within the impacted area⁶</i>
	2-a	Industrial Uses include Tongue Point (The base was deactivated in January 1962, and since then the property has been divided among several different owners including non-DoD agencies of the Federal government, the Oregon Division of State Lands, and private parties), (RM 17- RM19).
	2-b	Commercial Uses
3.		<i>All incorporated towns within the impacted area⁷</i>
	3-a	Skamokowa, WA, not incorporated but has 2 commercial uses and a handful of clustered residential uses, (RM 34).
	Red Dots	The map depicts names of towns shown as red dots along the river. With the exception of unincorporated Skamokowa, these red dots are not significantly developed areas. They are mostly remnants of old fishing villages or lumber mill-towns, e.g. ghost towns.

¹ Data source: <http://www.co.clatsop.or.us/land-use/Fisheries>.

² Data source: <http://gorp.away.com/gorp/resource>.

³ Data source: <http://www.clatsopwatersheds.org/>, Nicolai-Wickiup Watershed Assessment 2000.

⁴ Data source: <http://www.clatsopwatersheds.org/>, Nicolai-Wickiup Watershed Assessment 2000.

⁵ Data source: www.nwp.usace.army.mil/issues/crcip/cms/home.asp Final Supplemental Integrated Feasibility Report and Environmental Impact Statement - January 2003.

⁶ The mapped information is based on county tax assessor's records. The tax records were obtained from Pacific and Wahkiakum Counties, Washington State and Clatsop County, Oregon. The tax-based data was sorted by Township, Range and Section No.; then the information was further sorted by tax codes to extrapolate commercial and industrial uses. The map depicts approximate situs locations of all industrial and commercial uses.

⁷ Data source: <http://www.fema.gov/fima/> map review, <http://www.econ.state.or.us/>, listing of cities and verbal verification with respective tax assessor or county planning staff.



16611
February 28, 2007

Richard R. Hoffmann
Director of Gas – Environmental & Engineering, PJ-11
Federal Energy Regulatory Commission
888 First Street, N.E., Room 62-45
Washington, DC 20426

WATERWAY SUITABILITY REPORT FOR BRADWOOD LANDING LNG

Dear Mr. Hoffmann:

On February 28, 2007, the Coast Guard completed a review of the Waterway Suitability Assessment for the Bradwood Landing LNG Terminal project submitted by Northern Star Natural Gas, LLC in May of 2006. This review was conducted following the guidance provided in Navigation and Vessel Inspection Circular (NVIC) 05-05 of June 14, 2005. The review focused on the navigation safety and maritime security risks posed by LNG marine traffic, and the measures needed to responsibly manage these risks. During the review, the Coast Guard consulted a variety of stakeholders including state and local emergency responders, Marine Pilots, towing industry representatives, members of the Port Waterway Safety Committee, and the Area Maritime Security Committee.

Based upon this review, I have determined that to make the Columbia River suitable for the type and frequency of LNG marine traffic associated with this project, additional measures will be necessary to responsibly manage the navigation, safety and security risks. The specific measures, and the resources needed to implement them where applicable, are described below and in a separate supplementary report which is being provided to you under the terms and conditions established for handling Sensitive Security Information. This supplemental report also includes a copy of the Bradwood Landing LNG Waterway Suitability Assessment. This determination is preliminary because the required NEPA analysis has not yet been completed.

The following is a list of specific risk mitigation measures that must be put into place to responsibly manage the safety and security risks of this project. Details of each measure, including adequate support infrastructure, will need to be further developed through the creation of an Emergency Response Plan as well as a Transit Management Plan that clearly spell out the roles, responsibilities, and specific procedures for the LNG vessel and all agencies responsible for security and safety during the operation.

Navigation Measures:

- Safety/Security Zone A moving safety/security zone shall be established around the LNG vessel extending 500-yards around the vessel but ending at the shoreline. No vessel may enter the safety/security zone without first obtaining permission from the Coast Guard Captain of the Port (COTP). (The expectation is that the COTP's Representative will work with the Pilots and patrol assets to control traffic, and will routinely allow vessels to transit the Safety/Security zone based on a case-by-case assessment conducted on scene. Escort resources will be used to contact and control vessel movements such that the LNG Carrier is protected.)

February 28, 2007

While the vessel is moored at the facility there shall be a 200 yard-security zone around the vessel. In addition, there will be a 50 yard security zone around the LNG Terminal when there is not a vessel at the dock.

Resource Gap: Resources required to enforce the safety/security zone are discussed under Security Measures in the supplemental report.

- Vessel Traffic Management Due to a narrow shipping channel, numerous navigational hazards, and the proximity to populated areas, LNG vessels will be required to meet the following additional traffic management measures:
 - A Transit Management Plan will be developed in coordination with River Pilots, Bar Pilots, Escort Tug Operators, Security Assets and the Coast Guard prior to the first transit.
 - This plan will be reviewed within six months of the initial arrival, and followed by an annual review to ensure that it reflects the most current conditions and procedures.
 - For at least the first six months, there will be at least 2 Pilots throughout the transit.
 - For at least the first six months, all transits will be daylight only, unless approved in advance by the COTP.
 - The LNG Vessel must board Pilots at least 5 miles before the CR Buoy.
 - Overtaking by or of the LNG Vessel is prohibited without COTP approval.
 - Meetings situations of commercial vessels will be closely controlled. All meetings must be pre-arranged via Channel 13 VHF Bridge-to-Bridge and will be limited to the following areas:
 - From the CR buoy to Tongue Point, with the exception that commercial vessels shall avoid meeting in all turns, and between buoys 22 and 29, and buoy 33 and 42,
 - Vessels may arrange meetings from Tongue Point to Rice Island between buoy 42 and 54,
 - Altoona to Pillar Rock Miller Sands Light #11 to Light # 17,
 - Price Island to Puget Island between buoy 32 and Bradwood.
 - 24 hours prior to arrival, the Coast Guard, FBI, Bar Pilots and River Pilots, Escort Tug Masters, and other Escort assets will meet to coordinate inbound and outbound transit details
 - Vessel transits and bar crossings will be coordinated so as to minimize conflicts with other deep draft vessels, recreational boaters, seasonal fisheries, and other Marine Events

Resource Gaps: The Vessel Transit Management Plan must be approved by the COTP at least 30 days prior to the first arrival.

- Vessel Traffic Information System / Vessel Traffic System The current Vessel Traffic Information System on the Columbia River is limited to AIS receivers and a handful of cameras. In order to ensure vessel safety and security, this capability will need to be augmented with a robust camera system capable of monitoring the entire transit route. Due to weather concerns, these cameras must be equipped with detectors capable of monitoring vessel traffic in wind, rain and fog conditions common on the river. In addition this capability may need to be augmented in the future with additional command and control capability and the establishment of a full Columbia River VTS.

Resource Gaps: Camera system with complete coverage of the entire transit route, capable of detecting vessel traffic in wind, rain, fog, and dark conditions. An additional AIS repeater

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located in Astoria is also required to provide complete coverage of the Lower Columbia. If implemented, a fully staffed VTS would require at least 2 watch standers and a supervisor or 20 personnel to maintain round-the-clock coverage.

- Tug Escort and Docking Assist Due to the confined channel and high wind conditions, each LNG Carrier must be escorted by two tugs; at least one of which must be a tractor tug, which will join the vessel as soon as safe to do so. The primary tug will be tethered at the direction of the pilot. A third tug will be required to assist with turning and mooring.

All three tugs will be at least 60 Ton Astern Bollard Pull or larger and equipped with Class 1 Fire Fighting equipment. Based on the Maneuvering Simulation Study of November 4, 2005, vessels over 140,000 m³ will be limited to transiting during periods of 25 knots of wind or less. Additionally, extreme wind and weather conditions may require a third tug escort tug for any LNG vessel. While unloading, all three tugs will remain on standby to assist with emergency departure procedures.

Resource Gaps: Three 60 Bollard Ton Tractor Tugs with Class 1 Fire Fighting capability.

- Navigational Aids Buoys or Daymarks will be required:
 - Three Aids at Bradwood, outlined in Figure 3, on p. 8 of the Vessel Maneuvering Simulation Study of November 4, 2005.
 - Range on Upper and Lower Desdemona Reach
 - PORTS (Physical Oceanographic Real-Time System) station at Bradwood contracted with NOAA to provide real time river level, current and WX data
 - Doppler docking station similar to the one found in Savannah River
- LNG Carrier familiarization training for Pilots and Tug Operators Prior to the arrival of the first vessel, simulator training will be required for Pilots and Tug Operators identified as having responsibility for LNG traffic.
- Dynamic Under Keel Clearance System Installation of a real time system for data collection on bar conditions is strongly recommended as increasing the ability to safely navigate the Columbia River Bar during marginal conditions. The lack of accurate data, will limit the conditions under which a vessel may safely transit the bar. An immersion study of deep draft LNG vessels transiting the bar during summer and winter conditions is required within the first 12 months.

Resource Gap: Actual data on LNG tanker immersion.

Safety Measures:

- Vessel and Facility Inspections LNG tankers and facilities are subject to (at a minimum) annual Coast Guard inspections to ensure compliance with federal and international safety, security and pollution regulations. In addition, LNG vessels and facilities are typically required to undergo a pre-arrival inspection, and transfer monitor.

Resource Gap: Additional Coast Guard Facility and Vessel Inspectors.

- Shore-Side Fire-Fighting Firefighting capability is extremely limited along the entire transit route. Shore side firefighting resources and training will need to be augmented in order to provide basic protection services to the facility as well as the communities along the transit route.

Resource Gap: To be determined in conjunction with local and regional response agencies through the Emergency Response Planning process. Prior to the approval of the Emergency Response Plan, adequate cost sharing arrangements for project related training, equipment, maintenance, and staffing will need to be addressed for all of the communities impacted by the project.

- In-Transit Fire-Fighting Significant resource and jurisdictional issues exist in any marine fire incident on an underway vessel in the Columbia River. Current planning and preparedness efforts focus on a shore based response to a vessel moored at a facility.

Resource Gap: Development of a concrete plan for managing underway firefighting, including provisions for command and control of tactical fire fighting decisions as well as financial arrangements for provision of mutual aid and identification of suitable locations for conducting fire fighting operations is critical to ensuring the safety of the port and securing the waterway.

- Public Notification System and Procedures Adequate means to notify the public along the transit route, including ongoing public education campaigns, emergency notification systems (such as reverse 911 and siren systems), and adequate drills and training are required. Education programs must be tailored to meet the various needs of all river users, including commercial and recreational boaters, local businesses, local residents, and tourists.

Resource Gap: Current public notification capabilities vary greatly, and as part of the Emergency Response Planning process, a comprehensive notification system, including the deployment of associate equipment and training, will need to be developed.

- Gas Detection Capability With the exception of the HAZMAT team in Astoria, gas detection capability is not resident and may not be available to initial responders along the transit route and at the facility. Emergency response personnel (both Police and Fire) require appropriate gas detection equipment, maintenance, and training.

Resource Gap: Gas Detectors, appropriate training, and maintenance infrastructure.

- Communication Systems and Protocols Inter-agency communication pose a significant obstacle to joint operations. Deployment of a Regional Communication Plan and associated equipment is required to ensure that the facility, associated command centers, emergency responders, Coast Guard, Tug Operators, Escort Vessels, and Pilots can communicate in an effective manner. The system must provide for monitoring and communicating on both secure and unsecure (eg Ch. 16, 13, 22), as well as sending and receiving both speech and data.

Resource Gap: Operation specific and contingency communications plans and appropriate (intrinsically safe) equipment to coordinate both routine escorts and emergency operations. Equipment to transmit and receive both voice and data in a secure and unsecure environment.

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Security Measures:


- Security Boardings, Waterway Monitoring, Shoreline Patrols, and Vessel Escorts Extensive security measures will be required to provide adequate protection for LNG vessel while transiting the Columbia River and moored at the facility. The details of these measures are Sensitive Security Information, and are outlined in a separate supplementary report.
- Additional Measure While A Cruise Ship is in Port While cruise ships are moored or anchored at the Port of Astoria, LNG vessels will be restricted to transiting in good visibility (6 miles or more). In addition, any cruise ship will also require separate waterside security, during the LNG Transit. Finally a Cruise Ship and LNG Carrier shall not be placed in a meeting situation.

Resource gap: Sufficient Coast Guard or local law enforcement assets to provide adequate and independent security for both vessels.

- Facility Security Measures LNG facilities are subject to the security regulations outlined in 33 CFR 105, and are required to submit a Facility Security Plan (FSP) for Coast Guard approval, and undergo (at a minimum) an annual Coast Guard security inspection. The facility shall also develop a plan to provide for appropriate security measures from the start of construction through implementation of the Coast Guard approved FSP.
- Sandia Study The WSA proposes to receive vessels with up to 200,000 m³ cargo capacity. The Sandia Report is based on consequences of LNG breaches, spills and hazards associated with LNG vessels having a cargo capacity no greater than 148,000 m³ and spill volumes of 12,500 m³. There remains some question as to the size of hazard zones for accidental and intentional discharges and the potential increased risk to public safety from LNG spills on water for larger vessels. Based on these existing uncertainties, Northern Star must either complete a site-specific analysis for the largest sized LNG vessel or limit arrivals to vessels with a cargo capacity no greater than 148,000 m³ until additional analysis addressing vessels with higher cargo capacities is completed.

In the absence of the measures described in this letter and the resources necessary to implement them, or in the absence of any changes to existing Coast Guard policy or guidance to lessen safety and security requirements, the Columbia River would be considered unsuitable for the LNG marine traffic associated with the Bradwood LNG terminal. Due to the dynamic nature of the Columbia River, the applicant shall be required to submit an annual update to the Waterway Suitability Assessment to the Coast Guard which shall be revalidated by the COTP and AMSC. For further information, please contact LT Shadrack Scheirman of Coast Guard Sector Portland at (503) 240-9307.

Sincerely,



Patrick G. Gerrity
Captain, U.S. Coast Guard
Captain of the Port
Federal Maritime Security Coordinator

Copy: Thirteenth Coast Guard District (dp)
Coast Guard Pacific Area (Pp)
Commandant, Coast Guard Headquarter (G-PSO)

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Maintenance and Logistics Command Pacific (Sm)

APPENDIX H

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APPENDIX I

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LIST OF PREPARERS

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APPENDIX J

RESPONSE OF THE FEDERAL ENERGY REGULATORY COMMISSION TO THE SAFETY ADVISORY REPORT OF THE OREGON DEPARTMENT OF ENERGY FOR THE BRADWOOD LANDING PROJECT

1.0 INTRODUCTION

The Natural Gas Act (NGA), as modified by the Energy Policy Act of 2005 (EPAAct), requires that the Federal Energy Regulatory Commission (FERC or the Commission) consult with the state in which a liquefied natural gas (LNG) terminal is proposed to be located regarding state and local safety matters. The governor of Oregon designated the Oregon Department of Energy (ODE) as the state agency that the FERC should consult with on safety and siting matters for the Bradwood Landing Project.

On July 6, 2006, the ODE submitted its Safety Advisory Report to the FERC. In the report, ODE addressed state and local considerations for the project and provided comments from the Columbia River Estuary Study Taskforce (CREST), a council of governments that includes the local counties, cities, and port districts surrounding the Columbia River Estuary in both Oregon and Washington. The Safety Advisory Report also includes the comments received directly from local governmental entities (Clatsop County and the Cities of Astoria and Warrenton).

The EPAAct also stipulates that before the Commission may issue an order authorizing an LNG terminal, it must “review and respond specifically” to the safety matters raised by the state agency designated as the lead for the state and local safety matters. Table 2-1 of this appendix provides the FERC’s response to the ODE Safety Advisory Report for the Bradwood Landing Project.

Section 3.0 contains the Safety Advisory Report including attached comment letters from CREST, Clatsop County, Astoria, and Warrenton. Only safety-related issues raised in the comment letter are addressed in this appendix.

2.0 FERC RESPONSE TO THE ADVISORY REPORT

The ODE identified the following key categories of potential safety concerns in the Safety Advisory Report:

- Emergency Planning and Response;
- Security Zone;
- Terminal Design;
- Hazard Identification;
- Quality Assurance;
- Safety Issues; and
- Emergency Response Capabilities near the Facility Location.

The Safety Advisory Report included both general and specific safety matters that ODE requested be included in the FERC’s review of the NorthernStar application. The FERC’s specific responses to those concerns are presented in Table 2-1 in the order of the issues presented in the report. Where appropriate, the response identifies the section of the EIS where information on the issue of concern is addressed.

As described in sections 1.0 and 2.0 of the EIS, the U.S. Coast Guard (Coast Guard) has shared responsibility with FERC in reviewing the Bradwood Landing Project and has summarized portions of its review in its Waterway Suitability Report (WSR). In addition to including the complete WSR in the EIS (see Appendix N), we have summarized portions of it in the EIS. As a result, for some concerns presented in the Safety Advisory Report, we have noted that the issue is addressed in the WSR, as well as the specific section of the EIS where the concern is addressed.

TABLE 2-1

The FERC's Responses to Concerns Presented in the ODE Safety Advisory Report for the Bradwood Landing Project

Commentor/Topic	Issue	Response ^a
ODE		
Emergency Planning and Response	<p>The applicant has not accurately or adequately characterized the areas' emergency response capabilities in its WSA.</p> <p>The FERC should consider the issues and safety concerns raised by stakeholders and the safety of the communities along the shipping route on the Columbia River.</p> <p>The FERC should require an applicant to commit to covering 100 percent of the safety and security costs directly associated with the LNG vessel transits, the facility, and the pipeline, including all infrastructure, planning, training, and other associated costs identified in an emergency response plan agreed to by the state and local jurisdictions, or the FERC should explain its authority for imposing such costs on local jurisdictions and the state.</p> <p>The safety/security zones proposed for the vessel in transit and the vessel at dock must be sufficiently calculated and justified. The applicant or the Coast Guard must thoroughly explain any changes to those zones that might accompany heightened national security as well as any resulting impacts.</p> <p>The FERC should require the applicant to complete an acceptable emergency response plan prior to any Commission decision on its application and in conjunction with the Coast Guard's validation of the WSA.</p>	<p>The emergency response capabilities of the local areas are discussed in sections 4.8.1.6 and 4.8.2.6 and the WSR (see Appendix N).</p> <p>Stakeholder issues and concerns are addressed throughout section 4.11.</p> <p>We included a recommendation that the Emergency Response Plan include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies (see section 4.11.7).</p> <p>See section 4.11.5.5 and the WSR in Appendix N.</p> <p>In accordance with the EP Act, we included a recommendation in section 4.11.7 that NorthernStar develop an Emergency Response Plan (including evacuation) and coordinate procedures with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies, and that the Emergency Response Plan should be filed with the Secretary of the Commission (Secretary) for review and written approval by the Director of Office of Energy Projects (OEP) prior to initial site preparation (also see the WSR in Appendix N).</p> <p>We included a recommendation in section 4.11.7 that NorthernStar develop an Emergency Response Plan (including evacuation) and coordinate procedures with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies.</p> <p>This will be addressed during the preparation of the Emergency Response Plan which must be filed with the Secretary for review and written approval by the Director of OEP prior to initial site preparation. See section 4.11.7</p> <p>See above.</p>
	<p>The applicant's Emergency Response Plan must be developed in full cooperation with state and local authorities, including authorities from Washington State.</p> <p>The applicant's Emergency Response Plan must sufficiently and accurately characterize the emergency response capabilities along the vessel transit route and near the facility, including response times and must include measures to mitigate for any safety gaps.</p> <p>The applicant's Emergency Response Plan must include all potentially affected communities along the LNG vessel route and near the terminal in a comprehensive, thoroughly publicized warning system.</p>	

TABLE 2-1 (cont'd)

The FERC's Responses to Concerns Presented in the ODE Safety Advisory Report for the Bradwood Landing Project		Response ^a
Commentor/Topic	Issue	
	The applicant's Emergency Response Plan must account for potential population increases due to tourism. Any FERC authorization for an LNG terminal and associated pipeline in Oregon must fully comply with Oregon state and local laws and regulations, including energy facility siting laws.	See above. As a matter of foreign commerce, the importation of LNG is subject to federal, not state, control. Although the Commission has exclusive jurisdiction over the proposed project, certain permits, approvals, and licenses are the responsibility of other federal agencies and state and local authorities. The Commission encourages cooperation between project applicants and these agencies. However, any state or local permits issued with respect to the jurisdictional facilities authorized by the Commission must be consistent with the conditions of the approving Order. The tanks will be constructed of 9 percent nickel steel. See section 11.4 for an in-depth discussion.
Terminal Design	Resource Report 1 states that the primary storage tank may be constructed of either 9percent nickel steel or, alternately, pre-stressed concrete. While either construction method is allowed by the National Fire Protection Association (NFPA) 59A, the FERC should require that the safer option be selected. The ODE expects the FERC to perform a detailed design review to verify compliance with NFPA 59A and the codes referenced in Resource Reports 1, 11, and 13.	The proposed facilities must meet the federal safety standards prescribed by Title 49 Code of Federal Regulations (CFR), Part 193 including applicable portions of the NFPA 59A (2001) standard, as adopted by reference. During construction, facilities are inspected by the Department of Transportation (DOT) to ensure compliance. In addition, the facilities would be required to comply with the FERC staff's recommendations made as a result of the cryogenic design and technical review. See section 4.11. The FERC will gladly accept and address any future comments.
Hazard Identification	The ODE requests the opportunity to comment on design issues as more time and more information become available. The FERC should verify that NorthernStar chose the most conservative assumptions regarding break size, meteorological conditions, and accident scenario for all calculations used to determine the thermal radiation and vapor dispersion from the design basis spill. NorthernStar should use a non-mechanistic double ended ("guillotine") break with all pumps running for calculation purposes unless it can demonstrate that either a smaller break is more conservative or the guillotine break in this circumstance is not credible. Verify that intentional spills were assumed. The thermal radiation maps and vapor dispersion maps should be shown centered at the location closest to an affected population (in this case, the dock). For the Bradwood Landing site, the nearest affected population is most likely the residences on Puget Island.	The FERC staff has performed its own thermal radiation and vapor dispersion modeling and agrees with the conditions NorthernStar selected. See section 4.11.4. The design spills used in the thermal radiation and flammable vapor dispersion calculations are in accordance with 46 CFR 193. See above. See Vapor Dispersion and Thermal Radiation maps in section 4.11.4.

TABLE 2-1 (cont'd)

The FERC's Responses to Concerns Presented in the ODE Safety Advisory Report for the Bradwood Landing Project		
Commentor/Topic	Issue	Response ^a
	The FERC should verify that conservative assumptions were used in NFPA 59A required calculations. The EIS should include an explanation of how these assumptions were made and why they are the most conservative.	Conservative assumptions were made during calculations in sections 4.11.4 and 4.11.5.3. The exclusion zone analysis performed for the onshore facilities was in accordance with 49 CFR 193. The meteorological conditions used yielded the largest thermal and vapor exclusion zones. For marine calculations, the FERC staff used the full range of hull breaches identified in the 2004 Sandia report. In areas of uncertainty due to the lack of large-scale field data, the FERC staff used conservative assumptions (i.e., resulting in longer hazard distances) in the marine spill modeling. These conservative assumptions concern: calculation of the pool spread; determination of the pool fire flame height; and use of a higher surface emissive power. Our results have been in agreement with the Sandia guidance zones of concern, and support the conservative nature of the calculations.
Quality Assurance	<p>Provide a sample quality assurance program from a previous project for state and public review. The sample quality assurance program should include evidence that the quality assurance function is independent of operations, scheduling, or budgeting. The program should include steps to ensure that:</p> <ul style="list-style-type: none"> a. metal components are fabricated of metals with the specified metallurgical content and properties; b. concrete or other structural materials are tested to the strength specified; c. vendors of equipment and material are audited by qualified auditors; d. nondestructive tests are observed and approved by independent, quality control personnel; e. personnel performing safety related construction or operation activities are properly qualified, with documentation of that qualification available for audit; f. construction and operations are performed in accordance with approved procedures; g. only controlled copies of design documents are used in construction, with only the current revision used in the field; h. all changes in design documents are carried forward to other related and associated design documents; i. measurements are made with equipment that is calibrated and traceable; and j. conditions adverse to quality are subject to a corrective actions program that results in actions to prevent recurrence. 	<p>Quality assurance and control programs to monitor material selection, equipment fabrication, and installation would be provided by the Engineering, Procurement, and Construction (EPC) contractor selected by the project applicant if the project is authorized. In addition, the applicant would also have a similar program to provide oversight of the EPC. The FERC staff would review these programs during the periodic construction inspections occurring prior to a facility entering service.</p>

TABLE 2-1 (cont'd)

The FERC's Responses to Concerns Presented in the ODE Safety Advisory Report for the Bradwood Landing Project		
Commentor/Topic	Issue	Response ^a
Safety Issues	Resource Report 5 describes an area of relatively low population density with most of the affected houses on Puget Island in Washington State. The description of the affected area should take into account the fact that the City of Astoria is a growing community with increasing tourism largely concentrated along the shoreline.	Section 4.8.1 notes that the City of Astoria, located adjacent to the waterway, is a growing community with increasing tourism and a high population density along the shoreline.
	Resource Report 5 uses the entire county to characterize population density. The resource report fails to adjust for the fact that most of that population is along the shoreline, quite close to the river channel; therefore, the potentially affected population is actually much higher in density than implied in the application. The report also does not account for the fact that during parts of tourist season, the population can more than double.	Section 4.8.1 notes that within individual counties, population density is generally higher along the shoreline of the Columbia River. In addition, during parts of the tourist season, population in some areas can more than double.
	Roads during particularly busy summer weekends frequently back up, which would be a concern in the unlikely event that an evacuation might become necessary.	This will be addressed during the preparation of the Emergency Response Plan which must be filed with the Secretary for review and written approval by the Director of Office of OEP prior to initial site preparation. See section 4.11.7
	The ODE has reviewed the Safety Advisory Report on the proposed LNG terminal at the Port of Long Beach issued by the California Energy Commission (CEC) that relies largely on material taken from two readily available reports: (1) the Sandia Labs' November 2004 report "Guidance on Risk Analysis and Safety Implications of a Large LNG Spill Over Water" (Sandia Report) and (2) Richard Clark's "LNG Facilities in Urban Areas." The ODE agrees that the 5 kw/m ² described in the Sandia Report is "the permissible level for emergency operations lasting several minutes with appropriate clothing" (Table 6, p.38). This is the lowest heat flux shown in the thermal radiation maps provided in Attachment 11A. Because the people occupying the nearest residences to the Bradwood Landing Project (those on Puget Island) are relatively far from the nearest fire station and do not have the appropriate clothing or emergency training, thermal radiation calculations should show the point at which worst case heat flux will permit safe evacuation, possibly requiring more than "several minutes" and without appropriate clothing or emergency training. The CEC advisory report at p. 15 suggests 1.5 kw/m ² . NorthernStar should calculate the distance to this heat flux for a design basis event at Bradwood Landing and issue a figure showing the results. NorthernStar should calculate this distance not from the tanks but from the point on the facility nearest the affected properties (presumably the dock).	As identified in section 4.11.4, the incident flux levels that are used to define thermal exclusion zones for the onshore facilities were developed by the DOT through its rulemaking process, starting with the Advance Notice of Proposed Rulemaking (Notice No. 77-4, Docket No. OPO-46), and determined to be appropriate after evaluating comments in the regulatory review process. We believe this process supports the use of these incident flux levels for their intended purpose. These incident heat fluxes are also used to define the thermal exclusion zones in NFPA 59A which have been incorporated into the DOT standards in 49 CFR 193. The same incident flux levels are applied in section 4.11.5.3 to describe transient hazard areas for LNG spills on water.

TABLE 2-1 (cont'd)

The FERC's Responses to Concerns Presented in the ODE Safety Advisory Report for the Bradwood Landing Project		Response ^a
Commentor/Topic	Issue	
Emergency Response Capabilities near the Facility Location	Information included in the WSA regarding measures to protect the public during a design basis event should be a part of public outreach and should be made available before the issuance of a FERC construction permit.	The WSA has been designated Sensitive Security Information as defined in 49 CFR 1520. Because any unauthorized disclosure of details of these measures could be employed to circumvent the proposed security measures, it is not releasable to the public. However, information in the Emergency Response Plan pertaining to items, such as off-site emergency response and procedures for public notification and evacuation, would be subject to public disclosure.
	The communities along the Oregon and Washington shore are correctly characterized in the resource reports as primarily rural communities without extensive police, fire, and emergency medical organizations. If the hazards assessment in the WSA shows that additional resources are necessary in these communities to respond to a design basis emergency, the communities can only get these resources if NorthernStar funds them.	We included a recommendation that the Emergency Response Plan include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies (see section 4.11.7 and the WSR in Appendix N).
Clatsop County		
Emergency Planning and Response	Requests that FERC require the applicant to fund 100 percent of the costs related to public safety response associated with construction and operation of the Bradwood Landing facilities. Involve local first responders in the development of the WSA.	See above.
		NorthernStar submitted its WSA to the Coast Guard in May 2006. The Coast Guard reviewed the WSA and consulted with the Area Maritime Security Committee, local law enforcement, and emergency response organizations in preparing its WSR (see section 4.11.5.5 and the WSR in Appendix N).
CREST		
Emergency Planning and Response	Include provisions for adequate police and fire protection for the site to be funded by the applicant.	We included a recommendation that the Emergency Response Plan include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies (see section 4.11.7 and the WSR in Appendix N).
City of Astoria		
Emergency Planning and Response	The City of Astoria has no marine law enforcement, little marine firefighting capability, and limited public safety resources, and a significant portion of the City geography is within the zones of concern.	We included recommendations in section 4.11.7 that NorthernStar develop an Emergency Response Plan (including evacuation) and coordinate procedures with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies; and that the Emergency Response Plan include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies (see section 4.11.7 and the WSR in Appendix N).

TABLE 2-1 (cont'd)

The FERC's Responses to Concerns Presented in the ODE Safety Advisory Report for the Bradwood Landing Project	
Commentor/Topic	Response ^a
Requests continued coordination with the City regarding development of the Emergency Response Plan and WSA.	We included a recommendation that NorthernStar develop an Emergency Response Plan in coordination with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies (see section 4.11.7 and the WSR in Appendix N). NorthernStar submitted its WSA in May 2006 (see section 4.11.5.5 and the WSR in Appendix N).
Vessel transit operational procedures and the Emergency Response Plan need to address safety concerns along the vessel transit route.	We included a recommendation that NorthernStar develop an Emergency Response Plan in coordination with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies that includes among others, the requirements including procedures for notifying residents and recreational users within areas of potential hazard, and evacuation routes/methods for residents and public use areas that are within any transient hazard areas along the route of the LNG marine transit (see section 4.11.7 and the WSR in Appendix N).
The FERC or Coast Guard should require at least two dedicated tug boats with firefighting capabilities including deluge system or water curtain to protect tug operators. Tugs should be able to pull a disabled LNG carrier.	The Coast Guard would require two tugs to escort the LNG ships upriver, at least one of which must be a tractor tug, which would be made up as soon as it is safe to do so. The primary tug would be tethered at the direction of the Pilot. A third tug would be required to assist with turning and mooring (see section 4.11.5.4 and the WSR in Appendix N).
Recommends at least two Columbia Bar Pilots be on the LNG tanker ships at all times between the sea buoy, along the Astoria coast, and through the city jurisdictional limits.	The Coast Guard would require that LNG vessels must board a Pilot(s) at least 5 miles before the CR Buoy, and for at least the first 6 months, at least two Pilots must be present throughout the transit (see section 4.11.5.5 and the WSR in Appendix N).
The City does not currently have marine law enforcement assets which will be needed to supplement the Coast Guard escorts, especially within the City's jurisdictional waters.	We included a recommendation that the Emergency Response Plan include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies (see section 4.11.7 and the WSR in Appendix N).
Require the applicant to fund LNG emergency response training similar to that offered by Texas Engineering Extension Service (a member of Texas A&M System) and compensate fulltime and volunteer firefighters to attend training. A fireboat would be needed to provide adequate protection for waterfront properties.	See above.
The City of Astoria expects to be fully compensated for the additional costs associated with added police, fire and emergency response personnel and equipment needed during LNG transit.	See above.

TABLE 2-1 (cont'd)

The FERC's Responses to Concerns Presented in the ODE Safety Advisory Report for the Bradwood Landing Project		Response ^a
Commentor/Topic	Issue	
City of Warrenton Emergency Planning and Response	The City of Warrenton has no marine law enforcement, little marine firefighting capability, and limited public safety resources, and a significant portion of the city geography is within the zones of concern.	We included recommendations in section 4.11.7 that NorthernStar develop an Emergency Response Plan (including evacuation) and coordinate procedures with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies; and that the Emergency Response Plan include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies (see section 4.11.7 and the WSR in Appendix N).
	Requests continued coordination with the City regarding development of the Emergency Response Plan and WSA.	We included a recommendation that NorthernStar develop an Emergency Response Plan in coordination with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies (see section 4.11.7 and the WSR in Appendix N). NorthernStar submitted its WSA in May 2006 (see section 4.11.5.5 and the WSR in Appendix N).
	Vessel transit operational procedures and the Emergency Response Plan need to address safety concerns along the vessel transit route.	We included a recommendation that NorthernStar develop an Emergency Response Plan in coordination with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies that includes among others, the requirements including procedures for notifying residents and recreational users within areas of potential hazard, and evacuation routes/methods for residents and public use areas that are within any transient hazard areas along the route of the LNG marine transit (see section 4.11.7 and the WSR in Appendix N).
	The FERC or Coast Guard should require at least two dedicated tug boats with firefighting capabilities including deluge system or water curtain to protect tug operators. Tugs should be able to pull a disabled LNG carrier.	The Coast Guard would require two tugs to escort the LNG ships upriver, at least one of which must be a tractor tug, which would be made up as soon as it is safe to do so. The primary tug would be tethered at the direction of the Pilot. A third tug would be required to assist with turning and mooring (see section 4.11.5.4 and the WSR in Appendix N).
	Recommends at least two Columbia Bar Pilots be on the LNG tanker ships at all times between the sea buoy, along the Astoria coast, and through the city jurisdictional limits.	The Coast Guard would require that LNG vessels must board a Pilot(s) at least 5 miles before the CR Buoy, and for at least the first 6 months, at least two Pilots must be present throughout the transit (see section 4.11.5.5 and the WSR in Appendix N).
	The City does not currently have marine law enforcement assets which will be needed to supplement the Coast Guard escorts, especially within the City's jurisdictional waters.	We included a recommendation that the Emergency Response Plan include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies (see section 4.11.7 and the WSR in Appendix N).

TABLE 2-1 (cont'd)

The FERC's Responses to Concerns Presented in the ODE Safety Advisory Report for the Bradwood Landing Project

Commentor/Topic	Issue	Response ^a
	Require the applicant to fund LNG emergency response training similar to that offered by Texas Engineering Extension Service (a member of Texas A and M) and compensate fulltime and volunteer firefighters to attend training. A fireboat would be needed to provide adequate protection for waterfront properties.	See above.
	The City of Warrenton expects to be fully compensated for the additional costs associated with added police, fire and emergency response personnel and equipment needed during LNG transit.	See above.

^a Sections listed are the relevant sections of the Environmental Impact Statement for the Bradwood Landing Project.

**3.0 SAFETY ADVISORY REPORT ON THE PROPOSED BRADWOOD LANDING
LIQUIFIED NATURAL GAS TERMINAL AT RIVER MILE 38 ON THE COLUMBIA
RIVER, JULY 6, 2006**



Oregon

Theodore R. Kulongoski, Governor



OREGON
DEPARTMENT OF
ENERGY

625 Marion St. NE
Salem, OR 97301-3737
Phone: (503) 378-4040
Toll Free: 1-800-221-8035
FAX: (503) 373-7806
www.Oregon.gov/ENERGY

VIA Electronic Filing

July 6, 2006

The Honorable Magalie Roman Salas
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: Bradwood Landing LLC LNG Import Project, Docket No. CPO6-365-000, CP06-366-000,
CP06-376-000, CP06-377-000

Dear Ms. Salas:

On June 5, 2006, Bradwood Landing LLC filed an application for construction of a terminal for importation of liquefied natural gas (LNG) to be located at about River Mile 38 on the Columbia River in Oregon. Bradwood Landing also filed an application for an associated pipeline to run 36 miles from the proposed site, under the Columbia River and into Washington state. The Energy Policy Act of 2005, enacted on August 8, 2005, specifies in Section 311(d) that the Governor of a state where a proposed LNG terminal would be located shall designate a state agency to consult with the Federal Energy Regulatory Commission regarding applications and that this state agency may prepare a safety advisory report that addresses state and local safety considerations. This provision in the Energy bill appears to be specific to the terminal and not to any associated pipeline. The report is due 30 days from the application filing date.

The Governor of Oregon has designated the Oregon Department of Energy as the agency responsible for preparation of a safety advisory report for the proposed Bradwood Landing LNG terminal. Therefore, enclosed for filing in the above-mentioned proceeding, please find an electronic copy of the safety advisory report for the proposed LNG terminal. If you have any questions in this matter, please contact Catherine Van Horn at (503) 378-4041 or catherine.vanhorn@state.or.us

Sincerely

Ken Niles
Assistant Director
Nuclear Safety and Energy Facility Siting

SAFETY ADVISORY REPORT

ON THE PROPOSED BRADWOOD LANDING LIQUEFIED NATURAL GAS TERMINAL AT RIVER MILE 38 ON THE COLUMBIA RIVER

***PREPARED BY THE STAFF
OF THE OREGON DEPARTMENT OF ENERGY***

JULY 6, 2006

SAFETY ADVISORY REPORT ON THE PROPOSED BRADWOOD LANDING LIQUEFIED NATURAL GAS TERMINAL AT RIVER MILE 38 ON THE COLUMBIA RIVER

The Oregon Department of Energy (ODOE) issues this Safety Advisory Report on behalf of the State of Oregon pursuant to section 311(d) of the Energy Policy Act of 2005 (the Act). The report concerns the application to the Federal Energy Regulatory Commission (FERC) by Bradwood Landing LLC (Bradwood) to construct a Liquefied Natural Gas (LNG) import terminal and associated natural gas pipeline. The Bradwood Landing Terminal would be located in Clatsop County, Oregon on the southern shore of the Columbia River at about river mile 38. Bradwood filed its application with FERC on June 5, 2006.

The Act allows the state to file an advisory report that identifies “state and local safety considerations” within 30 days of the date the application is filed. The “safety” information solicited in the advisory report is largely repetitive of information that Bradwood itself provides in its application to FERC in its terminal application and in its Waterway Suitability Assessment to the Coast Guard. It is information that Bradwood also must provide in its emergency response plan to be developed in conjunction with the Coast Guard, the state, and appropriate local jurisdictions prior to any construction.

The State of Oregon has been intimately involved in reviewing and commenting on Bradwood Landing’s pre-filing and application resource reports, and is involved with the Coast Guard in reviewing the project’s WSA. To the extent that the State disagrees with the information Bradwood has provided or will provide on safety issues in those venues, the state will pursue corrections or changes through the above review processes. For example, Bradwood has not accurately or adequately characterized in its Waterway Suitability Assessment (WSA) the area’s emergency response capabilities. The Department will work with the Coast Guard, other state agencies and local jurisdictions to correct the information under the WSA process.

The State considered providing FERC with specific scenarios for evaluating accidental or intentional releases of LNG from a vessel or the facility itself. Again, however, such scenarios play a role both in the WSA and in the forthcoming emergency response planning. Moreover, based on recent Commission approvals of LNG terminal projects, the State believes the Commission will find that the risk of any potential LNG release scenario can be reduced to an acceptable minimum.

On June 15, 2006, the Commission approved three new LNG terminal projects: Semptra’s Port Arthur LNG in Port Arthur, Texas; Cheniere’s Creole Trail LNG in Cameron Parish, Louisiana; and BP America Production Company’s Crown Landing LNG in Logan Township in New Jersey. The language in the Commission’s Creole Trail decision about the risk of an accidental LNG release is mirrored in the other two decisions:

Based on the extensive operational experience of LNG shipping, the structural design of an LNG vessel, and the operational controls imposed by the Coast Guard and the local pilots, a cargo containment failure and subsequent LNG spill

from a vessel casualty – collision, grounding, or allision – is highly unlikely. For similar reasons, an accident involving the onshore LNG import terminal is unlikely to affect the public. As a result, the FEIS determined that the risk to the public from accidental causes is negligible.

Further, the language in the Commission's Creole Trail decision about the risk of an intentional LNG release is also mirrored in the other two decisions:

Unlike accidental causes, historical experience provides little guidance in estimating the probability of a terrorist attack on an LNG vessel or onshore storage facility. For a new LNG import terminal proposal having a large volume of energy transported and stored near populated areas, the perceived threat of a terrorist attack is a serious concern of the local population and requires that resources be directed to mitigate possible attack paths. If the Coast Guard issues a Letter of Recommendation finding the waterway suitable for LNG marine traffic, the operational restrictions that would be imposed by the Lake Charles Pilots on LNG vessel movements through this area, as well as the requirements that the Coast Guard would impose, would minimize the possibility of a hazardous event occurring along the vessel transit area. While the risks associated with the transportation of any hazardous cargo can never be entirely eliminated, we are confident that they can be reduced to minimal levels and that the public will be well protected from harm.

For the above reasons, what the State provides in this advisory report largely is broad safety policy statements about the proposed Bradwood project along with a limited amount of specific, technical comments. In addition, the State is attaching one letter each from the cities of Warrenton and Astoria and a package of information from Clatsop County for FERC's consideration. As well, the State of Oregon incorporates by reference the safety comments included in all of the State of Oregon/Department of Energy previous filings to the FERC Northern Star Docket #PF05-10-000, and especially those comments and attachments submitted on October 5, 2005, and posted to the docket on October 17, 2005.

Although the application to FERC is limited in scope to the LNG terminal and associated pipeline, we consider the risks from a release of LNG on the river to be among the most significant safety concerns associated with the facility. The safety of the LNG terminal is strongly connected to the question of safety on the river and in the communities that the LNG carriers must pass. We expect FERC to address issues and concerns raised by stakeholders in those communities and to consider the safety of those communities in determining whether to approve the LNG terminal and associated pipeline.

Each of the state and local agencies in Oregon, whether or not they contributed to this advisory report, reserve their right to file additional joint or separate comments and/or evidence on safety and other issues.

State of Oregon General Policy Comments

1. **FERC should require an applicant to commit to 100 percent of the safety and security costs directly associated with the LNG vessel transits, the facility and the pipeline.**

Under Section 311(e)(2), an emergency response plan to be developed prior to construction must include a cost-sharing plan that includes a “description of any direct cost reimbursements that the applicant agrees to provide to any State and local agencies with responsibility for security and safety at the LNG terminal and in proximity to vessels that serve the facility.” The State understands and appreciates that Bradwood Landing has agreed thus far to pick up the costs of most safety and security needs that the company has identified as necessary. However, the local jurisdictions are not in a position to dedicate their own limited funds to any LNG safety and security measures that may be required. In addition, local jurisdictions may not agree with an applicant about the level of resources required. An applicant should first be required to pay for an adequate assessment of safety and security needs and then pay for all infrastructure, planning, training and other associated costs identified in an emergency response plan agreed to by the state and local jurisdictions. Should FERC not require the applicant to commit to 100 percent of the costs, FERC should explain its authority for imposing such costs on local jurisdictions and the state.

2. **The safety/security zones proposed for the vessel in transit and the vessel at dock must be sufficiently calculated and justified. The applicant or Coast Guard must thoroughly explain any changes to those zones that might accompany heightened national security as well as any resulting impacts.**

Some area residents have expressed concern that the safety/security zones will be so large that they will “shut down” traffic on the Columbia River or access to Clifton Channel near the proposed terminal site. Others have expressed concern that the safety/security zones will be too small, sized to avoid the above concern rather than for adequate safety protection. Any zones proposed should provide a rationale for their size.

3. **FERC should require an applicant to complete an acceptable emergency response plan prior to any Commission decision on an application and in conjunction with the Coast Guard’s validation of the Waterway Suitability Assessment.**

Under Section 311(e)(1), FERC will not require Bradwood to create an emergency response plan until after a positive decision by the Commission and just before any final approval to begin construction. However, to the extent that Bradwood’s Waterway Suitability Assessment relies on the creation of a satisfactory emergency response plan to ensure that the Columbia River is suitable for LNG, that emergency response plan must be available for review prior to any decisions on both the WSA and the FERC application. It would be illogical for either the Commission or the Coast Guard to decide that LNG is safe for the region without knowing first if a suitable emergency response plan can be enacted along the vessel route and at the facility.

4. **The applicant’s Emergency Response Plan must be developed in full cooperation with state and local authorities, including authorities from Washington State.**

Emergency response planning must be an integrated, carefully developed effort with those potentially affected from both sides of the river.

- 5. The applicant's Emergency Response Plan must sufficiently and accurately characterize the emergency response capabilities along the vessel transit route and near the facility, including response times. The Plan must mitigate for any safety gaps.**

Thus far, the state and local jurisdictions have not seen in Bradwood's assorted filings accurate characterizations of the area's stretched emergency response capabilities. Clatsop County, the cities of Warrenton and Astoria, and the rural Knappa Fire Protection District all have expressed concern about the lack of personnel, equipment and storage facilities to support an LNG vessel and terminal/pipeline. In addition, Highway 30's slow, winding character, greatly affected by inclement weather, as well as the condition of Clifton Road should be taken into account in any discussion of emergency response capabilities.

- 6. The applicant's Emergency Response Plan must include all potentially affected communities along the LNG vessel route and near the terminal in a comprehensive, thoroughly publicized warning system.**

Any community located within one of the three Sandia zones of impact must be considered in emergency response plans, including access to a reverse 911 system and sirens.

- 7. The applicant's Emergency Response Plan must account for potential population increase due to tourism.**

According to a 2004 Clatsop County Grand Jury Report, Clatsop County's population can increase by 50-to-100 percent or more during high tourism season. Depending on the location of those visitors, the influx may bring challenges for LNG emergency response education as well as LNG ship transit education

- 8. Any FERC authorization for an LNG terminal and associated pipeline in Oregon must fully comply with Oregon state and local laws and regulations, including energy facility siting laws.**

In particular, the State of Oregon requires large energy facilities to provide a bond or letter of credit to ensure that the proposed site can be restored to a useable, non-hazardous condition. We consider the bond or letter of credit to be a safety precaution against a potentially abandoned or otherwise vacated site. Thus far, the applicant does not appear to have addressed this issue in its application materials.

State of Oregon Specific Comments

Terminal Design

In resource reports 1 and 11, Bradwood Landing has committed to designing and constructing the terminal in accordance with all requirements of 49 CFR 193 and National Fire Protection Association (NFPA) 59A. Resource report 1 states that the primary storage tank may be constructed of either nine percent nickel steel or, alternately, prestressed concrete. While either construction method is allowed by NFPA 59A, FERC should require that the safer option be selected.

Resource reports 1, 11 and 13 consistently commit to compliance with NFPA 59A and codes referenced therein, but with little information on the actual details of compliance. Even if detailed design information were available, the short deadline for this advisory report does not

permit a detailed design review, sufficient to audit Bradwood Landing's design against NFPA code requirements on a line-by-line basis. We expect FERC to perform this detailed design review, and reserve the right to comment on design issues as more time and more information become available.

Hazard Identification

Hazards potentially affecting the public are discussed in Resource Report 11 and its attachments. As required by NFPA 59A, Bradwood Landing used the LNGFIRE and DEGADIS codes to calculate thermal radiation and vapor dispersion from the design basis spill. Resource report 11 includes isopleth drawings and input decks for these calculations at Attachment 11A. As noted above, the short deadline for this advisory report did not allow a detailed review of all the inputs and assumptions to these calculations. However, FERC should verify that Bradwood Landing chose the most conservative assumptions regarding break size, meteorological conditions, and accident scenario for all calculations. The input tables in attachment 11A show assumptions regarding pipe break sizes and leak rates. FERC should verify that the most conservative values were selected. For pipe breaks, the most conservative assumption is a non-mechanistic double ended ("guillotine") break with all pumps running. We assume but could not verify that this was the break used for calculation purposes. Bradwood Landing should use this break unless it can demonstrate that either a smaller break is more conservative or the guillotine break in this circumstance is not credible. We also assume but could not verify that intentional spills were assumed, since they likely bound any accident scenario.

We note that thermal radiation maps in attachment 11A appear to be centered at the tanks, and extend out to the dock. Because the accident or intentional spill could just as easily happen at the carrier or the unloading arms, the thermal radiation maps and vapor dispersion maps should be shown centered at the location closest to an affected population (in this case, the dock). For the Bradwood Landing site the nearest affected population is most likely the residences on Puget Island.

Our review of attachment 11A shows that the meteorological conditions assumed appear to be average conditions. For example, 51.5 degrees Fahrenheit, 50 percent relative humidity, and 4.5 mph wind speed may not be worst case conditions. Similarly, the assumption of pure methane is probably not representative of actual cargo and may not be conservative. We expect FERC to verify that conservative assumptions were used in NFPA 59A required calculations. The EIS for this project should explain how these assumptions were made and why they are the most conservative.

Quality Assurance

At various sections of its application, Bradwood Landing takes credit for the programmatic measures it will take to ensure that systems and components important to safety will function as designed. At resource report 1, section 1.4, Bradwood Landing commits to a quality assurance program "***in accordance with Bradwood Landing's standard policy***." In resource report 11, Bradwood Landing takes credit for programmatic safety measures such as enforcement of procedural compliance during construction and operation.

We agree that a rigorous and comprehensive quality assurance program is as essential to safety as the design of the facility or its location. However, our review of 49 CFR 193 and NFPA 59A did not reveal any standards for an acceptable QA program. Other than the reference to Bradwood Landing standard policy, the applicant did not identify the elements of its program. If the program is standard policy, then a sample plan from a previous project should be available for state and public review. We would expect to see evidence that the QA function is independent of operations, scheduling or budgeting. We would expect to see steps to ensure that:

- i metal components are fabricated of metals with the specified metallurgical content and properties,
- ii concrete or other structural materials are tested to the strength specified,
- iii vendors of equipment and material are audited by qualified auditors,
- iv nondestructive tests are observed and approved by independent quality control personnel,
- v personnel performing safety related construction or operation activities are properly qualified, with documentation of that qualification available for audit,
- vi construction and operations are performed in accordance with approved procedures,
- vii only controlled copies of design documents are used in construction, with only the current revision used in the field,
- viii all changes in design documents are carried forward to other related and associated design documents,
- ix measurements are made with equipment that is calibrated and traceable,
- x conditions adverse to quality are subject to a corrective actions program that results in actions to prevent recurrence.

Safety Issues

The material in resource report 5 describes an area of relatively low population density, with most affected houses on Puget Island in Washington state. As noted above, a complete description of the affected area would take into account the City of Astoria, a growing community with increasing tourism largely concentrated along the shoreline.

As written, the resource report is misleading in that it characterizes the entire county for population density. The resource report fails to adjust for the fact that most of that population is along the shoreline, quite close to the river channel where the LNG carriers would travel. Therefore the potentially affected population is actually much higher in density than implied in the application. The report also does not mention that during parts of tourist season, the population can more than double. Roads during particularly busy summer weekends frequently back up. This would be a particular concern in the unlikely event that an evacuation might become necessary.

The State of Oregon has reviewed the Safety Advisory Report on the proposed LNG terminal at the Port of Long Beach (POLB) issued by the California Energy Commission (CEC). That report relies largely on material taken from two readily available reports: (1) the Sandia Labs' November 2004 report "Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water" (Sandia Report) and (2) Richard Clark's "LNG Facilities in Urban Areas."

The safety significant events listed in Sandia and Clark and quoted in the CEC advisory report could apply to any terminal at any location and need not be repeated in this report. However, we agree with CEC that the 5 kw/m^2 is described in the Sandia Report as “the permissible level for emergency operations lasting several minutes with appropriate clothing” (Table 6, p.38). This is the lowest heat flux shown in the thermal radiation maps provided in Attachment 11A. Because the people occupying the nearest residences (those on Puget Island) are relatively far from the nearest fire station and do not have the appropriate clothing or emergency training, thermal radiation calculations should show the point at which worst case heat flux will permit safe evacuation, possibly requiring more than “several minutes” and without appropriate clothing or emergency training. The CEC advisory report at p. 15 suggests 1.5 kw/m^2 . Bradwood Landing should calculate the distance to this heat flux for a design basis event at Bradwood Landing and issue a figure showing the results. As noted previously, Bradwood Landing should calculate this distance not from the tanks but from the point on the facility nearest the affected properties (presumably the dock).

Emergency Response Capabilities near the Facility Location

We note that Bradwood Landing, in its application, commits to an Emergency Response Plan but did not provide a detailed description. To our knowledge, FERC has not issued rules, regulatory guidance or a standard review plan for an acceptable emergency response plan for LNG facilities. We are familiar with the U.S. Nuclear Regulatory Commission’s NUREG 0654, which is the regulatory standard for emergency plans at commercial nuclear plants, and consider it to be one good model, although not the only model.

Whatever model is used, FERC should make clear to the public what elements it is looking for in an emergency plan. Although the details of the WSA are withheld from public disclosure, information regarding measures to protect the public during a design basis event should be a part of public outreach and should be available before the issuance of a FERC construction permit. Most important, the communities along the Oregon and Washington shore are correctly characterized in the resource reports as primarily rural communities without extensive police, fire and emergency medical organizations. If the hazards assessment in the WSA shows that more resources are necessary in these communities to respond to a design basis emergency, the communities can only get these resources if Bradwood Landing funds them.

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**MEMORANDUM**

TO: Andy Jordan, Clatsop County Counsel

FROM: Kathleen Sellman, Community Development Director *us*

SUBJECT: Bradwood Landing Proposal Comments

DATE: June 30, 2006

**Department of
Community Development**
800 Exchange Street
Suite 100
Astoria, Oregon 97103

Clatsop County has prepared a number of detailed comments in response to the Bradwood Landing Terminal Application Under Section 3 of the Natural Gas Act. Many of our comments were raised in our March 29, 2006, letter to Magalie Salas, Secretary, Federal Energy Regulatory Commission (FERC) in response to Bradwood Landing's draft resource reports. It does not appear that the Resource Reports now under review have addressed these concerns adequately.

**Economic Development
Planning & Development**
Telephone (503) 325-8611
Fax (503) 338-3666

Attachment 1 is a Memorandum dated June 30, 2006, prepared for Clatsop County by Columbia River Estuary Task Force (CREST), a council of governments of which Clatsop County is a member. That Attachment contains several numbered exhibits. Attachment 2 is a Memorandum from Public Works Director Ed Wegner dated June 27, 2006.

Building Codes Division
Telephone (503) 338-3697
Fax (503) 338-3666

Inspection Request Line
(503) 338-3698

In summary, the county asserts the following orders from FERC are necessary to preserve the public interest:

Clatsop County requests FERC to order Bradwood Landing Terminal to comply with the county's adopted land use regulations in the siting and development of its proposed liquified natural gas project. A Use and Permit Matrix Exhibit included in Attachment 1 provides the county's best effort to specify the land use requirements. While a portion of the Bradwood Landing site has been identified as future water-dependent development in the comprehensive plan, such future development has been described as small to medium in scale. Some portions of the site are zoned at this time to support industrial development, but other portions are not. Compliance with local land use ordinances and plans is integral to consistency with the Coastal Zone Management Act. The county reserves the right to expand or otherwise modify the approvals required when site-specific information becomes available from the applicant.

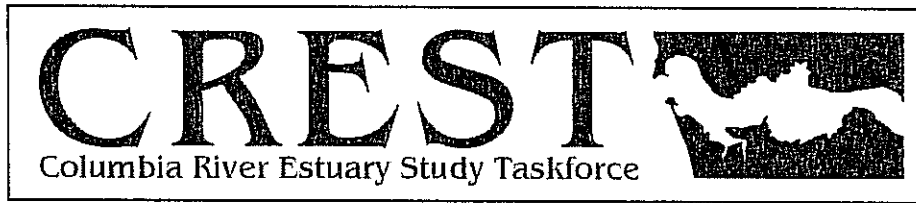
Clatsop County requests FERC to order the applicant to enter into a cost reimbursement agreement with the county for additional staff time, training, and expertise related to the review and inspection of land use plans, building plans, and site development and construction. A highly technical and specialized project such as this one may require, for example, additional training for Clatsop County inspectors or the temporary hiring of third party expertise.

Clatsop County requests FERC to order the applicant to fund 100% of costs related to public safety response related to development and operation of the proposed facilities. Such costs include both capital expenditure and ongoing operational costs including personnel, equipment and equipment storage, transportation, emergency access and facilities, and training.

Clatsop County requests FERC to order the applicant to fund 100% of capital improvements required to mitigate impacts of the proposed LNG facility's development and operation including improvement of transportation facilities such as Clifton Road. The applicant is producing a Traffic Impact Study and Traffic Management Plan. County Sheriff Tom Bergin expresses particular concern about increasing the volume of large truck traffic on Highway 30. Highway 30 is characterized by curves and no alternative route exists when it is closed as for a major accident.

Please let me know if you require additional information to prepare the county's protest.

ATTACHMENT I



DATE: July 3, 2006

TO: Kathleen Sellman, Clatsop County CDD Director

CC: Patrick Wingard, Senior Planner

FROM: Catie Fernandez, Coastal Planner

SUBJECT: Comments to the Northern Star Natural Gas proposal to the Federal Energy Regulatory Commission for a liquid natural gas terminal at Bradwood, Oregon

Bradwood Landing, LLC (also commonly referred to as Northern Star Natural Gas or NSNG) filed an application for authorization to site, construct and operate a liquefied natural gas terminal for the purpose of importing LNG into the United States under with the Federal Energy Regulatory Commission (FERC) on June 15, 2006. The project is proposed for Bradwood, Oregon, a former mill in Clatsop County.

CREST staff has prepared comments relative to the Resource Reports provided by Bradwood Landing, LLC as part of the FERC application. The comments are organized by Resource Report and attempt to relate as much as possible to Clatsop County's Land and Water Development and Use Ordinance (LWDUO), Standards Document and Comprehensive Plan. However, the comments do not represent a comprehensive review of the proposal to the County's approval criteria for land use applications.

This memo includes a number of attachments as follow:

Exhibit 1	Comments to draft Resource Report 8 dated March 29, 2006
Exhibit 2	Use/Permit Matrix
Exhibit 3	CREST memo to Clatsop County regarding dredged material management plan dated May 23, 2006 and revised June 20, 2006.
Exhibit 4	CREST Comments to Resource Report 2, dated July 3, 2006

A. General Project Comments

The Bradwood site was envisioned as an industrial site for a small to mid-size industrial use. This is reflected in the site's zoning designations, and supporting infrastructure. Elements of the proposed development are not permitted as currently zoned. Areas of the Bradwood site that can support industrial uses are zoned MI (Marine Industrial) and AD (Aquatic Development). Surrounding aquatic and wetland areas are zoned AC-2 (Aquatic Conservation Two) and AN

(Aquatic Natural) due to the ecological functions they provide. These land use designations are the product of a larger management plan for the Columbia River Estuary. Additional background was provided to FERC during the pre-filing process, and is enclosed as Exhibit 1 to this memo.

The Clatsop County Community Development Department asserts that compliance with local land use ordinances is integral to consistency with the Coastal Zone Management Act (CZMA).

County Staff has expended considerable time monitoring and commenting to the FERC pre-filing process, and now the filing process. This time has come out of a budget that has no contingency for a project of this scope or venue. If and when land use applications are submitted to the County for review, the County's land use application fee will be required with application. For a project of this nature, it is expected that the applicant, will enter an agreement with the County to reimburse for staff review time and materials beyond the application fees. This will allow the County to thoroughly review applications within the state-mandated timelines by hiring additional assistance for the review and/or pay for overtime as deemed appropriate by the Community Development Director.

Similarly, it is expected that the applicant will enter an agreement to reimburse the County for additional staff time and expertise related to the review and inspection of building permits.

B. Resource Report 1. Project Description

This Report, as the name implies, provides an overview of the overall project, including site description, terminal facilities, facilities in the aquatic areas, and off-site facilities such as roads and power lines. In the absence of land use applications or specific information relating to the County's ordinances, the following comments are provided. The comments attempt to relate the project activities and elements to County Ordinances, but given the volume and organization of materials, the following comments are not an exhaustive review of the project relative to all applicable County regulations. Exhibit 2 to this memo is a matrix that identifies the various project components, to the best extent possible, the zoning of that project component, and the land use permits that would be required.

The report does not address the pipeline, which is submitted as a separate filing. CREST, on behalf of the County, reserves the right to comment relative to the pipeline proposal in the future.

1. An in-water berth measuring 330 feet in length and 45 feet in width is proposed. New mooring dolphins are also proposed. The berth and dolphins appear to be proposed in waters that are zoned Aquatic Development by Clatsop County. While dredging and piling installation for water dependent industrial uses is permitted, these activities are subject to the Development Standards of the AD zone (LWDUO Sec. 3.754) and the requirements of the Standards Document (S4.208 and S4.232). Compliance with these standards has not been established.

In addition to the berth, an extensive turning basin will be necessary. The turning basin are proposed to be located in areas zoned AD and AC-2. Dredging for the berth and turning basin or installation of any piling/dolphins are not permitted in the AC-2 zone. Under the normal course of land use review, these activities could only be permitted if the zoning of the aquatic area were changed. This information was submitted to FERC when the second round of Resource Reports were submitted by NSNG during the pre-filing process (see Exhibit 1 to this memo).

At this point, NSNG has not submitted any requests for land use approvals, including zone changes to Clatsop County. NSNG has asserted that all County land use permits are preempted by the FERC siting process. To date, NSNG has provided a draft Coastal Zone Consistency determination document to the State of Oregon, Department of Land Conservation and Development (DLCD). This document included an identification that the site is not zoned properly, but provided inadequate information to support the document's conclusions that a zone change is appropriate for this site.

2. The report identifies that Bradwood Road is proposed to be widened to 24-feet in width. NSNG should ensure that the road is constructed to Clatsop County Public Works Standards. These standards are administered by the County Roadmaster through the County Public Works Department.
3. Hunt Creek Bridge is proposed to be replaced with a 90 foot long by 28.5 foot wide rail car crossing. Based on the plans provided, it appears that the bridge and associated support structures will be located in the F-80 (Forest-80), AN (Aquatic Natural) and Marine Industrial (MI) zones. The purpose of the Forest-80 zone is to protect the County's forest income by conserving the County's forest lands and assuring continuous growth of forest lands for harvest with sound management of natural resources. To that end, new bridge support structures are only permitted as a Conditional Use after a goal exception to the County's agricultural and forestry goals has been taken. As described under item 2, taking a goal exception is an involved process that requires significant demonstration on the part of the applicant that the exception is warranted. In the AN zone, bridge crossings are a Review Development. This means that the applicant would need to show that the standards of the AN zone are satisfied, including that the development satisfies all policies of the Comprehensive Plan, Estuarine Resources and Coastal Shorelands Element in addition to the Columbia River Estuary Shoreland and Aquatic Use and Activity Standards. The portion of the bridge support structure in the MI zone is a Conditional Use, meaning that the development needs to satisfy the standards of the MI zone including all policies of the Comprehensive Plan, Estuarine Resources and Coastal Shorelands Element in addition to the Columbia River Estuary Shoreland and Aquatic Use and Activity Standards. In addition, uses that are listed as Conditional in the LWDUO are reviewed on an individual basis to determine if the use is compatible with their location, surrounding uses and the comprehensive plan.
4. The existing Portland and Western rail line is proposed to be relocated in order to accommodate the terminal facilities. The realignment would move the rail line from the Marine Industrial zone to the Aquatic Natural zone. The rail line is not permitted in the Aquatic Natural zone. NSNG has opined in the draft CZM consistency document that a zone change is warranted for the relocation of the rail line. However, there is no compelling evidence to support encroachment into natural resource areas. The Marine Industrial boundary has been established for the areas of the Bradwood site that are appropriate for industrial development. The argument that a zone change or encroachment into the AN zone simply for the purpose of allowing larger scale development than originally envisioned at the Bradwood site is not compelling and falls short of zone change criteria.
5. In addition to establishing zoning districts, the County has established riparian areas (also referred to as "riparian buffers" or "riparian zones") associated with water bodies and wetlands. Setting land use designation or zoning aside, the relocated rail line does not appear to meet this requirement of the County's standards. Areas of riparian vegetation are identified as 50-feet from the mean high waterline area for estuarine rivers and sloughs. Where emergent wetland vegetation exists next to a river, the 50-feet shall be measured from the landward extent of the emergent wetland area. If a shrub or forested wetland area exists next to a river, the zone of riparian vegetation shall be the entire area of shrub or forested wetland. This requirement is applied throughout Clatsop County, regardless of zoning district and whether or not a use is considered an "approved use", "review use" or "conditional use".
6. A 5-acre temporary construction parking lot is proposed off of Highway 30 at Clifton Road. The parking lot is proposed in the F-80 zone. This use is not permitted in this zone, as its purpose is to reserve forest lands for production. Setting aside the zoning issue, the Community Development Department recommends against locating the parking area at this location due to its isolated, rural nature. The parking area as proposed appears to offer easy opportunity for car prowls, particularly if construction schedule demands nighttime work. County resources are already stretched thin, and minimizing situations that will require additional law enforcement is a high priority. Further, NSNG's effort to "encourage carpooling" as mentioned in other Resource

Reports appears to be superficial at best. The County recommends limiting parking to the development site, while providing real incentives for carpooling or providing a shuttle bus service from an urbanized area.

7. A 1.6 mile electrical powerline is proposed from the Bradwood Landing site to the existing electrical infrastructure. The structures supporting the lines are proposed to be 65 feet in height. A 105 foot right of way is proposed to be cleared to accommodate the line, and the applicant's materials indicate that the alignment is, "to be determined during detailed engineering". However Figure 1-23 shows an aerial photo with an overlay of the proposed line and 105 foot right of way. The powerline and its associated right of way appear to pass through the riparian buffer associated with the Columbia River. As mentioned previously, the riparian buffer is 50-feet from the river, or in the instance where a shrub or forested wetland area exists next to a river, the entire area of shrub or forested wetland is the riparian area. Throughout Clatsop County, removal of vegetation in the riparian area is not permitted to accommodate development needs.

8. The two concrete storage tanks, which are 160 feet in height and 262 feet in outer diameter are proposed to be constructed upon dredge spoils. The applicant has provided a geotechnical report (Attachment 6B to Resource Report 6). It is anticipated that this report includes detailed information to assure the Clatsop County Building Codes Division that the soils are structurally sound to support the tanks. Additional geotechnical work may be required of the applicant at the time of building permit application to ensure compliance with County Ordinances and the International Building Code.

9. Resource Report 1 also briefly touches on "other" components of the development including such features as pipe racks, administrative offices and the control room. All of the structural elements will require building permits and inspections to ensure compliance with the applicable building codes. For a project of this nature where the components are highly technical and specialize, additional training for Clatsop County inspectors or the temporary hiring of third party inspectors may be required.

10. The County's standards document requires that water be provided for new development by either a public water system, well, spring, river, stream or pond. Depending on source, a permit from the State Water Resources Board will be required. Non-potable water for construction and irrigation is proposed to be drawn from an on-site well. It is assumed that the State Watermaster will comment relative to water rights and Permits. River water is proposed for ship ballast water (approximately 11-14 million gallons per carrier) and on-board cooling mechanisms as well as terminal fire suppression systems, which are tested on a weekly basis. Again, a permit from the State Water Resources Department will be required. Additionally, it is assumed that other regulating agencies, such as NOAA will identify the environmental issues and impacts to threatened and endangered species associated with drawing this volume of water from the Columbia River. Potable water is proposed to be provided by trucking in bottled water. Again, the County's standards document requires that water be provided for new development by either a public water system, well, spring, river, stream or pond. It does not make allowances for bottled potable water. This is an issue that will need to be resolved if/when the development moves forward.

11. One feature that the report doesn't address is a waste water outfall. It is assumed that the non-potable water used for construction purposes and operation of the facility will be returned to the Columbia River (water is proposed to be drawn from an on-site well for non-potable uses; bottled water is proposed for potable uses and hydrostatic testing; and, river water is proposed for ballast water and on-board cooling). Any outfalls, either for the return of waste water or storm water are subject to the requirements of Clatsop County as identified in Exhibit 2.

12. Attachment 1-A to Resource Report 1 is the NSNG Dredged Material Placement and Management Plan. Comments to this plan are provided in the attached memo from CREST to Clatsop County dated May 23, 2006 and revised June 20, 2006 (Exhibit 3).

C. Resource Report 2, Water Use and Quality

Please see Exhibit 4 to this memo.

D. Resource Report 3, Fish, Wildlife and Vegetation

The following comments are provided by Columbia River Estuary Study Taskforce (CREST) as the County has an interest in ensuring that new development does not negatively affect natural resources. In general, work proposed in the estuary is subject to an Environmental Impact Statement (EIS). The EIS will need to address many of the same issues discussed in Resource Report 3.

1. Page 5, paragraph 6: Need more detailed "local" information on sturgeon and their habitat in the Columbia River. Adults use shallow water as well as juveniles. Generally much too thin on sturgeon information and needs many more references for the Columbia River.
2. Page 6, paragraph 2: Cutthroat "roam" throughout the lower Columbia River, they do not remain in "these streams" throughout their life cycle. The report needs much better information on Columbia River cutthroat life history and many more references.
3. Page 6, paragraph 3: Need references and more information on shad.
4. Section 3.2.2.1, paragraph 1: Is there no EFH for chum? Needs to be mentioned.
5. Page 6 (3.2.2.1): Very poor information regarding Columbia River chinook salmon, needs much better references. There are a ton of papers and reports on the life history of chinook salmon, include these in this section.
6. Page 7, Coho: Very poor information regarding Columbia River coho salmon, needs much better references. There are a ton of papers and reports on the life history of coho salmon, include these in this section. This section stated that "most coho fry stay in for 1 year". This is not accurate, some stay, some go that year. Needs much better more accurate information on the life history of the lower Columbia River coho.
7. Page 7, Rec Fishing, last paragraph: Needs much more information on recreational fishing in the lower Columbia. Section should include times of year, how many people are out there, etc...Also take out the popularity of warm water species which seems too much like an opinion rather than true facts.
8. The following sections are suggested reading and references that could be included into the report. These do not include any references on life history of salmonids in the lower Columbia River.

Noise Effects

Arimoto, T., S. Akiyama, K. Kikuya, and H. Kobayashi. 1993. Fish-herding effect of an air bubble curtain and its application to set-net fisheries. – ICES mar. Sci. Symp., 196: 155-160.

Sharpe, F.A., and L.M. Dill. 1996. The Behavior of Pacific Herring Schools in Response to Artificial Humpback Whale Bubbles. Behavioral Ecology Research Group, Department of Biological Sciences, Simon Fraser University, Burnaby BC. December, 1996.

Amoser, S., and F. Ladich. 2003. Diversity in noise-induced temporary hearing loss in otophysine fishes. Journal of Acoustic Society of America. 113(4):2170-2179.

Mann, D.A., Z. Lu, M.C. Hastings, and A.N. Popper. 1998. Detection of ultrasonic tones and simulated dolphin echolocation clicks by a teleost fish, the American shad (*Alosa sapidissima*). *J. Acoust. Soc. Am.* 104: 562-568.

Mann, D.A., D.M. Higgs, W.N. Tavalga, M.J. Souza, and A.N. Popper. 2001. Ultrasound detection by clupeiform fishes. *J. Acoust. Soc. Am.* 109: 3048-3054.

McCauley, R.D., J. Fewtrell, and A.N. Popper. 2003. High intensity anthropogenic sound damages fish ears. *Journal of Acoustic Society of America.* 113(1):638-642.

Turnpenny, A. W. H., Thatcher, K. P. and Nedwell, J. R. 1994. The effects on fish and other marine animals of high-level underwater sound. Report prepared for UK Defense Research Agency. (FRR1 27/94).

Feist, B.E. 1991. Potential Impacts of Pile Driving on Juvenile Pink (*Oncorhynchus gorbuscha*) and Chum (*O. keta*) Salmon Behavior and Distribution. M.S. Thesis, Univ. of Washington, Seattle. 66 p.

Effects of Wharfs, Armoring, Dredging

Barnard, W. D. 1978. Prediction and Control of Dredged Material Dispersion Around Dredging and Open-Water pipeline Disposal Operations. Technical Report DS-78-13. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Heiser, D.W. and E.L. Finn. 1970. Observations on Juvenile Chum and Pink Salmon in Marine and Bulkhead Areas. Washington Department of Fisheries. Supplemental Progress Report. Puget Sound Stream Studies. Olympia, Washington.

Prinslow, T.E., C.J. Whitmus, J.J. Dawson, N.J. Bax, B.P. Snyder, and E.O. Salo. 1980. Effects of Wharf Lighting on Outmigrating Salmon, 1979. Fisheries Research Institute, Univ. of Washington. FRI-UW-8007.

Ratte, L.D. and E.O. Salo. 1985. Under-Pier Ecology of Juvenile Pacific Salmon (*Oncorhynchus* spp.) in Commencement Bay, Washington. Final Report to the Port of Tacoma. Univ. Washington Fisheries Research Institute. FRI-UW-8508.

Salo, E.O., N.J. Bax, T.E. Prinslow, C.J. Whitmus, B.P. Snyder, and C.A. Simenstad. 1980. The Effects of Construction of Naval Facilities on the Outmigration of Juvenile Salmonids from Hood Canal, Washington, Final Report. Fisheries Research Institute, FRI-UW-8006, University of Washington.

Thom, R.M., D.K. Shreffler and K. Macdonald. 1994. Shoreline Armoring Effects on Coastal Ecology and Biological Resources in Puget Sound, Washington. Prepared for Ecology Shorelands and Water Resources Program. Ecology Report No. 94-80.

Weitkamp, D.E. 1982. Juvenile Chum and Chinook Salmon Behavior at Terminal 91, Seattle, Washington. Report by Parametrix to the Port of Seattle. 21 p.

E. Resource Report 4 Cultural Resources

Resource Report 4 appears to address relevant historic and cultural resource issues, however, agencies with more expertise, such as the State Historic Preservation Office (SHPO) may require additional information. If the project moves forward, and archaeological resources are discovered during excavation or construction, the resource shall remain intact until a plan for excavation or reinternment has been developed by the State Historic Preservation Office.

F. Resource Report 5 Socioeconomic

1. The report explores the effects to commercial/recreational craft should safety zones be implemented around LNG carriers. The safety zones analyzed include a 1,000 yard zone (ahead and back) or a two mile ahead, one mile back scenario. The report also assumes a 200-yard zone when ships are docked at Bradwood and draws the conclusion that access to Clifton Channel would not be affected. It is unclear why a 200-yard zone assumption was made for a docked LNG carrier. However, if the Waterway Suitability Analysis (WSA) process results in a greater safety zone for docked carriers, there is a higher likelihood that access to Clifton Channel will be impacted (particularly in light of Army Corps navigational structures that are in the water at this location).
2. The report provides an overview of existing emergency service providers and makes no prediction or assumptions as to what additional public safety measures may be needed with the development of an LNG facility. It is expected that additional information is provided in the Waterway Suitability Analysis (WSA), although the WSA has not been made available for Community Development Staff's viewing. Due to the critical nature of public safety as it relates to this project, it is imperative that local first responders be involved in the development of this report. In particular, the numbers in Table 5-7 should be verified. Also, Table 5-7 should be qualified somehow to account for the local road conditions. Distance in miles may be deceptive due to slow traffic on Highway 30 caused by weather conditions (fog, rain, wind) and seasonal tourist traffic. It should also be noted that there are no alternate routes should Highway 30 be closed due to landslide, fallen trees or other hazard. It is also expected that the applicant will fully support additional public safety measures to accommodate a development of this nature.
3. The report briefly discusses existing transportation facilities and identifies that a traffic study is being developed for County Review. At this time, the traffic study has not been submitted.
4. With regard to rail service, an agreement to move the Portland & Western rail line is attached to this report. It should be noted that the area proposed for rail realignment is zoned AN (Aquatic Natural) due to the ecological value associated with the wetlands/riparian vegetation surrounding the Bradwood site. This issue is discussed in greater detail in section B.4 of this memo.
5. Appendix A, River Use Impact Analysis concludes that there is a general downward trend in shipping traffic on the Columbia and cites the loss of the Hyundai, K-Line and Evergreen lines to support this conclusion. However, in the recent past, the Port of Portland has recently added container service from Yang-Ming and ZIM AMP. These container line additions have been widely publicized, and it is unknown to CREST Staff if there have been any other developments that will increase or decrease shipping traffic in the Columbia River. The most recent data related to ship traffic should be reflected in the applicant's report and in the Environmental Impact Statement.
6. Appendix A also addresses recreational use of the river, including fishing. The report discusses spikes in fishing activities with seasonal fisheries, including Buoy 10 and suggests that timing LNG passages with the seasons could help mitigate conflicts.
7. "Wildlife Viewing" is discussed briefly in Appendix A, with a conclusion that wildlife viewing will not be affected by the construction or operation of the plant because it is located on private property. This section of Appendix A does not consider the potential for wildlife viewing from the river, particularly the value that the Bradwood Cliffs provide.

G. Resource Report 6 Geologic

The Bradwood site is not within the County's Geologic Hazard Overlay (GHO). However, additional geotechnical reports may be required by the Building Official to establish the site soils, particularly the dredged materials are suitable for construction.

1. Section 6.6 of Report 6 discusses the potential need to blast through basalt for the relocated Portland and Western rail line. The impacts of blasting should be a consideration in whether or not it is appropriate to move the rail line into an area that is zoned AN (Aquatic Natural).
2. Section 6.9.1.1 addresses flooding hazards and notes that the dredged materials placed on the site, once graded, will bring the site above flood elevation of 10-feet NGVD. The applicant and FERC should note that the site is mapped as floodplain on FEMA's Flood Insurance Rate Maps (FIRM), and will be treated as floodplain until such time the maps are revised. The applicant or property owner can initiate a map revision by filing the appropriate documents (Letter of Map Revision based on fill) with FEMA.
3. Section 6.12.2 discusses shoreline erosion and potential shoreline stabilization measures that may be implemented in the future. The applicant and FERC should note that shoreline stabilization is reviewed by Clatsop County as part of a land use permit. For areas zoned MI (Marine Industrial) and AD (Aquatic Development), vegetative shoreline stabilization is a permitted use and will require a development permit only while structural shoreline stabilization is a Review Use, subject to a Type II (public notice – no hearing) review in addition to a development permit.
4. Also, it should be noted that there is anecdotal reports of a portion of the Bradwood Cliffs sheering off, creating a wave that caused extensive damage on Puget Island.

H. Resource Report 7, Soils

1. Section 7.2.3.1 discusses revegetation of the temporary impact area and that this area will be seeded with grass rather than shrubs or trees. Vegetation removal in these areas needs to be reconciled with 1) impacts to wetlands, 2) conflicts with county zoning and 3) the requirement of Clatsop County's Land and Water Development and Use Ordinance for 50-foot riparian buffers and a 50-foot buffer around industrial development in the MI (Marine Industrial) zone.
2. Section 7.2.3.1 also discusses soil erosion control measures along the riverbank, including, slope breaks, mulching and rock armoring, as appropriate. As mentioned previously, bank stabilization requires review by Clatsop County pursuant to the Land and Water Development and Use Ordinance (discussed further under Report 6).
3. This Report also discusses that an erosion control plan will be prepared in the future. Erosion control plans are required by Clatsop County with all Development Permit applications.

I. Resource Report 8, Land Use, Recreation and Aesthetics

Clatsop County provided comments to the draft Resource Report 8 as part of the FERC pre-filing process. In general, Resource Report 8 has not been updated or revised to sufficiently address the County's comments and concerns as it relates to land use. These comments are attached for the record (Exhibit 1). Additionally, the following comments supplement those previously provided.

1. Section 8.2.1 indicates that the 52 acre area proposed for the turning basin is primarily within an area designated aquatic development. The report neglects to mention the area (acreage) of the turning basin that require dredging that is located within an area zoned Aquatic Conservation (AC-2). The conservation designation of the area was not arbitrarily applied by the County and Report 8 does not address the resource values that contribute to this zoning designation. As pointed out in the comments to the draft resource report 8 as part of the pre-filing process, the Goal Exception taken for the filling of the log pond for an industrial user specifically does not permit any new dock construction or new dredging projects in Aquatic areas.

2. Section 8.2.1 discusses that the County's Comprehensive Plan anticipates filling of the log pond for an industrial use. The applicant should also be aware that, 1) the area of the log pond will need to be rezoned upon filling and, 2) filling of the log pond is subject to State and Federal removal fill laws and compensatory mitigation requirements regardless of the exception that the County has taken.

3. 8.2.1 discusses Clifton Road and the Hunt Creek Bridge expansions. County comments have been provided in Section B, Resource Report 1, Project Description of this memo.

4. 8.2.1 discusses the facilities for off-loading LNG from carriers and indicates that they will be located in the MI and AD zones. The applicant should note that these facilities are not permitted in the AC-2 zone.

5. Section 8.2.1 indicates that fire suppression water will be drawn from the on-site well. We notice that in Report 1, fire suppression water is proposed to be drawn from the Columbia River. This is a discrepancy that needs to be clarified at the very latest, before building permits are issued.

6. Section 8.2.1 also discusses a buffer area that will surround the project. Clatsop County ordinances include two distinct buffers as it relates to this project. The first type of buffer is a riparian buffer, which is generally 50 feet, and discussed in greater detail in Item A.5 of this memo. The County's Land and Water Development and Use Ordinance also sets forth a buffer for uses in the MI zone. Where the MI zone adjoins a zone other than LI, there shall be an area of depth adequate to provide for a dense evergreen landscaped area which attains a minimum height of 8-10 feet, or such other screening measures as may be prescribed by the Community Development Director. In no case shall the buffer area have less width than the required 50-foot setback of this zone. The MI buffer has more to do with an industrial uses compatibility with surrounding zones, in this case, the Aquatic Development and Forest-80 zones. Therefore, it is expected that there would be a 50-foot riparian buffer provided to all estuarine rivers and wetlands as well as a 50-foot vegetated buffer between all site development and any adjacent zone boundaries. To clarify, the two buffers are not added to each other for a 100 foot buffer, rather, a 50-foot buffer applies to all areas of the site, not simply areas adjacent to rivers and wetlands.

7. Section 8.2.1 also discusses waterway leases and removal-fill permits for dredging and dredged material disposal. Note that the County is required by the State to sign off on these permits prior to submittal to the State for review.

8. Coastal Zone Management Consistency. Section 8.2.5 includes a brief statement with regards to Coastal Zone Management Consistency. Comments relative to CZM consistency have been provided to FERC as part of the pre-filing process (Exhibit 1). A draft CZM consistency certification document has been provided to DLCD, however, it was not included as part of the FERC application. The County Community Development Department believes that compliance with local ordinances is integral to consistency with the Coastal Zone Management Act. To date, adequate evidence for the County to support CZMA consistency has not been provided by the applicant.

9. Section 8.2.6 discusses the zoning of the land where construction of the terminal will occur and provides acreage calculations for each zone that will be impacted. The report also mentions that, "portions of AN land and AC-2 land will be used for purposes not listed as permitted or conditionally permitted in the corresponding zones. Exceptions allowing uses otherwise unpermitted are anticipated by Statewide Land Use Goal 2 and allowed where appropriate reasons justify the exception." This same statement was provided in the draft Resource Report 8. The County prepared a lengthy response to this statement and submitted it to FERC during the pre-filing process (see Exhibit 1 to this document). In the latest version of Resource Report 8, the applicant makes no further efforts to reconcile the zoning conflict.

10. Visual resources. Resource Report 8 has not been amended or improved upon as it relates to visual resources. County comments submitted to FERC (Exhibit 1) indicate that the County identifies the Bradwood Cliffs as a natural and scenic area in the County's Northeast Community Plan and places value on lands visible from the waterway. The LNG storage tanks, which will measure over 160 feet in height will have a significant impact on views of the cliffs from the river, despite the best attempts of the applicant to paint them in a color that will blend with the natural surroundings.

J. Resource Report 9, Air and Noise Quality

The applicant and FERC should note that the County's noise ordinance limits noise between the hours of 10:00 PM and 7:00 AM. Exceptions include businesses in the AF, QM, LI, HI, EFU or F80, or QMO zones and overlays.

K. Resource Report 10, Alternatives

1. Section 10.10.3.3.1 & 2 discuss local and regional alternative sites that were considered for location of the NSNG LNG terminal. Site considerations included, ease of acquiring permits, availability of adequate land, marine and shoreline features, avoidance of major population centers, avoidance of sensitive habitats in construction areas, proximity to pipelines and site control. A Puget Sound location is dismissed due in part, because, "environmental issues and associated regulatory requirements in this region as compared to the proposed project location. The significant permitting issues in the area are related to potential impacts on salmon, wetlands and other resources". Since potential impacts to salmon, wetlands and a host of other environmental issues are raised with the Bradwood application, the applicant's reasoning is ineffective.

2. Section 10.10.3.3.2 further discusses local alternatives based on the various site considerations including site control and availability of adequate land. As commented during the pre-filing process by Oregon's Division of State Lands, the State owns the submersed waters surrounding the site. Further, it could be questioned whether the site contains available adequate land, since the applicant is proposing to move a rail line outside the industrially zoned portion of the site into land zoned Aquatic Natural and dredge a vessel turning basin in aquatic areas with a Conservation designation. In terms of avoidance of sensitive habitats in construction areas, the alternatives analysis is not particularly strong considering the effects this proposed development will have on fish habitat. With respect to fish habitat, the alternatives analysis should consider operational effects such as ballast water intake and waste water outfalls.

3. Section 10.4, Summary and Conclusions includes the following statements:

- *The site is very large and can provide the required space for construction and operation of the terminal and an adequate buffer...*The alternatives analysis does not discuss that the Portland and Western rail line requires movement in to a natural area in order to accommodate the proposed development. Nor does the analysis discuss the extensive dredging required for the turning basin.
- *The site is adjacent to relatively deep water, and has sufficient area for an adequate turning basin.* Again, the alternatives analysis does not address the dredging that must occur to accommodate LNG carriers or the issue of the portion of the dredge area that is zoned Aquatic Conservation.
- *The portion of the site that would be used for the terminal is predominantly zoned for marine industrial use...*Again, there is no mention of the aquatic areas that are zoned aquatic conservation where dredging is not permitted under local ordinances.
- *The site is currently permitted as an official dredge deposit site on the Columbia River.* The analysis does not discuss the fact that upland dredge disposal sites are at a

premium, and upon development, the Bradwood site will no longer be available for disposal.

L. Resource Report 11. Reliability and Safety

Clatsop County Community Development Department offers no specific comments relating to the applicant's reliability and safety report, except to strongly urge provision of adequate police and fire protection for this site, fully funded by the applicant. The County's Comprehensive Plan Goal 11, Public Facilities Background Document discusses the deficiency in the police protection that is being provided in the County. It also recognizes that fire protection is provided by rural fire protection districts, staffed by volunteers.

M. Resource Report 13. Engineering and Design Material

Engineering specifications will be reviewed fully by the Clatsop County Building Codes Division if the project moves forward and an application for building permit is submitted. In the absence of detailed plans, specific comments to this resource report are not provided herein. However, the following general comments are provided.

1. Section 13.1.9 Adjacent Activities discusses a 200-foot vegetation free zone to minimize forest fire. This vegetation free zone will need to be reconciled with the County's requirement for riparian buffers and vegetated buffers around industrial development in the MI zone.
2. Section 13.1.11, Site Development. The applicant and FERC should note that in addition to land use approvals, a development permit and building permits will be required by the County prior to construction. A development permit is required for site grading, prior to any structural elements being constructed as well. In addition to plans and engineering specifications, an erosion control plan will be required with all development permit applications. Road construction is subject to approval by the County Public Works Department and the Community Development Department.

The above comments are provided based on the information available to date. If you have any questions or require any additional information, please contact CREST staff by phone or email. CREST is available for additional comments in the future at the County's request.

EXHIBIT 1

ORIGINAL

Clatsop County

FILED
OFFICE OF THE
SECRETARY



March 29, 2006

2006 APR -7 A 11:39
2006 APR 7
FEDERAL ENERGY
REGULATORY COMMISSION

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

Department of
Community Development
800 Exchange Street
Suite 100
Astoria, Oregon 97103

RE: Bradwood Landing LNG Project, Docket #PF05-10
Comments on Bradwood Terminal Resource Reports

Dear Ms. Salas:

Clatsop County submits the following comments with the understanding that Northern Star Natural Gas' Bradwood Terminal Resource Reports for both the terminal and the proposed pipeline are at the draft stage. Clatsop County reserves the right to comment on future documents.

If you have any questions, please contact Kathleen Sellman, Community Development Director, at (503) 325-8611 or ksellman@co.clatsop.or.us.

Sincerely,

Kathleen A. Sellman

Kathleen A. Sellman AICP
Community Development Director

Enclosures

Economic Development
Planning & Development
Telephone (503) 325-8611
Fax (503) 338-3666

Building Codes Division
Telephone (503) 338-3697
Fax (503) 338-3666

Inspection Request Line
(503) 338-3698

www.co.clatsop.or.us

Page 2, Applicable Zoning Codes. The applicant provides a table (Table 8.1-1) that lists applicable zoning designations. However, the resource report does not detail whether the proposed uses are permitted in these zones or describe the County requirements for review of development in these zones. Of particular concern is the proposed dredging activity within the AC-2 zone. **Note: Dredging is not a Permitted, Conditional or Review use in this zone. In other words, the site is not zoned appropriately for the proposed use.** The applicant should also note that there are mechanisms for requesting zone changes built into the County's Land and Water Development and Use Ordinance and the Clatsop County Comprehensive Plan. However, the applicant bears the burden of proof in establishing the appropriateness of a zone change. To that end, the applicant, must follow the appropriate procedures, identify all applicable County Goals, Policies and Standards and provide findings that establish the proposed zone change as consistent with the County's adopted plans.

Beyond the procedural nature of a zone change, the applicant will need to carefully analyze its request for zone change as the site is located within the Columbia River Estuary. The Estuary is managed cooperatively by jurisdictions within its influence through the adoption of the Columbia River Estuary Management Plan. The Management Plan was formulated by the Columbia River Estuary Study Task Force (CREST), local jurisdictions, state and federal agencies and concerned citizens in response to federal environmental protection laws and the Coastal Zone Management Act. The Management Plan represents a unique bi-state effort to manage the Estuary by balancing development needs with natural resource protection. To that end, the standards of the management plan were adopted into the Comprehensive Plans (for Oregon jurisdictions) and Shoreline Master Plans (for Washington jurisdictions) including the Comprehensive Plan for Clatsop County.

The Bradwood site is specifically addressed in the Columbia River Estuary Management Plan within the Eastern Clatsop Planning Area. The Bradwood Subarea is identified as a former industrial area, a stretch of steep forested shoreline to the east, where the planning areas extends either 200 feet inland or to the extent of geological instability and includes portions of the Columbia River. The subarea plan discusses the fishing resources, tidal marsh and wetlands; soils and old growth vegetation found at Bradwood. The plan also acknowledges the industrial nature of the site, but cautions against large scale development as follows, "The Bradwood industrial site offers excellent potential for small to medium sized water dependent industrial development. There is deep water close to shore, some available vacant land, and railroad access. There are constraints to development, however, including poor highway access and the proximity of the wildlife refuge. Large scale development involving extensive dredging or filling would not be appropriate." The above information is provided so that the applicant can gain an appreciation of the collective thought and effort

that went in to the Estuary Plan and the establishment the zoning district boundaries at the Bradwood site.

Page 2, Dredged Material Disposal. Note that the Bradwood Dredged Material Disposal site is inventoried as site O-38.9 in the Columbia River Estuary Dredged Material Management Plan. The site's capacity is 420,000 cubic yards and special conditions apply to disposal of materials including:

- Runoff from the disposal site shall not be allowed to flow through potentially sensitive wetlands to the south and west of the site.
- Any dredging project proponent must demonstrate that the dredged material disposal will not preclude present or future water-dependent use at the site.
- The western boundary of the site shall be leveed to prevent dredge materials from entering the intertidal area west of the site.

Page 3, Wetland Fill. While the County's Comprehensive Plan sets forth a goal exception for the potential fill of the wetland for industrial uses, it does not permit the fill in advance of an approved permit for industrial use. Any proposal to fill the wetlands requires an approved permit for industrial development.

Page 3, Quarry. The applicant and property owner shall acquire all necessary county and State permits if extraction is to resume at the Bradwood rock quarry.

Page 3, Existing Buildings. If the proponent desires to remove the existing buildings, demolition permits will be required from the Clatsop County Building Codes Division.

Page 4, Public or Private Conservation Land. The report states that the Bradwood site is not among the scenic sites designated in Clatsop County's Comprehensive Plan. However, the proponent should note that the rocky bluffs discussed on this page are the "Bradwood Cliffs" identified as a Scenic and Natural Area in the Clatsop County Northeast Community Plan. The plan describes the cliffs as follows, "The area consists of 40 acres of old growth Douglas Fir forest standing on basalt ledge overlooking the Columbia River. This stand is highly natural and the old trees will continue to constitute a viable natural ecosystem if left alone. The steep rocky slopes could not tolerate logging."

Page 4, Areas of Environmental Sensitivity. The proponent's report goes on to state that, "there are no designated protected habitats, nor areas of environmental sensitivity...within .25 miles of the Terminal site. This statement is a mischaracterization of the site and surrounding land. The site does contain several areas of environmental sensitivity including wetlands, old growth forest (see previous comments relating to Bradwood Cliffs) and the Columbia River

Estuary. The report also neglects to identify the Bradley State Wayside, a State Park, located near the top of Clatsop Crest approximately 1.5 miles from the Terminal site. Bradley State Wayside offers a sweeping vista of the Columbia River and surrounding miles of countryside.

Page 5, Flood Control Lands. The proponent's report states that the Terminal and accompanying facilities are above the 100-year floodplain. According to the Flood Insurance Rate Map for Clatsop County (Community Panel Number 410027 0014 A), portions of the site are located within Zone A3 (within the 100-year flood, base flood elevation has been determined to be 10' elevation). Other areas of the site are within Zone B (areas between the limits of the 100-year and the 500-year flood). This information is correctly identified in the proponent's Resource Report 2 (Page 9). Note that the proponent should request a Letter of Map Amendment (LOMA) or Letter of Map Revision (LOMR) from FEMA to establish the site as outside the 100-year flood based on fill activities that have taken place. Until the map correction is made by FEMA, the site will continue to be mapped as is.

Page 5, Coastal Zone Management Area. The proponent has correctly identified the site to be within the Coastal Zone Management Area. However, the applicant does not address the special issues associated with the CZMA. Simply stating that the, "applicant has begun discussions with DLCD concerning the consistency determination process, and expects to be consistent with the Oregon Coastal Management Program" is insufficient. As representatives from OCMP have repeatedly pointed out in correspondence and meetings with the applicant, the federal Coastal Zone Management Act requires listed federal licenses to be consistent with the mandatory enforceable policies of the OCMP. These policies include: 1) applicable statewide planning goals; 2) applicable city or county comprehensive plan and land use regulation requirements that have been approved by the Land Conservation & Development Commission; and 3) applicable state agency authorities that are part of the federally approved coastal management program. OCMP staff has accurately and thoroughly explained the implications of the Coastal Zone Management Act as it relates to development of the Bradwood Site for a LNG terminal to the applicant on numerous occasions. For that reason, the County will not duplicate the information that has been transmitted by OCMP staff. However, the County would like to emphasize the following points:

- Applicable Plan and land use regulations of the Clatsop County Comprehensive Plan, Clatsop County Land and Water Development and Use Ordinance, Standards Document and the Columbia River Estuary Management Plan regulate development at Bradwood.
- Consistency with the Coastal Zone Management Act is dependant on the applicant satisfying the land use regulations of the above referenced documents.

Page 5, Uses in the MI Zone. Water-dependent industrial and port uses are permitted in the MI zone. The applicant should be aware that specific standards apply to permitted development. These standards are described in Section 3.634 of the Clatsop County Land and Water Development and Use Ordinance.

Page 5, Activities in the F-80 Zone. The applicant states that 3.7 acres of land zoned F-80 will be used for temporary construction "lay-down". Temporary construction staging areas are not permitted within the F-80 zone.

Page 6, Uses in the AN and AC-2 zones. The applicant states that certain proposed uses are permitted in the AN and AC-2 zones, but that other proposed uses are not permitted in these zones. A complete report should identify specific uses proposed for each zone. The report goes on to state "Exceptions to allow uses that are otherwise unpermitted are anticipated by Statewide Land Use Goal 2 and allowed where appropriate reasons justify the exception." This statement seriously understates the process and scrutiny involved in requesting and granting a goal exception. Goal exceptions are processed as an amendment to the County's Comprehensive Plan and because the Plan is acknowledged by the State, the goal exception must satisfy Statewide Planning Goal 2 (please see attached) with ultimate approval by the State Department of Land Conservation and Development (DLCD). The bottom line is that goal exceptions are not taken lightly by the County or the State.

The applicant should note that an Exception to Goal 16 has already been taken for the Bradwood site. The goal exception places the former mill pond (wetland) into an Aquatic Development (AD) zone designation and ultimately anticipates the filling of the pond for an industrial use. The exception allows for lateral expansion of the existing dock and dredging to provide navigational access along the face of the existing dock and future new docks within the AD zone. **The Goal 16 exception specifically states that it does not permit any new dock construction or new dredging projects in Aquatic areas.**

Page 6, 45-Acre Dredge Area. As mentioned previously, the bulk of the 45-acre dredge area is zoned AC-2. Dredging associated with development is not permitted in the AC-2 zone. A change to this land use designation will require a Zone Change, Comprehensive Plan Amendment and Goal Exception.

Page 6, Wetland Fill. The applicant states that it would be appropriate to fill the former log pond for industrial development. This is supported by the Clatsop County Goal 16 Exception, as discussed previously. However, any fill of the pond will continue to require applicable permits from the State Division of State Lands and the US Army Corps of Engineers. Further, the filling of the former log pond will not be approved by the County without an associated permit approval for an industrial development. Other wetland fill also will require County permit approval in addition to State and Federal permits. Fill of any wetlands in the

Aquatic Natural Zone (AN) raises the same issues as dredging in the AC-2 zone. The use is not permitted, therefore, if the applicant wishes to fill these areas, they will need to apply for a Zone Change, Comprehensive Plan Amendment and a Goal Exception would need to be taken.

Page 6 & 7, Visual Impacts. The report discusses that the Bradwood Terminal is visible from few developed areas. The report also acknowledges that the Terminal would be visible from vessels on the river. This is an important point that merits underscoring. The recreation activities associated with the Columbia River are an important component of Clatsop County's economic base. The County's reliance on tourism is ever increasing as natural resource industries (i.e. timber, commercial fishing) struggle. Recreational fishing and boat tours (small craft such as kayak outfitters and large sternwheeler tours) utilize this reach of the River and the visual impact of a large-scale industrial use at this site is unquantifiable. Clatsop County also has serious concerns about the visual impacts on our neighbors across the River in Wahkiakum County, Washington.

Page 7, Unique and Scenic Resources. The Report states that the Bradwood site is not a unique or scenic resource designated by Clatsop County or the State of Oregon. However, the applicant neglects to mention that the Bradwood Cliffs are identified as a Scenic and Natural Area in the Clatsop County Northeast Community Plan. In the context of the previous paragraph, the proposed development, and in particular, the 168-foot high tanks has the potential to impact views of the cliffs, the old growth forest and wildlife (i.e. raptors) from those using the River.

Page 8, Lighting Impacts. The County appreciates the applicant's suggestion to work together toward a responsible lighting scheme. Lighting at this remote location will have impacts on both humans and wildlife and should be designed with the utmost consideration.

Page 8, Construction Activities. The applicant indicates that construction activities will generally occur during the weekday, daytime hours, but that dredging may occur on a 24-hour basis. The applicant should take note of the County's Noise Control Ordinance No. 2001-11 in consideration of the nearby residences in Clatsop and Wahkiakum Counties.

Oregon's Statewide Planning Goals & Guidelines

GOAL 2: LAND USE PLANNING

OAR 660-015-0000(2)

PART I -- PLANNING

To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.

City, county, state and federal agency and special district plans and actions related to land use shall be consistent with the comprehensive plans of cities and counties and regional plans adopted under ORS Chapter 268.

All land use plans shall include identification of issues and problems, inventories and other factual information for each applicable statewide planning goal, evaluation of alternative courses of action and ultimate policy choices, taking into consideration social, economic, energy and environmental needs. The required information shall be contained in the plan document or in supporting documents. The plans, supporting documents and implementation ordinances shall be filed in a public office or other place easily accessible to the public. The plans shall be the basis for specific implementation measures. These measures shall be consistent with and adequate to carry out the plans. Each plan and related implementation measure shall be coordinated with the plans of affected governmental units.

All land-use plans and implementation ordinances shall be adopted by the governing body after

public hearing and shall be reviewed and, as needed, revised on a periodic cycle to take into account changing public policies and circumstances, in accord with a schedule set forth in the plan. Opportunities shall be provided for review and comment by citizens and affected governmental units during preparation, review and revision of plans and implementation ordinances.

Affected Governmental Units --

are those local governments, state and federal agencies and special districts which have programs, land ownerships, or responsibilities within the area included in the plan.

Comprehensive Plan -- as defined in ORS 197.015(5).

Coordinated -- as defined in ORS 197.015(5). Note: It is included in the definition of comprehensive plan.

Implementation Measures -- are the means used to carry out the plan. These are of two general types: (1) management implementation measures such as ordinances, regulations or project plans, and (2) site or area specific implementation measures such as permits and grants for construction, construction of public facilities or provision of services.

Plans -- as used here encompass all plans which guide land-use decisions, including both comprehensive and single-purpose plans of cities, counties, state and federal agencies and special districts.

PART II -- EXCEPTIONS

A local government may adopt an exception to a goal when:

(a) The land subject to the exception is physically developed to the extent that it is no longer available for uses allowed by the applicable goal;

(b) The land subject to the exception is irrevocably committed to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable; or

(c) The following standards are met:

(1) Reasons justify why the state policy embodied in the applicable goals should not apply;

(2) Areas which do not require a new exception cannot reasonably accommodate the use;

(3) The long-term environmental, economic, social and energy consequences resulting from the use of the proposed site with measures designed to reduce adverse impacts are not significantly more adverse than would typically result from the same proposal being located in areas requiring a goal exception other than the proposed site; and

(4) The proposed uses are compatible with other adjacent uses or will be so rendered through measures designed to reduce adverse impacts.

Compatible, as used in subparagraph (4) is not intended as an absolute term meaning no interference or adverse impacts of any type with adjacent uses.

A local government approving or denying a proposed exception shall set forth findings of fact and a statement of reasons which demonstrate that the

standards for an exception have or have not been met.

Each notice of a public hearing on a proposed exception shall specifically note that a goal exception is proposed and shall summarize the issues in an understandable manner.

Upon review of a decision approving or denying an exception:

(a) The commission shall be bound by any finding of fact for which there is substantial evidence in the record of the local government proceedings resulting in approval or denial of the exception;

(b) The commission shall determine whether the local government's findings and reasons demonstrate that the standards for an exception have or have not been met; and

(c) The commission shall adopt a clear statement of reasons which sets forth the basis for the determination that the standards for an exception have or have not been met.

Exception means a comprehensive plan provision, including an amendment to an acknowledged comprehensive plan, that;

(a) Is applicable to specific properties or situations and does not establish a planning or zoning policy of general applicability;

(b) Does not comply with some or all goal requirements applicable to the subject properties or situations; and

(c) Complies with standards for an exception.

PART III -- USE OF GUIDELINES

Governmental units shall review the guidelines set forth for the goals and either utilize the guidelines or develop alternative means that will achieve the

goals. All land-use plans shall state how the guidelines or alternative means utilized achieve the goals.

Guidelines -- are suggested directions that would aid local governments in activating the mandated goals. They are intended to be instructive, directional and positive, not limiting local government to a single course of action when some other course would achieve the same result. Above all, guidelines are not intended to be a grant of power to the state to carry out zoning from the state level under the guise of guidelines. (Guidelines or the alternative means selected by governmental bodies will be part of the Land Conservation and Development Commission's process of evaluating plans for compliance with goals.)

GUIDELINES

A. PREPARATION OF PLANS AND IMPLEMENTATION MEASURES

Preparation of plans and implementation measures should be based on a series of broad phases, proceeding from the very general identification of problems and issues to the specific provisions for dealing with these issues and for interrelating the various elements of the plan. During each phase opportunities should be provided for review and comment by citizens and affected governmental units.

The various implementation measures which will be used to carry out the plan should be considered during each of the planning phases.

The number of phases needed will vary with the complexity and size of the area, number of people involved, other governmental units to be

consulted, and availability of the necessary information.

Sufficient time should be allotted for:

- (1) collection of the necessary factual information
- (2) gradual refinement of the problems and issues and the alternative solutions and strategies for development
- (3) incorporation of citizen needs and desires and development of broad citizen support
- (4) identification and resolution of possible conflicts with plans of affected governmental units.

B. REGIONAL, STATE AND FEDERAL PLAN CONFORMANCE

It is expected that regional, state and federal agency plans will conform to the comprehensive plans of cities and counties. Cities and counties are expected to take into account the regional, state and national needs. Regional, state and federal agencies are expected to make their needs known during the preparation and revision of city and county comprehensive plans. During the preparation of their plans, federal, state and regional agencies are expected to create opportunities for review and comment by cities and counties. In the event existing plans are in conflict or an agreement cannot be reached during the plan preparation process, then the Land Conservation and Development Commission expects the affected government units to take steps to resolve the issues. If an agreement cannot be reached, the appeals procedures in ORS Chapter 197 may be used.

C. PLAN CONTENT

1. Factual Basis for the Plan

Inventories and other forms of data are needed as the basis for the policies and other decisions set forth in the plan. This factual base should include data on the following as they relate to the goals and other provisions of the plan:

- (a) Natural resources, their capabilities and limitations
- (b) Man-made structures and utilities, their location and condition
- (c) Population and economic characteristics of the area
- (d) Roles and responsibilities of governmental units.

2. Elements of the Plan

The following elements should be included in the plan:

- (a) Applicable statewide planning goals
- (b) Any critical geographic area designated by the Legislature
- (c) Elements that address any special needs or desires of the people in the area
- (d) Time periods of the plan, reflecting the anticipated situation at appropriate future intervals.

All of the elements should fit together and relate to one another to form a consistent whole at all times.

D. FILING OF PLANS

City and county plans should be filed, but not recorded, in the Office of the County Recorder. Copies of all plans should be available to the public and to affected governmental units.

E. MAJOR REVISIONS AND MINOR CHANGES IN THE PLAN AND IMPLEMENTATION MEASURES

The citizens in the area and any affected governmental unit should be given an opportunity to review and

comment prior to any changes in the plan and implementation ordinances. There should be at least 30 days notice of the public hearing on the proposed change.

1. Major Revisions

Major revisions include land use changes that have widespread and significant impact beyond the immediate area, such as quantitative changes producing large volumes of traffic; a qualitative change in the character of the land use itself, such as conversion of residential to industrial use; or a spatial change that affects large areas or many different ownerships.

The plan and implementation measures should be revised when public needs and desires change and when development occurs at a different rate than contemplated by the plan. Areas experiencing rapid growth and development should provide for a frequent review so needed revisions can be made to keep the plan up to date; however, major revisions should not be made more frequently than every two years, if at all possible.

2. Minor Changes

Minor changes, i.e., those which do not have significant effect beyond the immediate area of the change, should be based on special studies or other information which will serve as the factual basis to support the change. The public need and justification for the particular change should be established. Minor changes should not be made more frequently than once a year, if at all possible.

F. IMPLEMENTATION MEASURES

The following types of measure should be considered for carrying out plans:

1. Management Implementation Measures

(a) Ordinances controlling the use and construction on the land, such as building codes, sign ordinances, subdivision and zoning ordinances. ORS Chapter 197 requires that the provisions of the zoning and subdivision ordinances conform to the comprehensive plan.

(b) Plans for public facilities that are more specific than those included in the comprehensive plan. They show the size, location, and capacity serving each property but are not as detailed as construction drawings.

(c) Capital improvement budgets which set out the projects to be constructed during the budget period.

(d) State and federal regulations affecting land use.

(e) Annexations, consolidations, mergers and other reorganization measures.

2. Site and Area Specific Implementation Measures

(a) Building permits, septic tank permits, driveway permits, etc; the review of subdivisions and land partitioning applications; the changing of zones and granting of conditional uses, etc.

(b) The construction of public facilities (schools, roads, water lines, etc.).

(c) The provision of land-related public services such as fire and police.

(d) The awarding of state and federal grants to local governments to provide these facilities and services.

(e) Leasing of public lands.

G. USE OF GUIDELINES FOR THE STATEWIDE PLANNING GOALS

Guidelines for most statewide planning goals are found in two sections-planning and implementation. Planning guidelines relate primarily to the process of developing plans that incorporate the provisions of the goals. Implementation guidelines should relate primarily to the process of carrying out the goals once they have been incorporated into the plans. Techniques to carry out the goals and plans should be considered during the preparation of the plan.

EXHIBIT 2

Development	County Zone	Permittable Use?	Type of Review	Additional Stds? ¹
Dredge Turning Basin	AD	Y – Permitted Use	Development Permit	3.754, S4.208, S4.232
	AC-2	N		
Dredge Material Disposal	MI	Y – Permitted Use	Development Permit	3.634, S4.200-S4.243
Fill Old Log Pond	AD	Y	Development Permit	3.754, S4.235
Site Grading	MI	Y	Development Permit	3.634, S4.200-S4.243
	AD	Y ²	Development Permit	3.634, S4.200-S4.243
	AN	L – only if in conjunction with Review or Conditional Use	Development Permit	Dependant on associated project/structure
Relocate RR ³	MI	Y	Conditional Use ⁴	3.634, S4.200-S4.243
	AN	N		
Reconstruct/widen Hunt Cr Bridge	F-80	Y	Type IIA Conditional Use – upon Goal Exception to Ag and Forestry Goals	3.557, S3.509, S6.000
	AN	Y	Review Use	3.810, S4.200-S4.243, S5.040-S5.051, S6.000
	MI	Y	Conditional Use	3.634, 4.200-4.243, S6.000
Widen Clifton Rd	F-80	Y	Conditional Use - upon Goal Exception to Ag and Forestry Goals	3.557, S3.509, S6.000
Temporary Construction Parking	F-80	N		
Tanks & Associated upland structures	MI	Y	Development Permit	3.634, S4.200-S4.243
Ship Berthing Facility	AC-2	N		
	AD	Y	Development Permit	3.754, S4.200-S4.243
Piling	AC-2	N		
	AD	Y	Development Permit	3.754, S4.200-S4.243
Waste Water	AD	Y	Conditional Use	3.754, S4.200-

¹ Additional standards may apply in addition to those listed in this table

² A zone change for the old log pond from AD to MI will be required upon filling, per Comprehensive Plan policies

³ It appears that the relocated rail line will be in both the MI and AN zones

⁴ Land Transportation Systems are a Conditional Use in the MI zone, Marine railway facilities are listed as a Permitted Use. The relocated rail, is not proposed for use by the LNG terminal facilities, therefore, it is more suitable to consider it a land transportation system than a marine railway facility.

Development	County Zone	Permittable Use?	Type of Review	Additional Stds? ¹
Outfall			Permit	S4.243
Power Lines	MI	Y	Development Permit	3.634, S4.200-S4.243
	F-80	Y	Type II Conditional Use Permit	3.557
Pipeline	AN	Y	Conditional Use	3.810, S4.200-S4.243, S5.860-S5.880
	F-80	Y	Type II Conditional Use	3.557
	MI	Y	Development Permit	3.634, S4.200-S4.243

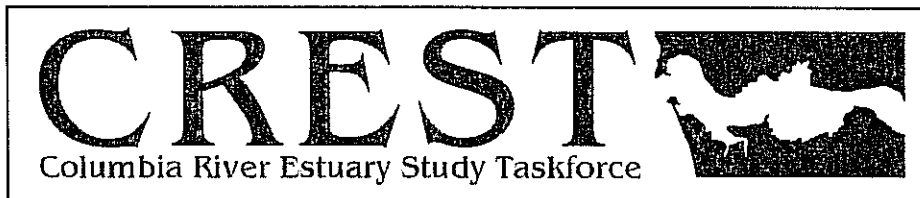


Exhibit 3

DATE: May 23, 2006 & Updated June 20, 2006

TO: Kathleen Sellman, Clatsop County CDD Director

CC: Patrick Wingard, Senior Planner

FROM: Catie Fernandez, Coastal Planner

SUBJECT: Comments to Northern Star's Draft Dredged Material Placement and Management Plan

Northern Star Natural Gas (NSNG) has submitted a draft Dredged Material Placement and Management Plan to FERC as part of the NEPA pre-filing process. CREST staff has reviewed the draft document on behalf of the County and prepared the following summary and comments.

First, it is understood that the Dredged Material Placement and Management Plan is a draft and subject to further revisions. Additionally, should the County desire, the comments may be provided to the State of Oregon DOE as a coordinating agency or to FERC, as the County sees appropriate.

To summarize, the purpose of the NSNG's Draft Dredged Material Placement and Management Plan is to 1) define the project's dredging requirements (i.e. volume & area); 2) identify suitable methods; and, 3) identify suitable disposal locations.

NSNG will be seeking to dredge a turning basin in the Columbia River adjacent to the Bradwood site that can accommodate LNG ship operations. The dredge area is proposed to be approximately 58 acres with a depth of -43 feet (including overdredge allowance) for a total volume of approximately 681,000 cubic yards of material to be removed. Maintenance dredging requirements are estimated to be 150,000 cubic yards every five to ten years.

CREST has no comment regarding whether the dimensions are appropriate to accommodate LNG carriers. However, the issue as to whether the site is appropriately zoned remains unresolved. The location proposed to be dredged is zoned AC-2 (Aquatic Conservation-Two) and dredging is not a permitted use in this zone. More discussion regarding the process and appropriateness of rezoning, Comprehensive Plan Amendment and Goal Exceptions were provided to FERC by the County in previous comments to the draft terminal reports.

The NSNG Dredged Material Placement and Management Plan evaluates disposal options, including upland sites, open water placement, ocean disposal and beach nourishment. To summarize the Plan's conclusions, disposal at the existing Bradwood site is most desirable, although there may be capacity issues. Flow lane disposal, beach nourishment at Puget Island and filling of scour holes at locations such as Pancake Point and Welcome Slough in Wahkiakum County are considered potential options for disposal of excess materials that can not be accommodated at the Bradwood site.

CREST offers the following comments related to the disposal option analysis provided by NSNG. First, the capacity issue at the existing Bradwood site should be clarified. The Columbia River Dredged Material Management Plan (DMMP), which is adopted into the County's Comprehensive Plan identifies that the Bradwood Disposal Site (aka O-38.9) has a capacity of 420,000 cubic yards. The DMMP identifies that the site has already received materials, over ten years ago, but does not include a volume. Further, the DMMP notes that the capacity figure is the approximate cubic yard volume of the site based on surface area and disposal height. Therefore, with more analysis, NSNG may find there is capacity greater than or less than the 420,000 cubic yards identified in the DMMP. Upon construction of a terminal at the Bradwood site, NSNG will need to find alternate disposal sites for maintenance dredging.

In general, keeping sediment in the system for beneficial uses such as filling scour holes is positive. The NSNG plan makes the statement that, "The lower Columbia River is sediment deficient because upstream dams limit downstream movement of sediment. Consequently, addition of sediment in the lower Columbia River can benefit the environment". This statement could be supported by more substantial analysis, as the "sediment deficiency" issue has as much to do with how the sediment is distributed and its effects on habitat as the fact that less is being delivered from upriver sources.

Finally, a note about the dredging activity. It is understood that this report is primarily an analysis of disposal sites; however, additional hydrological studies commissioned by NSNG should address impacts associated with creation of the turning basin.

If you have any questions about the above comments or wish to discuss them in greater detail, please feel free to contact me.

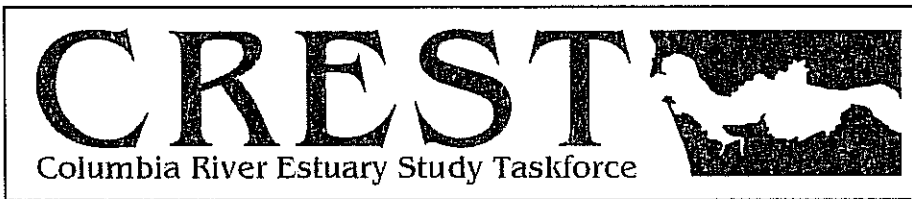


Exhibit 4

DATE: July 3, 2006

TO: Kathleen Sellman, Clatsop County CDD Director

CC: Patrick Wingard, Senior Planner

FROM: Catie Fernandez, Coastal Planner

SUBJECT: Addendum to Comments to Northern Star Natural Gas proposal to the Federal Energy Regulatory Commission for a liquid natural gas terminal at Bradwood.

This memo includes comments relating to the Bradwood Landing Resource Report 2, Water Use and Quality. Specifically, CREST has reviewed Resource Report 2 as it relates to wetland and wetland mitigation information.

In 2003, CREST prepared a wetland delineation at the Bradwood site for use by Clatsop County. This delineation received concurrence from Oregon Division of State Lands (DSL). CREST staff is familiar with the site wetlands and offers comments to Resource Report 2 based on this experience. The CREST wetlands delineation was utilized as one source of data by Bradwood Landing LLC/Northern Star Natural Gas in preparation of Resource Report 2.

General Comments: Compensatory Mitigation

A general overview was provided about the diversity of wetland classes in the area along with conceptual mitigation ideas. However at this time, it is difficult to provide comments without any specific details on what the actual mitigation activities will entail. This includes appropriate compensation for actual ecological function lost for each wetland type impacted by construction activities and the facility footprint itself. The resource report is correct in stating that this level of articulation will take place in the Joint Removal-Fill permit application. Estimates of acreages of each wetland type are given, but it would be valuable to articulate the approach to mitigate each wetland type at this juncture. For example, for estuarine wetland habitat types, applying HGM methods for tidal wetlands would be an appropriate framework to properly assess the functions associated to these unique wetlands. As the applicants are probably aware guidance has been developed by the State of Oregon for tidal wetlands that can be used to fit the specifics of this project.

Specific Comments: Compensatory Mitigation

The calculations given for required wetland mitigation ratios are not correct. What was provided are the ratios for freshwater wetlands. Given for the types of wetlands impacted by the project it is assumed that both freshwater and Estuary mitigation ratios would be applied using existing guidance. (OAR 141-085-0240 thru 0257).

Railroad Relocation:

The 30 foot buffer between the railroad tracks and Hunt Creek is not sufficient to comply with existing land use ordinance for Clatsop County (CLATSOP COUNTY STANDARDS DOCUMENT ORDINANCE 80-14, S4.237) According to Clatsop County standards, a minimum of 50 is required from non-aquatic vegetation. If this buffer cannot be feasibly accomplished because of construction activities, consultation with County staff should be conducted to develop a means to mitigate this impact.

We hope that the above information is helpful to you as you review this project. If you have any questions, or require any additional information, please feel free to contact CREST staff by phone or email.

Clatsop County



TO: Kathy Sellman, Director of Community Development
FROM: Ed Wegner, Director of Public Works *EW*
DATE: June 27, 2006
RE: Comments on Bradwood Landing Proposal

ATTACHMENT 2

1100 Olney Avenue
Astoria, Oregon 97103

- Traffic and transportation issues have not been resolved as of this date
- Information discussed to date is incomplete
- We are awaiting the required Traffic Impact Study and Traffic Management Plan
- Clatsop County Public Works and Community Development has not seen a complete plan for the proposed parking lot - issues remain unresolved
- Clatsop County anticipates Bradwood Landing to be responsible 100% of mitigation caused by or due to the project
- Bradwood LNG and Clatsop County have not yet agreed as to needed actions to take place on Clifton Road to become suitable for this construction traffic
- Bradwood Landing needs to address how local residents will have access to driving Clifton Road during construction phase
- Bradwood Landing will need to restore Clifton Road back to County standards or agreed upon improvements at the end of the construction period
- All traffic management plans will be reviewed in a public meeting with the residents before the County approves plan
- All involved emergency services agencies will need to review traffic management plan and make recommendation, i.e., Fire Department, Sheriff Office, Ambulance Service

Public Works
Department

Phone (503) 325-8631
Fax (503) 325-9312



Once the Traffic Impact Study and proposed Traffic Management Plan is presented to the County, we would request reserving comment of our specific concerns until that time.

Bradwood Landing Needs to Address:

Clatsop County Sheriff Tom Bergin would like to register concerns about the increased volume of large truck traffic on US 30 from Astoria to the Svensen intersection. His concerns are the curves and no alternative route for detour if a major accident was to occur.



CITY OF ASTORIA
OFFICE OF THE CITY MANAGER

June 26, 2006

RECEIVED

JUN 27 2006

DEPARTMENT OF ENERGY

Ms. Cathy Van Horn
Energy Facility Analyst
Oregon Department of Energy
625 Marion Street, NE
Salem OR 97301-3737

RE: Bradwood Landing LLC and Northern Star Energy LLC

Dear Ms. Van Horn:

Enclosed are the comments the City of Astoria would like included the State of Oregon's submittal to the Federal Energy Regulatory Commission (FERC). Thank you for your assistance in this matter.

Sincerely,

THE CITY OF ASTORIA

A handwritten signature in dark ink, reading "Paul Benoit". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Paul Benoit
City Manager

PB:jl
Enclosure

C:\MANAGER\CORRESP\VAN HORN LTR 6-26-06.DOC



CITY OF ASTORIA
OFFICE OF THE CITY MANAGER

June 26, 2006

Ms. Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Lt. Shadrack L. Scheirman
United States Coast Guard
Sector Portland, OR
6767 N. Basin Ave.
Portland, OR 97217

RE: Bradwood Landing LLC
Docket No. CP06-365-000

RE: Northern Star Natural Gas LLC
Docket No. CGD13-05-017

Northern Star Energy LLC
Docket Nos. CP06-366-000
CP06-376-000
CP06-377-000

Dear Secretary Salas and Lieutenant Scheirman:

Please accept these comments filed by the City of Astoria, Clatsop County, Oregon in the above-referenced dockets.

The City of Astoria, Oregon is a municipality consisting of approximately 10 square miles in geographic jurisdiction located near the mouth of the Columbia River. Astoria is the largest city in Clatsop County with a year round population of 10,000. However, proposed development plans could increase our residential population to over 13,000 in the next several years. During the summer and early fall our tourism population increases considerably and that is likely to continue with the development of additional tourist attractions.

Included within or immediately adjacent to Astoria are a diverse number of private and critical government occupancies. Among these are Fort Stevens (Oregon's largest State Park), Astoria Regional Airport (Clatsop County's only commercial airport), Camp Rilea Armed Forces Training Center (Oregon's largest active military reservation), Columbia Memorial Hospital (the region's major healthcare facility), a 100-bed juvenile corrections facility, the Tongue Point Job Corps (supporting more than 500 students),

two major recreational and commercial fishing boat mooring basins, a commercial port, and various Coast Guard facilities.

Astoria and the greater Astoria area also has a variety of commercial and industrial establishments. Traditionally our industries have been fish and lumber related, but the largest employee base is service oriented, including government agencies and healthcare. Industrial examples include Bornsteins Seafood, a major fish processing plant, and Weyerhaeuser, the only major lumber mill in northwest Oregon. All of these major employers are located directly on or within a few hundred yards of the Columbia River.

Public Safety is provided by local police and fire departments. The Astoria Police Department is comprised of sixteen full-time officers and several reserve officers, who are responsible for twenty-four hour protection of the City's ten square mile area. The Astoria Fire Department consists of twelve full-time personnel, fifteen volunteer firefighters and five response vehicles. The Fire Department's service area is approximately twelve square miles and includes the numerous facilities noted above. The City has no marine law enforcement and limited marine firefighting capability.

The City has very limited funding resources available for public safety services. It relies on limited property tax revenues that are used primarily for personnel expenses. In recent years most public safety equipment purchases have depended on grants and loans.

The City's public safety responsibility extends for approximately seven miles along the southerly bank of the Columbia River beginning at approximately Buoy 31 then continuing eastward past Buoy 41. The Columbia River shipping channel defines the northern City limits and parallels the City for seven miles from the City of Warrenton past Tongue Point. Consequently, the City is directly and significantly impacted by the proposed vessel transits carrying liquefied natural gas ("LNG") to the proposed Northern Star Natural Gas LLC ("NSNG") facility at Bradwood Landing, located at approximately river mile ("RM") 38 upstream.

Astoria is the second municipality potentially impacted once the LNG Carrier enters the Columbia River. City representatives have had several meetings with the LNG project consultants and officers concerning the City's safety and security concerns as required by Section 311(d) of the Energy Policy Act of 2005. We respectfully request that City officials continue to be directly engaged in development of the required Emergency Response Plan and Waterway Suitability Assessment.

Specifically, because the Shipping Channel is located very close to the southwestern and southern bank of the Columbia River, a significant portion of the City's geography and water resources are located within the Zones of Concern identified in the United States Coast Guard's Guidance on Assessing the Suitability of a Waterway for Liquefied Natural Gas (LNG) Marine Traffic, NVIC 05-05 (the "NVIC"). Within these Zones of Concern are many areas where people congregate outdoors, including the full length of

the River Walk trail, the downtown commercial district, the Columbia River Maritime Museum, the area of the East and West Boat Basins, the businesses at North Tongue Point, the Tongue Point Job Corps campus, the Clatsop Community College Marine Environmental Research and Training Station, and several residential neighborhoods. Each of these businesses and public areas are sufficiently close to the vessel transit route to warrant heightened safety and security measures. Additionally, the majority of Astoria's population of 10,000 actually resides within one-half mile of the Shipping Channel.

Because of the large geographic area that makes up the City's jurisdiction and responsibility, during periods of vessel transits, under current staffing plans and procedures, the City may not have adequate police and fire resources to cover its entire area of responsibility in a manner which the City Council deems appropriate. Therefore, it is critical that City officials be involved in development of vessel transit operational procedures and the statutorily required Emergency Response Plan designed to address safety and security concerns, not only at the terminal site itself, but also along the vessel transit route, which includes the City of Astoria.

With regard to specific comments to resource Report No. 11 (Reliability and Safety) dated February 27, 2006, in addition to the FERC staff comments dated April 27, 2006, we have the following additional comments:

- Tugboats: FERC seeks information concerning the number and type of tugboats and a plan providing dedicated tug service. We think that as part of that submittal that FERC and/or the USCG should require a minimum of two (2) dedicated tugs, each with firefighting capability, including a deluge system and/or water curtain for protection of tug operators so that they may safely approach an LNG fire at a distance where the water cannons will be effective. Additionally, the tugs should be adequate to pull a disabled LNG Carrier out of the mouth of the Columbia River, in appropriate situations, in the event of an incident within or near the City of Astoria's jurisdiction.
- Pilots: We believe that it is imperative for the safe navigation along the vessel transit route, and within the City of Astoria's jurisdiction, that built-in redundancy exists for measures designed to provide positive vessel control, including pilots. Therefore, we recommend that at least two Columbia Bar Pilots be present on the ship at all times when traveling between the sea buoy, along the Astoria coast, and through the jurisdictional limits of the City.
- Marine law enforcement: As noted, the City does not currently possess any marine law enforcement assets, which are needed to supplement the USCG escorts, especially within the City's jurisdictional waters. The City intends to investigate potential funding sources, including federal Port Security Grants and is in the process of discussing marine law enforcement options with its neighbor, the City of Warrenton, and the Port Commission of Astoria.

- Fire response training/equipment: As noted, the City's fire department is dependent upon full time and volunteer firefighters. In the event of an LNG incident along the vessel transit route, and within the City's jurisdiction, these firefighters will be called on to assist (or may be called to cover other incidents within the City). It is imperative that these firefighters receive substantial additional training for these added duties and commitments. Specifically, we recommend that FERC and/or the USCG require the project proponent to fund such specialized LNG emergency response training, such as that offered by Texas Engineering Extension Service, a member of Texas A&M System, including mutually-agreeable compensation for the time the City's firefighters and volunteer firefighters missing work to attend such training. The current fireboat owned by the Port of Astoria and operated by the fire department is out-of-service because of its aging condition (over thirty-five years). A fireboat would be needed to provide adequate protection for waterfront properties along with firefighting efforts of any vessel carrying LNG. A "deep draft" fireboat that accompanies vessels that also operates as a tug is not suitable for waterfront fire protection.
- Cost-sharing plan: At a minimum, the City expects it will be fully compensated for the additional costs associated with added police, fire, and emergency response personnel during LNG vessel transits. Given the extensive waterfront area open to the public where people assemble outdoors, the City anticipates the possibility of additional police and fire resources pre-stationed and "on alert" during the LNG vessel transits through the City limits for approximately 125 vessel calls per year (as estimated by NSNG). Police and fire officers may also be needed at the Command Center to coordinate any response. Additional equipment, including communications gear, capable of communicating with all relevant stakeholders and officials, additional fire turn-out gear, high expansion foam generating engine, mobile command center, etc may also be required.

The City asks for the opportunity to discuss its specific needs with appropriate personnel from FERC, USCG and NSNG, all of whom are charged with coordinating these requirements.

Thank you for the opportunity to comment. We look forward to further discussion and coordination on these issues.

Sincerely,

THE CITY OF ASTORIA



Paul Benoit
City Manager

Copy to: Northern Star Natural Gas LLC
Van Ness Feldman
Astoria City Council
Rob Deu Pree, Astoria Chief of Police
Lenard Hansen, Astoria Fire Chief
Cathy Van Horn, Oregon Department of Energy
State Fire Marshal
Port of Astoria
City of Warrenton
Clatsop County
Pacific County
Wahkiakum County
Representative David Wu
Governor Ted Kulongoski
Senator Gordon Smith
Senator Ron Wyden
Senator Betsy Johnson
Representative Deborah Boone
Columbia River Bar Pilots
Columbia River Pilots

"Making a difference through excellence of service"



RECEIVED

JUN 27 2006

DEPARTMENT OF ENERGY

CITY OF WARRENTON

June 23, 2006

Cathy Van Horn
Energy Facility Analyst
Oregon Department of Energy
625 Marion Street NE
Salem, Oregon 97301

Dear Ms. Van Horn:

Enclosed is a copy of a May 24, 2006 letter the Warrenton City Commission sent to the Federal Energy Regulatory Commission and the U.S. Coast Guard. It is regarding the Northern Star Natural Gas proposal concerning LNG vessel transits through the City of Warrenton.

It would be appreciated if you would include this letter in the Oregon Department of Energy's comments to FERC.

Thank you for your consideration. Please let me know if you have any questions.

Very truly yours,

Edward C. Madere
City Manager

Copy to: City Commission
 Harold Snow, City Attorney
 Ted Ames, Fire Chief
 Robert Maxfield, Police Chief

"Making a difference through excellence of service"



CITY OF WARRENTON

RECEIVED

MAY 26 2006

DEPARTMENT OF ENERGY

May 24, 2006

Ms. Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Lt. Shadrack L. Scheirman
United States Coast Guard
Sector Portland, OR
6767 N. Basin Ave.
Portland, OR 97217

Re: Northern Star Natural Gas LLC
Docket No. PF05-10-000

Re: Northern Star Natural Gas LLC
Docket No. CGD13-05-017

Dear Secretary Salas and Lieutenant Scheirman:

Please accept these comments filed by the City of Warrenton, Clatsop County, Oregon in the above-referenced dockets. The Warrenton City Commission the duly-elected governing body for the City of Warrenton, authorized me, the Mayor, to make this filing at its regular public meeting on May 23, 2006.

The City of Warrenton, Oregon is a municipality consisting of approximately 18 square miles in geographic jurisdiction located at the mouth of the Columbia River. It is the most northwesterly City in Oregon. The former Town of Hammond is merged into Warrenton. The City's year round population is currently 4,300, however based on proposed development plans this is expected to increase to over 7, 000 in the next several years. The summer time population can exceed 10,000 because of recreation activities in the City.

Included within or immediately adjacent to Warrenton are a diverse number of private and critical government occupancies. Among these are Fort Stevens (Oregon's largest State Park), Warrenton-Astoria Regional Airport (Clatsop County's only commercial airport), Camp Rilea Armed Forces Training Center (Oregon's largest active military reservation), a 100 bed juvenile corrections facility, and two major recreational and commercial fishing boat mooring basins.

Warrenton also has a variety of commercial and industrial establishments. Businesses range from small mom and pop stores to Fred Meyer, Costco, and Walgreens. Industries tend to be fish and lumber related and employ many people from the community. Industrial examples include Pacific Coast Seafood, a major fish processing plant, and Weyerhaeuser, the only major lumber mill in northwest Oregon.

Public Safety is provided by local police and fire departments. The Warrenton Police Department is comprised of eight full-time officers and several reserve officers, who are responsible for 24 hour protection of the City's 18 square mile area. The Warrenton Fire Department consists of two full-time personnel, 32 volunteer firefighters, and seven response vehicles. The Fire Department's service area is 28 square miles and includes the numerous facilities noted above. The City has no marine law enforcement or firefighting capability.

The City has very limited funding resources available for public safety services. It relies on limited property tax revenues that are used primarily for personnel expenses. In recent years equipment purchases have depended on grants and loans.

The City's public safety responsibility extends for approximately seven miles along the southerly bank of the Columbia River beginning at approximately Clatsop Spit (Buoy 14) then continuing eastward to Smith Point. Approximately four and a half miles of the Columbia River shipping channel from Hammond Marina east to the Astoria city limits are within the City of Warrenton. As such, the City is directly and significantly impacted by the proposed vessel transits carrying liquefied natural gas ("LNG") to the proposed Northern Star Natural Gas LLC ("NSNG") facility at Bradwood Landing, located at approximately river mile ("RM") 38 upstream.

Warrenton is the first municipality potentially impacted once the LNG Carrier enters the Columbia River. Until May 22, 2006, the City had not been contacted by anyone from the project proponent or any contractors acting on its behalf to engage in discussion concerning the City's safety and security concerns as required by Section 311(d) of the Energy Policy Act of 2005. Please see attached email.

We understand from the filings made by NSNG, including most recently the draft Resource Report No. 11 (Reliability and Safety), that selected officials from selected jurisdictions have been involved since August 2005 in discussions to develop the required Emergency Response Plan and Waterway Suitability Assessment. However, none of those officials represent Warrenton's interests or needs. Therefore, we respectfully request that City officials be directly engaged in development of the required Emergency Response Plan and Waterway Suitability Assessment.

Specifically, because the Shipping Channel is located very close to the southwestern and southern bank of the Columbia River, from the sea buoy to the jurisdictional limits of the City, a significant portion of the City's geography and water resources are located within the Zones of Concern identified in the United States Coast Guard's Guidance on Assessing the Suitability of a Waterway for Liquefied Natural Gas (LNG) Marine Traffic, NVIC 05-05 (the "NVIC"). Within these Zones of Concern are many areas where people congregate outdoors including essentially the entire route from Fort Stevens State Park, along the River Walk trail, in the area of Hammond Boat Basin and at Carruthers Park. Each of these public assembly areas is sufficiently close to the vessel transit route to warrant heightened safety and security measures.

Additionally, because of the large geographic area which makes up the City's jurisdiction and responsibility, during periods of vessel transits, under current staffing plans and procedures, the

City may not have adequate police and fire resources to cover its entire area of responsibility in a manner which the City Commission deems appropriate. Therefore, it is critical that City officials be involved in development of vessel transit operational procedures and the statutorily-required Emergency Response Plan designed to address safety and security concerns, not only at the terminal site itself, but also along the vessel transit route, which includes the City of Warrenton.

With regard to specific comments to resource Report No. 11 (Reliability and Safety) dated February 27, 2006, in addition to the FERC staff comments dated April 27, 2006, we have the following additional comments:

- Tugboats: FERC seeks information concerning the number and type of tugboats and a plan providing dedicated tug service. We think that as part of that submittal that FERC and/or the USCG should require a minimum of two (2) dedicated tugs, each with firefighting capability, including a deluge system and/or water curtain for protection of tug operators so that they may safely approach an LNG fire at a distance where the water cannons will be effective. Additionally, the tugs should be adequate to pull a disabled LNG Carrier out of the mouth of the Columbia River, in appropriate situations, in the event of an incident within or near the City of Warrenton's jurisdiction.
- Pilots: We believe that it is imperative for the safe navigation along the vessel transit route, and within the City of Warrenton's jurisdiction, that built-in redundancy exists for measures designed to provide positive vessel control, including pilots. Therefore, we recommend that at least two (2) Columbia Bar Pilots be present on the ship at all times when traveling between the sea buoy, along the Warrenton coast, and through the jurisdictional limits of the City.
- Marine law enforcement: As noted, the City does not currently possess any marine law enforcement assets which are needed to supplement the USCG escorts, especially within the City's jurisdictional waters. The City intends to investigate potential funding sources, including federal Port Security Grants and is in the process of discussing marine law enforcement options with its neighbor, the City of Astoria, and the Port Commission of Astoria, with which it already has Mutual Aid Agreements.
- Fire response training: As noted, the City's fire department is dependant upon volunteer firefighters, ordinary citizens who voluntarily agree to put their lives at risk to help their fellow citizens. In the event of an LNG incident along the vessel transit route, and within the City's jurisdiction, these volunteers will be called on to assist (or may be called to cover other incidents within the City). It is imperative that these volunteers receive substantial, additional training, and compensation for these additional duties and commitments. Specifically, we recommend that FERC and/or the USCG require the project proponent to fund such specialized LNG emergency response training, such as that offered by Texas Engineering Extension Service, a member of Texas A&M System, (see course descriptions) <http://www.teex.com/teex.cfm?pageid=ESTIprog&area=ESTI&templateid=1536> including mutually-agreeable compensation for the time the City's volunteer firefighters miss work to attend such training.

- Cost-sharing plan: Although NSNG acknowledges its requirement to implement an appropriate cost-sharing plan, until May 22, 2006, the City had not been contacted to negotiate such a plan. At a minimum, the City expects it will be fully compensated for the additional costs associated with added police, fire, and emergency response personnel during LNG vessel transits. Given the extensive waterfront area open to the public where people assemble outdoors, the City anticipates the possibility of additional police and fire resources pre-stationed and "on alert" during the LNG vessel transits from the sea buoy to the Astoria-Megler bridge, and during the out-bound ballast voyages (which still contain LNG heel) for approximately 125 vessel calls per year (as estimated by NSNG). Police and fire officers may also be needed at the Command Center to coordinate any response. Additional equipment, including potentially communications gear, capable of communicating with all relevant stakeholders and officials, additional fire turn-out gear, high expansion foam generating engine, mobile command center, etc may also be required.

The City welcomes the opportunity to discuss its specific needs with appropriate personnel from FERC, USCG and NSNG, all of whom are charged with coordinating these requirements.

Thank you for the opportunity to comment. We look forward to further discussion and coordination on these issues.

Very truly yours,



Gilbert Gramson
Mayor

Copy to: Northern Star Natural Gas LLC
Van Ness Feldman
Oregon Department of Energy
State Fire Marshal
Port of Astoria
City of Astoria
Clatsop County
Pacific County
Wahkiakum County
Representative Wu
Governor Kulongoski
Senator Smith
Senator Wyden
Senator Johnson
Representative Boone
Columbia River Bar Pilots
Columbia River Pilots

Edward Madere

From: Gary Coppedge [grcoppedge@northernstar-ng.com]
Sent: Tuesday, May 23, 2006 12:06 PM
To: citymanager@ci.warrenton.or.us
Subject: Re: Emergency response plan

Edward,

I have left a message for you at the office, please call me when you get a chance.

The only issue I have with the letter is that it is now outdated. We would like to see the letter reflect that NSNG has contacted you and has promised to work closely with you. You may want to delay the letter being sent until we can develop a more official participation for you.

Please call me to discuss a few other items,

--

Gary Coppedge
VP Development
Northern Star Natural Gas
505-532-5000 office
505-649-4084 cell

> From: Edward Madere <citymanager@ci.warrenton.or.us>
> Organization: City of Warrenton
> Reply-To: <citymanager@ci.warrenton.or.us>
> Date: Mon, 22 May 2006 17:22:31 -0700
> To: 'Gary Coppedge' <grcoppedge@northernstar-ng.com>
> Subject: RE: Emergency response plan
>
> Mr. Coppedge
>
> Thank you for your email. Attached is a copy of the letter the City
> Commission is scheduled to consider at it May 23 meeting. Please let me
> know if you have any questions.
>
> Edward Madere
> City Manager
> City of Warrenton
> P.O. Box 250
> Warrenton, OR 97146
> 503-861-2233
>
> -----Original Message-----
> From: Gary Coppedge [mailto:grcoppedge@northernstar-ng.com]
> Sent: Monday, May 22, 2006 12:30 PM
> To: citymanager@ci.warrenton.or.us
> Subject: Emergency response plan
>
> Dear Mr. Madere,
>
> It was good speaking with you today. I appreciate the issues we discussed,
> and want to confirm with you that we will be including the following persons
> from the City of Warrenton in our Emergency Response Planning meetings that
> will be coming up later this summer.
>
> Chief of Police Robert Maxfield 503-861-2235 Fire Chief Ted Ames
> 503-861-2494 Edward Madere 503-861-2233 (tentative)
>
> Please feel free to contact me directly if you have any questions or

> concerns. Northern Star certainly recognizes that the City of Warrenton
> will play an important role in the Emergency Response Plan preparation,
> including the identification of resource gaps that may occur.
>
> I look forward to developing a proactive, positive relationship with your
> staff and Warrenton City leaders as we continue in our permitting process.
> We would be happy to give a project update to you at a time that is
> convenient for you.
>
> Thank you for your time,
>
> --
> Gary Coppedge
> VP Development
> Northern Star Natural Gas
> 505-532-5000 office
>
>

Submission Contents

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APPENDIX K

COMMENTS ON THE DRAFT EIS AND RESPONSES

TABLE K-1						
Written Correspondence Received During the Draft EIS Comment Period						
Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
FEDERAL AGENCIES						
FA1	Bureau of Indian Affairs	9/7/2007	9/17/2007	Aquatic Wildlife, Cultural Resources, Dredging, Geology, Miscellaneous, Mitigation, Pipeline Construction Techniques, Project Description, Socioeconomics, Terrestrial Wildlife, Water Resources, Wetlands	Appendix K	K-340
FA2	NOAA NMFS	12/17/2007	12/17/2007	Alternatives, Aquatic Wildlife, Cumulative Impacts, Cultural Resources, Dredging, Miscellaneous, Mitigation, Palomar, Project Description, Purpose and Need, Safety, Socioeconomics, Soils/Sediments, Water Resources	Appendix K	K-346
FA3	EPA	12/19/2007	12/19/2007	Air Quality, Alternatives, Aquatic Wildlife, Dredging, Mitigation, Palomar, Vegetation, Water Resources, Wetlands	Appendix K	K-358
FA4	Department of the Interior	12/21/2007	12/21/2007	Aquatic Wildlife, EFH, Geology, Land Use, Miscellaneous, Mitigation, Palomar, T and E Species, Terrestrial Wildlife, Safety and Security, Vegetation, Water Resources	Appendix K	K-365
NATIVE AMERICAN TRIBES						
NA1	Nez Perce Tribe	12/21/2007	12/21/2007	Aquatic Wildlife, Cultural Resources, Mitigation, Soils and Sediments	Appendix K	K-376
NA2	Columbia River Inter-tribal Fish Commission	12/21/2007	12/21/2007	Alternatives, Aquatic Wildlife, Cultural Resources, Cumulative Impacts, Dredging, EFH, Geology, Miscellaneous, Mitigation, Pipeline Construction Techniques, Project Description, Safety and Security, Socioeconomics, Soils and Sediments, T and E Species, Vegetation, Water Resources, Wetlands	Appendix K	K-384
STATE AGENCIES						
SA1	State of Oregon	12/13/2007	12/18/2007	Air Quality, Alternatives, Aquatic Wildlife, Cumulative Impacts, Dredging, Geology, Land Use, Miscellaneous, Mitigation, Palomar, Pipeline Construction Techniques, Project Description, Purpose and Need, Safety and Security, Soils and Sediments, Socioeconomics, T and E Species, Terrestrial Wildlife, Transportation, Vegetation, Water Resources, Wetlands	Appendix K	K-427
	Washington Department of Natural Resources	12/20/2007	12/20/2007	See SA2.	Letter superseded by SA2.	NA
SA2	Washington Department of Natural Resources	1/3/2008	1/3/2008	Dredging, Geology, Land Use, Miscellaneous, Project Description, Soils and Sediments, Water Resources	Appendix K	K-486
SA3	State of Washington Citizen's Committee on Pipeline Safety	12/15/2007	12/21/2007	Alternatives, Geology, Land Use, Safety, and Security, Vegetation, Water Resources	Appendix K	K-497

TABLE K-1						
Written Correspondence Received During the Draft EIS Comment Period						
Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
SA4	State of Washington Department of Ecology	12/21/2007	12/22/2007	Air Quality, Alternatives, Cumulative Impacts, Dredging, Geology, Miscellaneous, Pipeline Construction Techniques, Purpose and Need, Safety, Water Resources, Wetlands	Appendix K	K-501
SA5	State of Washington Utilities and Transportation Commission	12/11/2007	12/19/2007	Geology, Safety and Security, Water Resources	Appendix K	K-516
SA6	State of Washington Department of Fish and Wildlife	undated	1/2/08	Aquatic Wildlife, Land Use, Mitigation, Pipeline Construction Techniques, Socioeconomics	Appendix K	K-520
LOCAL AGENCIES						
LA1	Lower Columbia Economic Development Council	11/12/2007	11/19/2007	Miscellaneous	Appendix K	K-531
LA2	City of Warrenton	12/18/2007	12/18/2007	Cultural Resources, Safety and Security	Appendix K	K-532
LA3	Cowlitz County Board of Commissioners	12/11/2007	12/18/2007	Air Quality, Alternatives, Aquatic Wildlife, Cultural Resources, Cumulative Impacts, Geology, Land Use, Miscellaneous, Mitigation, Noise, Palomar, Project Description, Purpose and Need, Safety and Security, Socioeconomics, Soils and Sediments, T and E Species, Terrestrial Wildlife, Transportation, Water Resources, Wetlands	Appendix K	K-540
LA4	Wahkiakum County Board of Commissioners	12/18/2007	12/18/2007	Safety	Appendix K	K-560
LA5	Columbia County	12/19/2007	12/19/2007	Land Use, Transportation, Project Description	Appendix K	K-562
LA6	City of Astoria	12/21/2007	12/21/2007	Cultural Resources, Safety and Security	Appendix K	K-573
LA7	Clatsop County	12/21/2007	12/21/2007	Air Quality, Alternatives, Aquatic Wildlife, Cultural Resources, EFH, Geology, Land Use, Miscellaneous, Mitigation, Noise, Palomar, Pipeline Construction Techniques, Purpose and Need, Safety and Security, Socioeconomics, Soils and Sediments, T and E Species, Terrestrial Wildlife, Transportation, Vegetation, Water Resources, Wetlands	Appendix K	K-580
LA8	Port of Vancouver	12/24/2007	12/26/2007	Safety, Transportation	Appendix K	K-605
LA9	Port of Portland	12/26/2007	12/28/2007	Safety	Appendix K	K-608
LA10	Port of Portland	12/21/2007	12/26/2007	Transportation	Appendix K	K-610
LA11	Clatsop County	11/12/2007	11/23/2007	State/Local Permits/Approvals	Appendix K	K-611
COMPANIES AND ORGANIZATIONS						
CO1	Swanson Bark Food Products, Inc.	9/7/2007	9/17/2007	Purpose and Need, Safety	Appendix K	K-615
CO2	Swanson Bark Food Products, Inc.	10/1/2007	10/9/2007	Miscellaneous, Purpose and Need, Socioeconomics	Appendix K	K-616

TABLE K-1						
Written Correspondence Received During the Draft EIS Comment Period						
Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
CO3	Teevin Bros Land and Timber Co.	10/8/2007	10/16/2007	Miscellaneous	Appendix K	K-617
CO4	Northwest Natural Gas Company	11/21/2007		Palomar	Appendix K	K-618
CO5	Willapa Hills Audubon Society	12/21/2007	12/21/2007	Land Use, Miscellaneous, T and E Species, Terrestrial Wildlife	Appendix K	K-622
CO6	Northwest Industrial Gas Users	12/21/2007	12/21/2007	Alternatives, Purpose and Need	Appendix K	K-624
CO7	Portland General Electric Company	12/24/2007	12/24/2007	Safety and Security	Appendix K	K-639
CO8	Oregon Physicians for Social Responsibility	12/24/2007	12/24/2007	Land Use, Miscellaneous, Purpose and Need, Safety and Security, Socioeconomics, Water Resources	Appendix K	K-646
CO9	Pipeline Safety Trust	12/24/2007	12/26/2007	Alternatives, Geology, Land Use, Purpose and Need, Safety and Security, Vegetation, Water Resources	Appendix K	K-648
CO10	Montinore Vineyards	Undated	12/18/2007	Miscellaneous, Purpose and Need, Safety and Security	Appendix K	K-654
CO11	Columbia RiverKeeper	12/21/2007	12/22/2007	Air Quality, Alternatives, Aquatic Wildlife, Cultural Resources, Cumulative Impacts, Dredging, EFH, Geology, Miscellaneous, Mitigation, Noise, Palomar, Pipeline Construction Techniques, Project Description, Purpose and Need, Safety and Security, Socioeconomics, Soils and Sediments, T and E Species, Terrestrial Wildlife, Vegetation, Water Resources, Wetlands	Appendix K	K-656
CO12	RainLane Fly Casters	12/21/2007	12/31/2007	Alternatives, Aquatic Wildlife, Mitigation, Safety and Security, Socioeconomics	Appendix K	K-756
CO13	The National Grange	12/19/2007	12/26/2007	Aquatic Wildlife, Miscellaneous, Safety	Appendix K	K-758
CO14	Willapa Hills Audubon Society to the FERC	12/19/2007	12/27/2007	Miscellaneous	Appendix K	K-760
INDIVIDUALS						
IND1	David Purcell	Undated	8/30/2007	Geology	Appendix K	K-777
IND2	Bob Speaker	10/1/2007	10/9/2007	Alternatives, Miscellaneous, Purpose and Need	Appendix K	K-778
IND3	James Reed	9/27/2007	10/11/2007	Alternatives, Aquatic Wildlife, Geology, Miscellaneous, Noise, Project Description, Safety and Security, Socioeconomics, Water Resources	Appendix K	K-779
IND4	Anita Amick	10/13/2007	10/22/2007	Miscellaneous	Appendix K	K-791
IND5	Stephanie Zakrzewski	10/12/2007	10/22/2007	Miscellaneous, Safety and Security, Socioeconomics	Appendix K	K-792
IND6	Kim Heinesh	10/13/2007	10/22/2007	Miscellaneous, Project Description, Socioeconomics	Appendix K	K-793
IND7	John and Christine Hulon	10/16/2007	10/23/2007	Mitigation, Project Description Purpose and Need, Safety and Security	Appendix K	K-794
IND8	Joe Pierre	10/16/2007	10/22/2007	Miscellaneous, Mitigation, Safety and Security, Socioeconomics	Appendix K	K-795

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Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
IND9	Kimberly Olson	10/15/2007	10/22/2007	Mitigation, Socioeconomics	Appendix K	K-796
IND10	Susan Marshall	10/14/2007	10/22/2007	Purpose and Need, Safety and Security	Appendix K	K-797
IND11	Mary E. Casper	10/12/2007	10/22/2007	Project Description, Purpose and Need	Appendix K	K-798
IND12	John Veenendaal	10/12/2007	10/22/2007	Miscellaneous, Mitigation	Appendix K	K-799
IND13	Connie Veenendaal	10/12/2007	10/22/2007	Miscellaneous, Mitigation	Appendix K	K-800
IND14	Don Hanseth	10/16/2007	10/22/2007	Miscellaneous, Purpose and Need, Socioeconomics	Appendix K	K-801
IND15	ChrisLynn Taylor	10/12/2007	10/22/2007	Alternatives, Purpose and Need	Appendix K	K-802
IND16	Brian McCollister	10/12/2007	10/22/2007	Project Description, Miscellaneous, Mitigation	Appendix K	K-803
IND17	Robert and Judy Pounders	10/15/2007	10/24/2007	Mitigation, Socioeconomics	Appendix K	K-804
IND18	Ken Reid	10/16/2007	10/24/2007	Miscellaneous, Mitigations	Appendix K	K-805
IND19	Jessie Jones	10/19/2007	10/25/2007	Mitigation	Appendix K	K-806
IND20	Milton and Patti Whiteside	10/14/2007	10/30/2007	Mitigation, Purpose and Need, Safety and Security, Socioeconomics	Appendix K	K-807
IND21	June McCollister	10/12/2007	10/30/2007	Miscellaneous	Appendix K	K-808
IND22	Carolyn Eady	10/22/2007	10/30/2007	Air Quality, Geology, Miscellaneous, Safety and Security, Water Resources	Appendix K	K-809
IND23	Darwin Smith	10/25/2007	11/5/2007	Geology, Purpose and Need, Safety and Security, Socioeconomics	Appendix K	K-823
IND24	Leo Kestler	10/28/2007	11/5/2007	Aquatic Wildlife, Geology, Miscellaneous, Safety and Security, Socioeconomics	Appendix K	K-825
IND25	Jim Santee	10/31/2007	11/7/2007	Alternatives, Land Use, Purpose and Need, Safety and Security, Socioeconomics	Appendix K	K-827
IND26	Charlene and Richard Damitio	11/5/2007	11/13/2007	Air Quality, Geology, Noise, Safety and Security, Socioeconomics	Appendix K	K-830
IND27	Frans Eykel	Undated	11/5/2007	Water Resources	Appendix K	K-832
IND28	Collin Booth, et al.	Undated	11/13/2007	Alternatives, Miscellaneous, Mitigation	Appendix K	K-834
IND29	Audrey Munk	10/31/2007	11/8/2007	Water Resources	Appendix K	K-835
IND30	Jean M. Dominey	11/8/2007	11/14/2007	Aquatic Wildlife, Soils and Sediments, T and E Species, Terrestrial Wildlife	Appendix K	K-836
IND31	Carolyn Eady	11/8/2007	11/14/2007	Geology, Land Use, Safety and Security	Appendix K	K-837
IND32	John Dunzer	11/8/2007	11/14/2007	Alternatives	Appendix K	K-840
IND33	William and Doris Dragich Trust	11/8/2007	11/14/2007	Alternatives, Cultural Resources, Dredging, Geology, Miscellaneous, Mitigation, Project Description, Purpose and Need, Safety and Security, Socioeconomics, Soils and Sediments , T and E Species, Water Resources	Appendix K	K-843
IND34	Georgia Marincovich	Undated	11/14/2007	Miscellaneous, T and E Species, Water Resources, Wetlands	Appendix K	K-853
IND35	Deborah Brink	Undated	11/14/2007	Miscellaneous, Mitigation, T and E Species, Terrestrial Wildlife, Transportation, Water Resources	Appendix K	K-854

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Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
IND36	Pamela Wright	Undated	11/14/2007	Same as IND35	Appendix K	K-857
IND37	Vonda Kay Brock	11/7/2007	11/14/2007	Miscellaneous	Appendix K	K-860
IND38	Richard Beck	11/13/2007	11/14/2007	Geology	Appendix K	K-862
IND39	Richard Parker	11/8/2007	11/14/2007	Mitigation	Appendix K	K-864
IND40	Laurie Caplan	11/8/2007	11/14/2007	Geology, Safety and Security	Appendix K	K-866
IND41	Jerry Havens	11/8/2007	11/14/2007	Safety and Security	Appendix K	K-868
IND42	Jim Kodama	11/8/07	11/14/2007	Safety and Security	Appendix K	K-871
IND43	Frank Aquesto, Jeannette Warlton, and Dale Trensdel	Undated	11/14/2007	Miscellaneous, Transportation, Water Resources	Appendix K	K-874
IND44	Marjorie A. Castle	11/8/07	11/27/2007	Water Resources	Appendix K	K-876
IND45	William and Doris Dragich Trust	11/8/2007	11/15/2007	Miscellaneous	Appendix K	K-878
IND46	Marc Auerbach	11/9/2007	11/28/2007	Palomar, Purpose and Need	Appendix K	K-879
IND47	John Peterson	Undated	12/5/2007	Aquatic Wildlife, Purpose and Need, Safety and Security, Socioeconomics, Vegetation	Appendix K	K-881
IND48	Robert Quoidbach	11/28/2007	11/28/2007	Geology	Appendix K	K-882
IND49	James Reed	11/20/2007	12/5/2007	EIS Process, Water Resources, Miscellaneous, Safety	Appendix K	K-885
IND50	Robert and Rhea Jacobs	11/29/2007	12/4/2007	Purpose and Need	Appendix K	K-893
IND51	R. Duncan MacKenzie	12/11/2007	12/12/2007	Water Resources	Appendix K	K-895
IND52	R. Duncan MacKenzie	12/12/2007	12/12/2007	Alternatives, Purpose and Need	Appendix K	K-897
IND53	R. Duncan MacKenzie	12/13/2007	12/13/2007	Water Resources	Appendix K	K-900
IND54	Frans Eykel	12/4/2007	12/10/2007	Air Quality, Land Use	Appendix K	K-903
IND55	Gary Marzolino	12/13/2007	12/7/2007	Palomar, Safety and Security, T and E Species	Appendix K	K-905
IND56	Norm and Nancy Monroe	12/3/2007	12/10/2007	Air Quality, Purpose and Need, Safety and Security	Appendix K	K-906
IND57	Irene Martin	12/6/2007	12/12/2007	Aquatic Wildlife, Cumulative Impacts, Mitigation, Socioeconomics	Appendix K	K-907
IND58	R. Duncan MacKenzie	12/14/2007	12/14/2007	Socioeconomics, Transportation	Appendix K	K-910
IND59	R. Duncan MacKenzie	12/14/2007	12/14/2007	Water Resources	Appendix K	K-913
IND60	Gayle Kiser	12/1/2007	12/13/2007	Alternatives, Aquatic Wildlife, Geology, Miscellaneous, Mitigation, Palomar, Project Description, Purpose and Need, Water Resources, Safety and Security, Socioeconomics, T and E Species, Vegetation	Appendix K	K-917
IND61	Anne Berblinger	Undated	12/17/2007	Alternatives, Palomar, Safety and Security, T and E Species	Appendix K	K-922
IND62	R. Duncan MacKenzie	12/17/2007	12/17/2007	Air Quality, Noise	Appendix K	K-925
IND63	R. Duncan MacKenzie	12/17/2007	12/17/2007	Safety and Security	Appendix K	K-929
IND64	Brenda Scott	12/6/2007	12/14/2007	Noise, Safety and Security, Socioeconomics	Appendix K	K-932

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Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
IND65	Patrick Cunningham	Undated	12/18/2007	Geology, Purpose and Need, Safety and Security, Transportation	Appendix K	K-933
IND66	Laurie Caplan	12/17/2007	12/18/2007	Geology, Miscellaneous, Palomar, Safety and Security	Appendix K	K-934
IND67	Sandra Davis	12/19/2007	12/19/2007	Alternatives, Cumulative Impacts, Geology, Miscellaneous, Purpose and Need, Safety and Security, Transportation, Vegetation, Miscellaneous	Appendix K	K-937
IND68	R. Duncan MacKenzie	12/20/2007	12/20/2007	Noise	Appendix K	K-939
IND69	R. Duncan MacKenzie	12/20/2007	12/20/2007	Safety and Security	Appendix K	K-942
IND70	R. Duncan MacKenzie	12/20/2007	12/20/2007	Safety and Security	Appendix K	K-945
IND71	Cheryl Johnson	12/20/2007	12/20/2007	Safety and Security	Appendix K	K-947
IND72	William Castle, Marjorie Castle, and Beverly Beal	12/20/2007	12/21/2007	Alternatives, Geology, Land Use, Pipeline Construction Techniques, Miscellaneous, Purpose and Need, Safety and Security, Socioeconomics, Transportation, Water Resources, Wetlands	Appendix K	K-950
IND73	Jerry Havens	12/20/2007	12/21/2007	Safety and Security	Appendix K	K-964
IND74	Robert Stang	Undated	12/21/2007	Alternatives, Aquatic Resources, Miscellaneous, Purpose and Need, Safety and Security, Water Resources	Appendix K	K-968
IND75	Erin Moore	Undated	12/21/2007	Alternatives, Geology, Mitigation, Palomar, Safety and Security, Socioeconomics	Appendix K	K-970
IND76	R. Duncan MacKenzie	12/21/2007	12/21/2007	Miscellaneous	Appendix K	K-972
IND77	R. Duncan MacKenzie	12/21/2007	12/21/2007	Air Quality	Appendix K	K-974
IND78	R. Duncan MacKenzie	12/21/2007	12/21/2007	Aquatic Wildlife	Appendix K	K-977
IND79	Warren G. Leback	12/12/2007	12/18/2007	Miscellaneous	Appendix K	K-980
IND80	Paul Sansone and Susan Vosburg	12/19/2007	12/21/2007	Miscellaneous, Palomar	Appendix K	K-982
IND81	Sandra Davis	12/25/2007	12/25/2007	Safety and Security	Appendix K	K-987
IND82	John Vlastelicia	12/24/2007	12/24/2007	Aquatic Wildlife, Dredging, Geology, Miscellaneous, Soils and Sediments, T and E Species	Appendix K	K-988
IND83	Carolyn Eady	12/24/2007	12/24/2007	Palomar, Purpose and Need, Safety and Security	Appendix K	K-996
IND84	Carol Carver	12/20/2007	12/21/2007	Geology, Miscellaneous, Safety and Security, Socioeconomics, Water Resources	Appendix K	K-999
IND85	Charles and Cynthia Straughan	12/22/2007	12/24/2007	Air Quality, Aquatic Wildlife, Dredging, Miscellaneous, Palomar, Purpose and Need, Safety and Security, Socioeconomics, Vegetation	Appendix K	K-1001
IND86	Mike and Jane Rees	12/23/2007	12/26/2007	Air Quality, Alternatives, Geology, Miscellaneous, Noise, Purpose and Need, Water Resources	Appendix K	K-1013
IND87	Jon Graves	Undated	12/24/2007	Aquatic Wildlife, Wetlands	Appendix K	K-1019
IND88	Roger Rocka	Undated	12/26/2007	Geology, Project Description, Safety and Security	Appendix K	K-1020

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Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
IND89	Tammy Dowling	12/24/2007	12/26/2007	Aquatic Wildlife, Geology, Safety and Security, Socioeconomics	Appendix K	K-1021
IND90	Carl Dominey	12/21/2007	12/27/2007	Miscellaneous	Appendix K	K-1022
IND91	George Exum	12/17/2007	12/26/2007	Water Resources	Appendix K	K-1023
IND92	George Exum	12/17/2007	12/26/2007	Safety and Security	Appendix K	K-1026
IND93	George Exum	12/17/2007	12/26/2007	Dredging, Geology, Miscellaneous, Mitigation, Palomar, Safety and Security, Socioeconomics, Water Resources	Appendix K	K-1028
IND94	Carol A. Kriesel	Undated	12/12/2007	Land Use, Miscellaneous, Safety and Security	Appendix K	K-1032
IND95	George Exum	12/25/2007	12/26/2007	Miscellaneous, Safety and Security	Appendix K	K-1034
IND96	Robert and Lisa Sudar	Undated	12/26/2007	Miscellaneous, Socioeconomics, Transportation, Water Resources, Vegetation	Appendix K	K-1036
IND97	Robert Pyle	12/26/2007	12/27/2007	Aquatic Wildlife, Land Use, Mitigation, Terrestrial Wildlife	Appendix K	K-1038
IND98	Jessie Jones	12/12/2007	12/19/2007	T and E Species, Terrestrial Wildlife	Appendix K	K-1040
IND99	Deborah Jaques	11/28/2007	12/27/2007	Terrestrial Wildlife	Appendix K	K-1041
IND100	Troy Laws	12/22/2007	12/28/2007	Aquatic Wildlife, Safety and Security, Socioeconomics, Water Resources	Appendix K	K-1043
IND101	Barbara Pereira	12/24/2007	1/10/2008	Alternatives, Purpose and Need, Safety and Security	Appendix K	K-1047
IND102	Ted Messing	11/14/2007	11/14/2007	Miscellaneous	Appendix K	K-1048
IND103	Lori Durheim	12/27/2007	12/17/2007	Miscellaneous, Safety and Security	Appendix K	K-1050
IND104	Gene Malizia	12/25/2007	1/3/2008	Alternatives, Geology, Miscellaneous	Appendix K	K-1051
IND105	Individual	Undated	12/26/2007	Miscellaneous, Purpose and Need	Appendix K	K-1052
IND106	Vance Fraser	12/18/2007	12/27/2007	Air Quality, Alternatives, Aquatic Wildlife, Cultural Resources, Cumulative Impacts, Dredging, Geology, Land Use, Miscellaneous, Mitigation, Purpose and Need, Safety and Security, Socioeconomics, Soils and Sediments, T and E Species, Vegetation, Water Resources, Wetlands	Appendix K	K-1053
IND107	Frans Eykel	12/17/2007	12/26/2007	Alternatives, Aquatic Wildlife, Geology, Mitigation, Safety and Security, Socioeconomics, Water Resources	Appendix K	K-1078
IND108	Steven and Erika Miller	12/20/2007	12/27/2007	Alternatives, Miscellaneous, Safety and Security, Socioeconomics	Appendix K	K-1081
IND109	Lee and Judy Talbot	9/18/2007	12/27/2007	Miscellaneous, Safety and Security	Appendix K	K-1083
IND110	Chris Michel and Linda Kaiser	12/17/2007	12/27/2007	Alternatives, Geology, Miscellaneous, Purpose and Need, Safety and Security, Socioeconomics, Water Resources	Appendix K	K-1084
IND111	Carl and Jean Dominey	12/21/2007	12/27/2007	Alternatives, Geology, Miscellaneous, Safety and Security, Socioeconomics	Appendix K	K-1085

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Written Correspondence Received During the Draft EIS Comment Period						
Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
IND112	Robert L. Kiser	12/1/2007	1/3/2008	Alternatives, Aquatic Resources, Geology, Land Use, Miscellaneous, Mitigation, Pipeline Construction Techniques, Purpose and Need, Safety and Security, Socioeconomics, T and E Species, Vegetation, Water Resources	Appendix K	K-1086
IND113	Steven R. Miller	12/19/2007	12/27/2007	Alternatives, Miscellaneous, Safety and Security, Socioeconomics	Appendix K	K-1096
IND114	Leslie Hildula	12/19/2007	12/27/2007	Miscellaneous	Appendix K	K-1098
IND115	Bennett and Patricia Garner	12/23/2007	1/2/2008	Alternatives, Aquatic Wildlife, Geology, Mitigation, Safety and Security, Socioeconomics	Appendix K	K-1100
IND116	Kristin Lee	12/23/2007	1/2/2008	Aquatic Wildlife, Geology, Palomar, Safety and Security, Socioeconomics, Water Resources	Appendix K	K-1104
IND117	Dan McShane	Undated	12/28/2007	Alternatives, Geology, Soils and Sediments, Terrestrial Wildlife, Vegetation	Appendix K	K-1107
IND118	Harriet Cavalli	Undated	12/26/2007	Miscellaneous	Appendix K	K-1110
	Frans Eykel to the Army Corps of Engineers	10/26/2007	11/6/2007	Not Applicable	Not a comment on draft EIS. No response necessary.	NA
	Marjorie Castle to the Clatsop County Board of Commissioners	11/19/2007	11/20/2007	Not Applicable	Not a comment on draft EIS. No response necessary.	NA
	William and Marjorie Castle to the Army Corps of Engineers	11/20/2007	11/20/2007	Not Applicable	Not a comment on draft EIS. No response necessary.	NA
	Testimony of Gloria G. MacKenzie	11/7/2007	11/14/2007	Not Applicable	Not a comment on draft EIS. No response necessary.	NA
	Gloria G. MacKenzie to Clatsop County Board of Commissioners	10/22/2007	11/14/2007	Not Applicable	Not a comment on draft EIS. No response necessary.	NA
	James N. Mitchell to the Army Corps of Engineers	11/3/2007	11/13/2007	Not Applicable	Not a comment on draft EIS. No response necessary.	NA
	Paul Sansone to Representative David Wu	12/5/2007	12/23/2007	Not Applicable	Not a comment on draft EIS. No response necessary.	NA
	Allen Neuringer to Oregon Public Utility Commission	12/11/07	12/19/07	Not Applicable	Not a comment on draft EIS. No response necessary.	NA
APPLICANT						
A1	NorthernStar	9/4/2007	9/4/2007	Safety and Security	Appendix K	K-1116

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Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
A2	NorthernStar (letters of support)	9/4/2007	9/4/2007	Miscellaneous, Project Description, Purpose and Need, Socioeconomics	Appendix K	K-1130
A3	NorthernStar (letters of support)	9/19/2007	9/19/2007	Alternatives, Miscellaneous, Mitigation, Water Resources	Appendix K	K-1135
A4	NorthernStar	10/15/2007	10/15/2007	Water Resources	Appendix K	K-1142
A5	NorthernStar	10/15/2007	10/15/2007	Safety and Security, Transportation	Appendix K	K-1143
A6	NorthernStar	12/21/2007	12/28/2007	Mitigation, Noise, Pipeline Construction Techniques, Water Resources, Wetlands	Appendix K	K-1148
A7	NorthernStar	12/21/2007	12/28/2007	Dredging, Miscellaneous, Wetlands	Appendix K	K-1152

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Written Correspondence Received After the Draft EIS Comment Period

Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
FEDERAL AGENCIES						
	National Oceanic and Atmospheric Administration- National Marine Fisheries Service	12/17/2007	1/18/2008	Letter to the Army Corps of Engineers	Not comment on draft EIS. No response necessary.	NA
	National Oceanic and Atmospheric Administration- National Marine Fisheries Service	2/1/2008	2/5/2008	Additional information to the Army Corps of Engineers	Not comment on draft EIS. No response necessary.	NA
	United States Senator Gordon Smith	2/8/2008	2/15/2008	Socioeconomics- eminent domain, purpose and need	Not comment on draft EIS. No response necessary.	NA
	Army Corps of Engineers	1/14/2008	2/22/2008	Data request to NorthernStar for JPA and Section 404 permit application	Not comment on draft EIS. No response necessary.	NA
	United States Representatives Peter A. DeFazio, David Wu, Darlene Hooley, and Earl Blumenauer	3/7/2008	3/24/2008	General support of Governor Theodore R. Kulongoski's letter, encouragement of collaboration with Oregon State Agencies	Not comment on draft EIS. No response necessary.	NA
	United States Representative David Wu	4/8/2008	4/11/2008	Request to FERC for additional public hearings in Clatsop County	Not comment on draft EIS. No response necessary.	NA
STATE AGENCIES						
	State of Oregon Ocean and Coastal Management Program	1/7/2008	1/18/2008	Project review period	Not comment on draft EIS. No response necessary.	NA
	Oregon Governor Theodore R. Kulongoski	2/14/2008	2/15/2008	Purpose and need	Not comment on draft EIS. No response necessary.	NA
	State of Oregon Department of Environmental Quality	1/25/2008	1/31/2008	Addition to "Interested Parties" mailing list	Not comment on draft EIS. No response necessary.	NA
	Office of Congressman David Wu- Steve Marx	3/5/2008	3/5/2008	Request for response to Clatsop County Board of Commissioners letter	Not comment on draft EIS. No response necessary.	NA
	Oregon Department of Land Conservation and Development	4/9/2008	4/11/2008	Stay Agreement between NorthernStar and the Oregon Department of Land Conservation and Development	Not comment on draft EIS. No response necessary.	NA
SA7	State of Oregon, Governor Theodore R. Kulongoski	5/9/2008	5/12/2008	Reissuance of draft EIS, Aquatic Wildlife, Socioeconomics, Air Quality, Dredging	Appendix K	K-521
LOCAL AGENCIES						
LA12	Clatsop County	2/22/2008	2/26/2008	EIS Process, State Permits/Approvals	Appendix K	K-613
	Board of Wahkiakum County Commissioners letter to NorthernStar	4/8/2008	4/10/2008	Request for information from NorthernStar	Not comment on draft EIS. No response necessary.	NA

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Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
	Board of Wahkiakum County Commissioners	4/22/2008	4/24/2008	Wahkiakum County requests that FERC allow NorthernStar to correct Attachment A: Emergency Response Plan and Attachment F: Marine Matters	Not comment on draft EIS. No response necessary.	NA
COMPANIES AND ORGANIZATIONS						
CO15	Columbia Riverkeeper	4/24/2008	4/25/2008	Various topics	Appendix K	K-763
INDIVIDUALS						
IND119	Jeff Blackwood	2/17/2008	2/26/2008	Aquatic Resources	Appendix K	K-1111
	Gene Malizia	2/26/2008	3/3/2008	Response to NorthernStar's filed request that FERC ignore Governor Theodore R. Kulongoski's request	Not comment on draft EIS. No response necessary.	NA
IND120	Houman Sabahi, MD	Undated	3/16/2008	Safety	Appendix K	K-1112
	Miles and Linda C. Martin	2/26/2008	3/10/2008	Response to NorthernStar's filed request that FERC ignore Governor Theodore R. Kulongoski's request, request to create one EIS for all projects	Not comment on draft EIS. No response necessary.	NA
IND121	Harriet Cavalli	Undated	3/11/2008	Project Description	Appendix K	K-1113
IND122	Tom and Marian Sawtell	Undated	4/22/2008	Safety, Land Use, Purpose and Need	Appendix K	K-1115
	Frans G. Eykel	4/13/2008	4/24/2008	ERP, Safety, Transportation	Not comment on draft EIS. No response necessary.	NA
APPLICANT						
	NorthernStar	2/21/2008	2/21/2008	Land Use-Clatsop County	Not comment on draft EIS. No response necessary.	NA
	NorthernStar	2/28/2008	2/28/2008	Clatsop County	Not comment on draft EIS. No response necessary.	NA
	NorthernStar	2/20/2008	2/20/2008	Response to Governor Theodore R. Kulongoski	Not comment on draft EIS. No response necessary.	NA
	NorthernStar	2/19/2008	2/19/2008	Well plan	Not comment on draft EIS. No response necessary.	NA
	NorthernStar	2/19/2008	2/19/2008	Decommissioning Plan to Clatsop County	Not comment on draft EIS. No response necessary.	NA
	NorthernStar	2/20/2008	2/21/2008	Submission of the Port of Vancouver funded final report: Spatial Analysis of the Beach Susceptibility for Stranding of Juvenile Salmonids by Ship Wakes, prepared by Entrix	Not comment on draft EIS. No response necessary.	NA

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Comment Letter	Agency/Name	Date of Letter	Date Filed	Topics	Response Status	Page
	NorthernStar	3/4/2008	3/4/2008	New project information	Not comment on draft EIS. No response necessary.	NA
	NorthernStar	3/10/2008	3/13/2008	New project information	Not comment on draft EIS. No response necessary.	NA
	NorthernStar	2/13/2008	2/22/2008	Response to the 1/14/2008 letter from the Army Corps of Engineers	Not comment on draft EIS. No response necessary.	NA
	NorthernStar	3/14/2008	3/24/2008	Conference call memo, e-mail from the Nez Pierce Tribe	Not comment on draft EIS. No response necessary.	NA
A8	NorthernStar	4/8/2008	4/8/2008	Response to FERC's recommended "Mitigation Measure 24"	Appendix K	K-1155
	NorthernStar	4/8/2008	4/8/2008	Schedule for submissions to the FERC	Not comment on draft EIS. No response necessary.	NA
A9	NorthernStar	4/23/2008	4/23/2008	Supplemental comments on the DEIS	Appendix K	K-1167

Public Meetings

1

PM1 RN-110507-FERC.txt

1

1 U.S. DEPARTMENT OF ENERGY
2 FEDERAL ENERGY REGULATORY COMMISSION
3

4 BRADWOOD LANDING LNG PROJECT
5 FERC DOCKET NUMBERS CP06-365 and 366
6
7

8 PUBLIC MEETING
9 TRANSCRIPT OF PROCEEDINGS
10 * * *
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12

13 Monday, November 5, 2007
14 6:30 p.m.
15

16 Clatskanie Middle/High School
17 471 S.W. Belair Drive
18 Clatskanie, Oregon
19 * * *
20

21 BEFORE: Mr. Paul D. Friedman
22 Federal Energy Regulatory Commission
23 Office of Energy Projects
24 * * *
25

2

1 P R O C E E D I N G S
2

3 MR. FRIEDMAN: I want to apologize for
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4 standing up here in the dark, but the reason is
18:38:08 5 by having it dark up here, the slides show
6 up -- show clearer. So, hopefully, you'll see
7 the slides and you'll hear me, and we'll find
8 the custodian, maybe after the slide show we'll
9 turn the lights on and actually see. One of
18:38:26 10 the artifices of coming to a new place that
11 you've never been before is figuring out light
12 switches and things like that.

13 I want to welcome you all here tonight.
14 Good evening, ladies and gentlemen. This is a
18:38:37 15 public meeting to take comments on the draft
16 Environmental Impact Statement or DEIS, issued
17 by the Federal Energy Regulatory Commission,
18 also referred to as FERC, F-E-R-C, or just the
19 Commission, for the Bradwood Landing liquefied
18:38:54 20 natural gas -- liquefied natural gas, often
21 abbreviated as LNG, and that's how I'll refer
22 to it for the rest of the meeting, for the
23 Bradwood Landing LNG project.

24 Let the record show that this meeting was
18:39:10 25 called to order at about -- my watch says 6:38
□

3

18:39:15 1 p.m., on Monday, November 5th, 2007, at
2 Clatskanie Middle/High School Auditorium, 471
3 S.W. Belair -- Belair Drive, Clatskanie, Oregon
4 97016.

18:39:37 5 My name's Paul Friedman, and I work in the
6 environmental branch of the Office of Energy
7 Projects, OEP, at the FERC. I am the
8 environmental team leader for the Bradwood

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9 Landing LNG project for the FERC. On behalf of
18:39:54 10 the FERC, I would like to welcome you all here
11 tonight. You may notice that there is a court
12 reporter sharing the stage with me up here.

13 Robin, please wave.

14 She is transcribing this meeting. This is
18:40:08 15 so we can have an accurate record of tonight's
16 comments. Within a few weeks a copy of the
17 transcript will be placed in the public record
18 for this proceeding and will be available
19 through the Internet via the FERC's Web site.

18:40:22 20 We can switch slides now, Pat.

21 The FERC is an independent agency within
22 the U.S. Department of Energy. We regulate the
23 interstate transportation of electricity,
24 hydropower, and natural gas. The Commission is
18:40:41 25 regulated by five Commissioners appointed by

4

18:40:43 1 the President of the United States and approved
2 by the United States Congress. The FERC staff
3 are civil servants.

4 Next slide.

18:40:52 5 On June 5th, 2006, Bradwood Landing LLC
6 filed an application with the Federal Energy
7 Regulatory Commission requesting permission to
8 construct and operate an LNG import terminal
9 under Section 3 of the Natural Gas Act, or
18:41:08 10 abbreviated as NGA, in docket number
11 CP06-365-000. NorthernStar Energy LLC filed a
12 companion application or under section 7 of the
13 NGA under docket number CP06-366-000.

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 Hereafter, I will refer to Bradwood
 18:41:36 15 Landing LLC and NorthernStar Energy LLC
 16 collectively as just NorthernStar since they
 17 are, in reality, two subsidiaries of the same
 18 company.
 19 Next slide. Pat, next slide.
 18:42:04 20 The FERC is the lead federal agency for
 21 this project, and we took the lead in producing
 22 the EIS in order to comply with the National
 23 Environmental Policy Act of 1969, better known
 24 as NEPA. Our EIS also summarizes activities
 18:42:21 25 relating to compliance with the Endangered
 □
 18:42:23 1 Species Act, the Magnuson-Stevens Fishery
 2 Conservation and Management Act, the Marine
 3 Mammal Protection Act, the National Historical
 4 Preservation Act, the Clean Water Act, Clean
 18:42:33 5 Air Act, and Coastal Zone Management Act.
 6 Next slide.
 7 As part of its decision-making process,
 8 the FERC considered environmental impacts of
 9 the project as disclosed in the EIS. The
 18:42:49 10 production of the DEIS was a collaborative
 11 effort involving FERC staff, a third-party
 12 contractor, which is Natural Resources Group --
 13 again, I'll refer to them as by their initials,
 14 NRG -- and cooperating agencies.
 18:43:05 15 Let me introduce some of the people here
 16 tonight who played major roles in writing the
 17 DEIS. Representing our environmental
 18 contractor, NRG, is Patricia Terhaar. Pat is

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19 down there doing the slide show. And at the
18:43:19 20 back, at the sign-in table is, Janelle Rieland.
21 For those of you who live in this area, I want
22 to point out that Pat's mother was born and
23 raised in Longview, Washington. We consider
24 our contractors to be an extension of the FERC
18:43:33 25 staff.
□

6

18:43:39 1 The federal agencies that cooperated in
2 the production of the DEIS includes the U.S.
3 Army Corps of Engineers, the U.S. Coast Guard,
4 and the U.S. Department of Transportation. A
18:43:50 5 cooperating agency has jurisdiction by law or
6 special expertise related to project-specific
7 environmental impacts, and those agencies may
8 adopt the EIS to meet their own regulatory
9 obligations for compliance with the NEPA.

18:44:06 10 Next slide.
11 We issued a notice of availability, or
12 NOA, for the DEIS on August 17th, 2007, which
13 gave a closing date for comments as December
14 24th, 2007. The U.S. Environmental Protection
18:44:21 15 Agency noticed the issuance of our DEIS in the
16 Federal Register on August 24th, 2007.

17 Next slide.
18 We mailed almost 1300 copies of the DEIS
19 to various elected officials, federal, state,
18:44:39 20 and local governmental agencies, landowners,
21 and interested members of the public. In
22 addition, copies were sent to local newspapers
23 and libraries, and copies of the DEIS are

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24 available at the public reference room at the
18:44:54 25 FERC in Washington, D.C., and can be viewed
□ 7

18:44:59 1 electronically on the FERC's Internet Web site
2 under the eLibrary link.
3 In addition, NRG will be receiving some
4 additional hard copies. So if you want a hard
18:45:09 5 copy, you may give your name and address to Pat
6 or Janelle, and they'll make sure they mail you
7 a copy.
8 The DEIS described the proposed action.
9 The purpose of the project is to provide a new
18:45:24 10 source of natural gas to the Pacific Northwest
11 by importing LNG. LNG is natural gas that has
12 been cooled to about minus 260 degrees
13 Fahrenheit for shipping and storage as a
14 liquid. It can be transported in specially
18:45:41 15 designed ships to its point of origin.
16 Next slide.
17 This is acknowledge LNG export facility, I
18 believe. This is in Alaska, and that's LNG
19 ship.
18:45:51 20 Next slide.
21 Another view of LNG ship.
22 In summary, the Bradwood Landing LNG
23 project would consist of the following key
24 elements:
18:46:04 25 An LNG import, storage, vaporization, and
□ 8

18:46:07 1 sendout facility located at Bradwood Landing in
2 Clatsop County, Oregon, about 38 miles up the
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3 Columbia River from its mouth.
4 The terminal would include a 58-acre
18:46:19 5 maneuvering area adjacent to the existing
6 Columbia River navigation channel, and a single
7 berth capable of handling LNG ships up to
8 2,000 -- up to 200,000 cubic meters in
9 capacity.
18:46:34 10 The waterway for LNG marine traffic would
11 extend from 12 nautical miles off the Oregon
12 coast, up the Columbia River to Bradwood
13 Landing. The upland portion of the terminal
14 would include two full-containment LNG storage
18:46:48 15 tanks with a capacity of 160,000 cubic meters
16 each.
17 Next slide.
18 A nonjurisdictional 1.5-mile-long,
19 115-kilovolt power line to be built, owned, and
18:47:02 20 maintained by PacifiCorp, that would extend
21 from the existing Bonneville Power
22 Administration system to the Bradwood Landing
23 LNG terminal. The LNG terminal would have a
24 maximum sendout capacity of 1.3 billion cubic
18:47:17 25 feet per day of natural gas.
□
18:47:18 1 Next slide.
2 A 36.3-mile-long natural gas sendout
3 pipeline would extend from the Bradwood Landing
4 LNG terminal to an intersection with the
18:47:30 5 existing Williams Northwest Pipeline
6 Corporation interstate natural gas system near
7 Kelso, Washington. This would include 18.9
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8 miles of 36-inch diameter pipeline across
9 portions of Clatsop and Columbia counties,
10 Oregon, and 17.5 miles of 30-inch pipeline
11 mostly in Cowlitz County, Washington.

12 Next slide.

13 Associated with the pipeline would be a
14 sendout meter station located within the LNG
15 terminal tract, four delivery meter stations,
16 and interconnections with the Georgia-Pacific
17 Wauna mill at milepost, or MP, 3.7, Northwest
18 Natural Pipeline at MP 11.4, PGE Beaver power
19 plant at milepost 18.9, and Williams Northwest
20 pipeline at milepost 36.3, six main line block
21 valves along the pipeline, pig launchers at the
22 terminal meter station and at the Beaver meter
23 station, and pig receivers at Beaver and
24 Williams Northwest meter stations.

18:48:29 25 Next slide.

10

18:48:31 1 Short, nonjurisdictional pipeline laterals
2 would be built, operated, and maintained by the
3 gas customers to interconnect with the
4 NorthernStar pipeline at Wauna mill, Northwest
18:48:42 5 Natural pipeline, and Beaver power plant.

6 I want to clarify that the Federal Energy
7 Regulatory Commission is not a sponsor of this
8 project. This is a project proposed by
9 NorthernStar. The FERC is a licensing or
10 regulatory body, and we take no position on
11 this project until after we have completed the
12 full review of NorthernStar's applications.

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13 Before the FERC makes a decision about the
14 project, there are several steps that must be
18:49:12 15 taken.

16 Next slide.

17 One of those steps includes public input.
18 So first we will consider comments from the
19 public on the DEIS, and that's the purpose of
18:49:27 20 tonight's meeting.

21 Because the Commission has the
22 responsibility to treat all parties to a
23 proceeding equally, we must first make sure
24 that our process is open and public. For this
18:49:37 25 reason, we are constrained by our own ex parte

11

18:49:41 1 rules. This means there can be no
2 off-the-record discussions or correspondence
3 between the FERC staff and interested parties
4 regarding the merits of this case. Therefore,

18:49:50 5 I encourage you to either speak tonight on the
6 record, or to send us your comments in writing.

7 Next slide.

8 You can use the Internet through the
9 FERC's Web page at www.ferc.gov to have access
18:50:08 10 to public records in this proceeding and to
11 post your comments. You may file -- you may
12 follow filings -- you may file -- you may
13 follow filings in this proceeding through the
14 FERC's eSubscription service. You may view all

18:50:22 15 filed documents of the public record through
16 our eLibrary link, and you may send comments in
17 electronically via our eFiling link, or you can
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18 18:50:38 send in written comments the old-fashioned way
19 through the U.S. mail. Written comments should
20 be sent to:

21 Kimberly D. Bose, Secretary.
22 Federal Energy Regulatory Commission.
23 888 First Street, Northeast, Room 1a.
24 Washington, D.C. 20426.

18:50:52 25 Please reference on anything you send to

12

18:50:54 1 us the docket numbers CP06-365 and CP06-366,
2 and send one original and two copies of these
3 written comments submitted. Label one copy for
4 the attention of the FERC Office of Energy
18:51:10 5 Projects, Division of Gas-Environment and
6 Engineering, Gas Branch 3, PJ-11.3, which is
7 our internal mail stop.

8 The FERC will address comments on the DEIS
9 in a final EIS, or FEIS. Copies of the FEIS
18:51:28 10 will be sent to all parties on our mailing
11 list.

12 After we have issued the FEIS, the FERC
13 staff will analyze both the environmental
14 impacts of proposed project and all
18:51:39 15 nonenvironmental issues, including markets and
16 rates. The FERC staff would then make
17 recommendations about the project to the five
18 Commissioners who head our agency. It is those
19 Commissioners who make the final decision about
18:51:53 20 whether or not to authorize this project.

21 Next slide, please.

22 If the FERC decides to approve the
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23 project, the Commissioners would issue an order
24 to NorthernStar. If the Commission issues a
18:52:07 25 Certificate of Public Convenience and Necessity
□

13

18:52:09 1 for the pipeline, under Section 7H of the NGA,
2 that certificate would convey to NorthernStar
3 the power of eminent domain for nonfederal and
4 nontribal lands along the pipeline route.

18:52:22 5 If NorthernStar is unable to negotiate an
6 easement agreement with property owners, it may
7 acquire its right-of-way of easement through
8 the local courts. We urge NorthernStar to
9 negotiate in good faith with all landowners to
18:52:37 10 reach agreements. The LNG terminal is under
11 Section 3 of the NGA, which does not include
12 the power of eminent domain.

13 It is likely that a Commission order
14 authorizing the project would include our
18:52:54 15 recommended environmental conditions as
16 outlined in the EIS. One of those conditions
17 in the DEIS is that NorthernStar should develop
18 and fund a third-party environmental monitoring
19 program to be implemented during construction.

18:53:09 20 In addition to this, the FERC staff will
21 also monitor the project through construction
22 and restoration, performing on-site inspections
23 for compliance with the environmental
24 conditions of the order, and the U.S.

18:53:21 25 Department of Transportation would also monitor
□

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18:53:23 1 PM1 RN-110507-FERC.txt
the project design and construction.
2 Next slide, please.
3 Other agencies must also issue various
4 permits before the project can go forward to
18:53:36 5 construction. The Coast Guard will issue a
6 letter of recommendation indicating whether or
7 not the waterway is suitable for LNG marine
8 traffic. The Corps of Engineers will issue a
9 permit under the Rivers and Harbors Act and
18:53:52 10 Section 404 of the Clean Water Act. The
11 Washington Department of Ecology and Oregon
12 Department of State Lands and Oregon Department
13 of Environmental Quality would issue permits
14 under Section 401 of the Clean Water Act.
18:54:06 15 The Oregon Department of Environmental
16 Quality would also issue a federally delegated
17 permit under the Clean Air Act, and the Oregon
18 Department Land Conservation and Development
19 would make a determination on whether or not
18:54:18 20 the project is consistent with the Coastal Zone
21 Management Act.
22 Let me emphasize that this meeting is not
23 a hearing on the merits of the NorthernStar
24 proposal. As I said earlier, the purpose of
18:54:29 25 this meeting tonight is to give you, the
□

18:54:32 1 public, an opportunity to comment on the draft
2 Environmental Impact Statement.
3 While you may want to declare that you are
4 either for or against this project, those kinds
18:54:41 5 of subjective statements are not particularly

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 6 useful to the FERC staff when we have to do an
 7 environmental analysis. The type of comments
 8 that we do find useful are those that address
 9 data gaps in the DEIS or point out factual
 18:54:57 10 errors that need to be corrected. And we make
 11 those corrections in the final Environmental
 12 Impact Statement.
 13 Next slide.
 14 Before we take public comments, let's run
 18:55:07 15 through some general rules of decorum. I know
 16 that some of you find these issues to be
 17 extremely emotional, and I ask you to try to
 18 remain calm and present your views in a
 19 reasoned manner. Please show respect to all
 18:55:21 20 speakers. Do not interrupt or yell out from
 21 the audience, and wait patiently for your turn
 22 to speak.
 23 I will call speakers in the order that
 24 they are on the sign-up sheet. However, I do
 18:55:32 25 typically allow public officials to go first.

16

18:55:35 1 I will call several people up at a time so they
 2 can go up here in the front row and be ready to
 3 speak. Each speaker will be limited to three
 4 minutes, and if there's time at the end of the
 18:55:48 5 meeting, you may be allowed to speak for a
 6 second time. But if you have more to say than
 7 can be said in three minutes, I urge you to
 8 send in detailed written comments to the FERC.
 9 I'd like everyone to be civil, treat all
 18:56:08 10 speakers with respect. Personal attacks and

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11 name-calling are not acceptable.
12 This is a meeting for you, the public, to
13 comment on the draft Environmental Impact
14 Statement. It is not a question-and-answer
18:56:25 15 forum. Because many of your concerns are
16 complex and the FERC staff would need to do
17 additional research before addressing those
18 issues in a final Environmental Impact
19 Statement, therefore I would not be able to
18:56:37 20 give you accurate or complete responses tonight
21 from the podium. However, I will answer
22 questions that I do know the answers to,
23 specifically questions relating to
24 administrative or process.
18:56:50 25 Before we start this hearing, I would --
18:56:53 1 before we start hearing from the speakers, I
2 suggest we take a short, five-minute break.
3 That will allow anyone who has not signed up to
4 go back to Janelle and signed up on the sign-up
18:57:05 5 sheet. So we'll take a five-minute break, and
6 we'll reconvene, and I'll call the speakers
7 from the list. Thanks.
8 (Recess.)
9 MR. FRIEDMAN: Okay. Thank you for
19:02:57 10 waiting. Now is -- I'll open the floor to
11 individual comments. I ask that each speaker
12 clearly state their name for the record, speak
13 clearly in the microphone, spell your name for
14 the transcriber, identify any organization that
19:03:13 15 you may represent. If you are a landowner

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16 along the pipeline route, please indicate where
17 your property is located according to mile
18 marks, if you know them.
19 So the first speaker tonight is the mayor
19:03:27 20 of Clatskanie, Diane Pohl.
21 MS. DIANE POHL: Good evening, and thank
22 you for giving me this opportunity to welcome
23 the Federal Energy Regulatory Commission staff
24 and everyone else that has come to participate
19:03:51 25 in this process. I just wanted you to know

18

19:03:54 1 that the City of Clatskanie is delighted that
2 you're here. If we can be of any help while
3 you're here, please let us know. But welcome
4 to our community.

19:04:06 5 MR. FRIEDMAN: Thank you. And for those
6 of you who do not know, we're going to do
7 another meeting tomorrow morning at 9:00 a.m.
8 at the Clatskanie River Inn. So we'll do
9 actually two meetings here in Clatskanie.

19:04:19 10 I'm going to call three names, if I can
11 read them, and have those people ready to just
12 come up and speak. It's still dark in here
13 because we weren't able to figure out how to
14 turn the lights up.

19:04:45 15 We think the first speaker is Carol
16 Carver, Duncan MacKenzie is next, and then
17 Gayle Kiser. Remember that you are limited to
18 three minutes so everyone gets an opportunity
19 to speak.

19:05:14 20 MS. CAROL CARVER: Are you ready?

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PM1-1	21	PM1 RN-110507-FERC.txt	
	22	Mr. Friedman, FERC staff, in general, I'm	
	23	gravely concerned that many issues are simply	
	24	recommended in the DEIS and/or postponed for	
	25	accomplishment until well after the surveying	
	19:05:27	or the construction. For example, in section	19
	19:05:31	4.1 -- sorry -- 4.11.6, emergency response, the	
	2	emergency response plan, in our opinion, should	
	3	be completed and approved prior to issuing the	
	4	permit rather than, as written in the DEIS,	
	19:05:46	prior to initial site preparation.	
	5		
	6	FERC is considering approving a permit for	
	7	a large LNG facility that will be located	
	8	within a half mile of people's residences, not	
	9	to mention the maneuvering zone that will	
	19:05:59	follow the ship 38 miles up the river. The ERP	
	10	should be written and approved, including	
	11	evacuation plans, before permitting takes	
	12	place. FERC's use of the word "recommendation"	
PM1-2	13	should be in replaced by "shall." I really	
	14	think it needs to be stronger than a	
	15	recommendation.	
PM1-3	16		
	17	In section 4.11.4, thermal exclusion zone	
	18	is described using the on-land tanks as the	
	19	center from which distances are calculated.	
	19:06:26	FERC should also require that similar	
	20	calculations occur using a docked ship as the	
	21	center. Until the ship is offloaded and after	
	22	it is docked, it is, in effect, a storage tank	
	23	that is located much closer to the residences	
	24	on Puget Island than are the on-land storage	
	19:06:39		20
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PM1-1 On March 24, 2008, NorthernStar filed a draft ERP with the FERC for review. As discussed in section 4.11.6, the ERP would need to be reviewed and approved by the FERC before any final approval to begin construction. NorthernStar would need to revise the draft ERP in response to the FERC's review, and after consultations with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and other appropriate federal agencies.

PM1-2 The EIS is not a decision document. It is an advisory document disclosing potential environmental impacts of the proposed project. The FERC's environmental staff makes recommendations in the EIS using the phrasing "should." If the Commission adopts the EIS, in an Order authorizing the project, it may include the environmental conditions listed in Section 5 as requirements, using the term "shall."

PM1-3 Thermal exclusion zones for the onshore LNG tanks are calculated based on 49 CFR 193 and NFPA59A, 2001 edition. These regulations do not apply to LNG vessels and the methodologies could not be appropriately applied to an LNG vessel. Section 4.11.5.3 describes the methodologies and studies that the FERC uses to assess LNG spills from LNG vessels.

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19:06:42 1 tanks.

PM1-4 2 Section 4.3.2.3, page 4-75, NorthernStar

3 references the City of Portland storm water

4 management manual for calculating storm water

19:06:55 5 runoff volumes. We have at least twice the

6 amount of rain as Portland. FERC should check

7 to be sure the rainfall is in the neighborhood

8 of 60 to 90 inches a year in the calculation

9 that was used and not Portland's rainfall.

PM1-5 19:07:08 10 Section 4.8.2.4, property values,

11 concludes that the presence of an LNG facility

12 does not have significant positive or negative

13 impact on property values. Why is the research

14 done by Clarkswell Bain, by Professor George

19:07:23 15 Tolley of the University of Chicago and RCF

16 Economic & Financial Consulting not quoted, in

17 which he finds a dramatic negative impact on

18 property values in proximity to the LNG

19 terminals?

PM1-6 19:07:39 20 Lastly, section 4.1.3.3, geologic hazards,

21 this section delineates that the soil will

22 liquify in the event of a large seismic event

23 to the depth of 85 feet. However, there's no

24 recommendation in relation to the soil level

19:07:55 25 actually dropping after such an event.

0

19:07:58 1 Professor Atwater at the University of

2 Washington has documented a three-foot drop in

3 soil levels very close to the Bradwood site

4 after the last major seismic event that

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21

PM1-4 As described in section 4.3.2.3, the Stormwater Management Plan was filed with the FERC as part of the JPA on November 22, 2006. Revisions to the JPA were filed on April 5, 2007. This document is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range. NorthernStar's Stormwater Management Plan is designed using rainfall amounts calculated at the Astoria Airport by the Western Regional Climate Center for 2006.

PM1-5 The referenced report by George Tolley and RCF Economic and Financial Consulting studied a proposed natural-gas-fired power plant in Libertyville, Illinois. The studies discussed in sections 4.8.2.3 and 4.8.3.3 in our EIS are analyses of the potential impacts of LNG terminals and pipeline projects on property values.

PM1-6 As discussed in section 4.1.3.3, the soils at the site, including the fill soils, would be treated using vibroflotation to minimize the potential for liquefaction and associated subsidence. NorthernStar would be required to comply with the seismic design requirements of NFPA 59 (2001) and the additional measures described in the FERC's Seismic Design Guidelines. Also see our response to comment SA1-4.

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PM1-6 cont'd

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19:08:10 5 occurred in the 1700s, which, by the way, he
6 feels we're long overdue for another one.
7 We would like to see in the DEIS what the
8 consequence of a three-foot drop in soil level
9 after soil liquefaction would be, and this is
19:08:25 10 not currently addressed in the DEIS. Also,
11 does the conclusion that soils will liquify to
12 85 feet include the fill that is planned for
13 this site?
14 Thank you.

19:08:41 15 MR. FRIEDMAN: Miss Carver, I want to
16 compliment you on those comments. Those are
17 the kind of comments we're looking for, very
18 specific in terms of resources, and comments
19 that we can address in the DEIS. I appreciate
19:08:53 20 those comments.
21 I want to make one clarification. You
22 asked about why we used the term "recommended"
23 and not the word "shall." Staff can only
24 recommend. The Commissioners will make the
19:09:03 25 final decision, and in the Commission order
□

19:09:05 1 you'll see the word "shall" replaced with the
2 word "recommend."
3 MS. CAROL CARVER: Thank you.
4 MR. FRIEDMAN: Next up to speak is Duncan
19:09:12 5 MacKenzie.
6 MR. DUNCAN MacKENZIE: Good evening. My
7 name is Duncan MacKenzie. M-A-C-K-E-N-Z-I-E.
PM1-7 8 Noted in the DEIS on page 4-346 and again
9 on 4-416 is the fact that the Portland
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22

PM1-7

As discussed in section 4.11.3, the "five foot impoundment dike" referenced in the comments is a tertiary earthen berm surrounding the facility. As shown in table 4.11.4-1, because the proposed storage tanks are full containment tanks, the "dike" for each tank would be its outer concrete wall, which would contain any spills from each storage tank. Any process related spills would be directed to and contained by the process area sump or tank area sump, not the tertiary earthen berm. Therefore, the applicable impoundment system that would fall under 49 CFR 193.2155 would be the outer concrete wall on the full containment tank. As referenced in section 4.11.4, section 4.8.2.7 of the final EIS has been updated to include a discussion on the adjacent railroad tracks.

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PM1-7 cont'd

19:09:28 10 willamette railroad tracks are adjacent to the
11 facility. Also noted on page 4-111 and 4-112
12 is the provision of a five-foot impoundment
13 dike surrounding the LNG storage tanks.
14 The applicant's resource report 13,
19:09:41 15 section 13.13, details specific codes of
16 regulation that are applicable to aspects of
17 the terminal's physical design. On page 13-60
18 of resource report 13, the applicant notes
19 compliance with only one aspect of structural
19:09:54 20 requirements is found in 49 CFR 190.2155,
21 indicating that the LNG storage tanks cannot be
22 sited near an airport runway.
23 However, far more applicable aspect of
24 this site regulation is found in the paragraph
19:10:09 25 immediately prior to the one sited by the
□

19:10:13 1 applicant. 49 CFR 193.2155 (a) (5) (ii)
2 states: "The structural members of an
3 impoundment system must be designed and
4 constructed to prevent impairment of the
19:10:18 5 system's performance reliability and structural
6 integrity as a result of the following." And
7 under sub 5: "If applicable, the potential
8 impact and loading on the dike due to," under
9 sub (ii), "If the LNG facility adjoins the
19:10:35 10 right-of-way of any highway or railroad,
11 collision by or explosion of a train, tank car,
12 or tank truck that could reasonably be expected
13 to cause the most severe loading."
14 As seen in the proposed site plans, the
Page 19

23

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PM1-7
cont'd

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19:10:51 15 impoundment dike surrounding the LNG storage
16 tanks is directly adjacent to the railroad
17 right-of-way. However, not found in any of the
18 design criteria considerations for the
19 impoundment dike contained in the applicant's
19:11:02 20 resource reports one, 11, or 13, the DEIS or
21 any other publicly available materials does not
22 make any mention for the need to conform to the
23 requirements found in 49 CFR 193.2155 (a) (5)
24 (ii). While this information may appear in
19:11:20 25 table 13.13-1, this table has been designated
□

19:11:24 1 CEII and therefore is unavailable for public
2 review.
3 It is understood that the applicant's
4 design of the facility is not finished and that
19:11:33 5 the facility design must be compliant with the
6 applicable aspects of 49 CFR 193 and FNPA 59-A.
7 However, the apparent lack of acknowledgment or
8 appreciation for what seems to be a standard
9 safety requirements is most troubling. In view
19:11:45 10 of the needs to ensure public safety a request
11 for Commission review and comment is
12 appropriate in the FEIS or other documents
13 regarding this currently perceived lack of
14 address by the applicant to this specific
19:11:57 15 aspect.
16 MR. FRIEDMAN: Thank you, Mr. MacKenzie.
17 And, again, I appreciate your very detailed,
18 very specific comments on very specific
19 resource topics that we can address in the

24

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19:12:11 20 DEIS.
21 Next speaker is Gayle Kiser. After
22 Mrs. Kiser -- having difficulty reading without
23 a light up here.
24 Gloria MacKenzie is up next. Sorry for
19:13:00 25 that delay. We're having trouble reading this.
□ 25

19:13:07 1 MS. GAYLE KISER: I am Gayle Kiser.
2 That's K-I-S-E-R.
3 (Reporter requests clarification.)
4 MS. GAYLE KISER: My written comments will
19:13:23 5 be submitted directly to FERC in Washington,
6 D.C., as they are too lengthy to address in the
7 three minutes that we have been given.

PM1-8 8 I find greatly inconsistency and
9 disappointment best describe this DEIS. Under
19:13:37 10 "inconsistency," we need an independent needs
11 assessment, not figures taken from industry-
12 friendly sources. The very fact that Northwest
13 Natural Gas just cut their gas rates to
14 residential customers should be a hint that we
19:13:49 15 don't need any more gas in the area.

PM1-9 16 Land use laws: By FERC's own reckoning,
17 the proposed project is not consistent with the
18 existing plans and guidelines that have been
19 established for land use development in the
19:14:02 20 project area. The professional planners hired
21 by Clatsop County agreed only to watch the
22 politically appointed commissioners on the
23 planning commission disagree. Take the word of
24 the professionals.

Page 21

PM1-8 The purpose and need discussion in section 1.1 has been expanded and includes a variety of sources.

PM1-9 Our discussion on local land use plans is included in section 4.7.2.2. On March 20, 2008, the Clatsop County Board of Commissioners made a final ruling accepting the land use changes proposed by NorthernStar for its Land Use Compatibility Statement process.

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PM1-10 19:14:13 25 Alternatives have not been fully 26

19:14:15 1 developed. Why was the pipeline route through

2 Cowlitz County chosen? The Williams pipeline

3 is fully subscribed at this time. In the

4 Oregon JPA it is stated that the preferred

19:14:25 5 route would be to this storage area. We now

6 know of the Palomar pipeline proposal, which

7 would intersect the Bradwood Landing. It would

8 be appear that the Cowlitz routed is extraneous

PM1-11 9 at this time. Jobs have been promised, yet the

19:14:40 10 DEIS shows only 10 percent of the construction

11 jobs will come from Cowlitz and Wahkiakum

12 County.

PM1-12 13 Disappointments: We need to eliminate our

14 dependence on foreign fossil fuels. If we

19:14:53 15 don't move towards renewable fuels, we will

16 continue to be at the mercy of unfriendly

17 nations and we will continue down the path

18 toward catastrophic climate change. Section

19 3.1.1.2, entitled increased efficiency and

19:15:03 20 conservation of natural gas makes the title,

21 very title, sound like that's a bad idea.

PM1-13 22 Secrecy: The citizens of the affected

23 area deserve to know what is being done to

24 protect their safety. Instead, we are not

19:15:17 25 allowed to know what the emergency response 27

19:15:19 1 plan is in the event of an accident or

2 intentional attack on the pipeline, tankers, or

- PM1-10 Section 3.1.8 describes the factors that were considered when developing the route for the Bradwood Landing sendout pipeline. NorthernStar chose the route for its sendout pipeline, and the FERC staff reviewed it. NorthernStar's route in Cowlitz County attempted to follow the existing right-of-way for the KB Pipeline to the greatest extent possible. Regarding capacity of the Williams Northwest pipeline for the proposed new supplies, just because a pipeline is fully subscribed, that does not mean that pipeline capacity is never available for new entrants. It should be noted that for the last few years, LNG import terminals in the United States have been operating at about 50 percent capacity. Further, a significant amount of the volumes being imported are in the summer months when spare pipeline capacity is never available. Even in the winter months, and the shoulder seasons, capacity can be made available on "fully subscribed" pipelines through various Commission programs such as reverse open seasons, capacity turnbacks, capacity releases, and interruptible capacity. By encouraging the use of these programs, the Commission ensures that to the greatest extent possible, fully subscribed pipelines are fully utilized. In addition, the FERC has recently proposed new rules which would further aid in efficient use of available capacity by allowing asset managers to "tie" capacity released on a pipeline with gas supplies. As discussed in section 3.1.2.2, the proposed Palomar pipeline would not be a substitute for the proposed Bradwood Landing sendout pipeline; but can be viewed as a newly proposed system that would provide an alternative path for gas supplies to reach markets. See also our response to PM1-24.
- PM1-11 The number of construction workers presented in the draft EIS is an estimate and the specific number from Wahkiakum and Cowlitz Counties could be more.
- PM1-12 We have provided additional text to section 3.1.1.3 regarding renewable fuels and our evaluation of them as alternatives to the proposed project.
- PM1-13 The ERP is developed under consultation with appropriate federal, state, and local agencies. NorthernStar would be required to submit the ERP for review and written approval by the FERC before any final approval to begin construction. If the needed resources are not available and properly funded, operation of the project would not be approved. The draft ERP was filed on March 24, 2008. It can be viewed by the public through the FERC Internet webpage at www.ferc.gov. Go Dockets & Filings, click on eLibrary, put in the proper docket (CP06-365) and date, and look up Submittal 20080325-5040. Maps of the pipeline route are contained in Appendix B of the EIS. In addition, on October 30, 2007, the FERC streamlined its policy for critical energy infrastructure information (CEII) so that property owners on the pipeline route can obtain detailed alignment sheets with CEII for the portion of the project that would affect their land and the adjacent parcels on each side, without going through the CEII process.

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PM1-13 3 facilities. Indeed, we pipeline victims are
cont'd 4 not supposed to know if our property will be on
19:15:28 5 the final route. That's not right. Everyone
6 is left with uncertainty. Our government owes
7 its citizens more than that.

PM1-14 8 Effects on shipping: Our economy depends
9 a great deal on the commerce conducted on the
19:15:42 10 Columbia River. The WSA does not effectively
11 delineate what the effects of tanker traffic in
12 the shipping lane virtually every day will have
13 on our courts.

PM1-15A 14 Eminent domain: The idea our land be can
19:15:54 15 condemned and the pipeline installed over our
16 objections is abhorrent. This is a for-profit
17 company. They should not have the right to
18 take control of private property.

PM1-15B 19 Economic impacts on communities: Nowhere
19:16:07 20 is it delineated who will pay for the increased
21 security and safety measures that will be
22 mandated when LNG is sited in the area. State
23 and local governments will be expected to pick
24 up their end of the cost-sharing measure. How
19:16:19 25 much per tanker do we have to pay?

19:16:26 1 MR. FRIEDMAN: Thank you very much for
2 your comments.
3 The next speaker is Steve Dragich, and
4 after Steve, Vance Fraser.

19:16:55 5 MS. GLORIA MacKENZIE: Good evening,
6 Mr. Friedman and staff. My name is Gloria
7 MacKenzie. And it's M-A-C-K-E-N-Z-I-E.

28

- PM1-14 The LNG carriers would not affect ports along the Columbia River. As indicated in section 4.8.1.7, LNG marine traffic in the waterway would not significantly impact other commercial ship traffic.
- PM1-15A NorthernStar would make every effort to negotiate in good faith with affected landowners, but if an easement cannot be negotiated with a landowner and the project has been certificated by the FERC, NorthernStar may use the right of eminent domain in accordance with section 7(h) of the NGA. This law was passed by the U.S. Congress. The use of eminent domain as it relates to this project is discussed in section 4.7.3.1.
- PM1-15B As discussed in section 4.11.6, in accordance with EPAct 2005, NorthernStar's ERP is required to include a Cost-Sharing Plan identifying mechanisms for funding all project/specific security/emergency management costs that would be imposed on state and local agencies. In addition to the funding of direct transit-related security/emergency management costs, this comprehensive plan would include funding mechanisms for the capital costs associated with any necessary security/emergency management equipment and personnel base. The FERC staff is currently reviewing the draft ERP, and NorthernStar would not be able to start construction until after we find it acceptable. .

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PM1-16 8 PM1 RN-110507-FERC.txt
9 wind power is mentioned as an alternative
10 energy source in the DEIS. while wind power
19:17:10 11 represents only a portion of the total Pacific
12 Northwest energy portfolio, and requires load
13 sharing from other sources of energy, the
14 dismissive presentation of wind power in the
DEIS is incorrect. Two, it uses outdated
19:17:29 15 information. Three, does not address the
16 Pacific Northwest as a whole.
17 A far more balanced picture is found in
18 the Inner Governmental Northwest Power and
19 Conservation Council. In the Council's
19:17:47 20 document, the rule -- the role of renewable
21 resources in the fifth power plant dated 5
22 October 2006, quote: Over 2600 megawatts of
23 generating capacity of all resource types will
24 have been placed in service in the Northwest
19:18:07 25 between adoption of the fifth plan in summer
29
19:18:11 1 2004 and by the end of 2008. About 800
2 megawatts is operating, 960 megawatts under
3 construction, and 880 megawatts currently
4 scheduled for completion by the end of 2008,
19:18:29 5 about 1720 megawatts of the total of renewable
6 energy resources. Nearly all of this is wind
7 capacity. Over 99 percent.
8 From the foregoing, the 400 megawatt wind
9 power figure noted in the DEIS is incorrect.
19:18:52 10 Additionally, while the assertion made on page
11 3-4 of the DEIS that most electrical generation
12 is from natural gas-fired sources was true in

PM1-16 We have taken your comments into consideration, and modified section 3.1.1.3 of our final EIS to include data from the Northwest Power and Conservation Council's (2007) "Biennial Monitoring Report on the Fifth Power Plan."

Public Meetings

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PM1-16
cont'd

13 PM1 RN-110507-FERC.txt
2003, this assertion is now incorrect by the
14 recent accelerated development of wind power
15 generation.
16
17 Noted in the introduction to the latest
18 Council's biannual monitoring report on the
19 fifth power plan dated January 5, 2007, the
20 plan -- quote: The plan found that the region
19:19:28 had a surplus of generating capability and the
21 need for new generation from coal or natural
22 gas likely would be -- would not occur until
23 after 2012, after the five-year action plan,
24 period, end quote.
19:19:46 25 And in summary, high energy prices,
□ 30
19:19:48 1 quote -- I'm sorry. High energy prices and
2 concerns about potential climate change policy
3 have also led to excessive development of wind
4 power in the Pacific Northwest. In the two
19:20:00 5 years since the Council adopted the fifth power
6 plan, new generation capacity and slow-demand
7 growth have increased the electrical supply
8 surface in the region, which further delays the
9 need for new generating capability.
19:20:17 10 In view of the above -- of the above, it
11 is requested that FERC and its contract
12 consultants reevaluate: One, the role of
13 alternative energy sources in relation to the
14 proposed -- proposed project using more
19:20:33 15 contemporary and regional data and, two, the
16 necessity for the proposed project in the first
17 place.

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PM1-17	18	PM1 RN-110507-FERC.txt Thank you very much.	
	19	MR. FRIEDMAN: Thank you very much for	
	19:20:46 20	your comments.	
	21	Next I think we have Mr. Dragich.	
	22	MR. STEVE DRAGICH: Mr. Dragich,	
	23	D-R-A-G-I-C-H, representing the Dragich Trust.	
	24	I find it ironic tonight in your rules of	
	19:21:03 25	decorum that you want the landowners identified	31
	19:21:06 1	under milepost when under the FERC Commission's	
	2	own rules titled, Critical Energy	
	3	Infrastructure Information, these	
	4	identifications and pipeline routes are denied,	
	19:21:20 5	and it's been further pushed by the proponents,	
	6	through their attorney, VanNess & Feldman, for	
	7	the FERC Commission in Washington, D.C., that	
	8	they have submitted to the FERC Commission a	
	9	so-called privacy right, which the landowners	
	19:21:38 10	lists and the privacy for the pipeline routes	
	11	have been denied.	
	12	Yet, in the original filing by the	
	13	proponent in June of 2006, a full 514 names of	
	14	landowners, their tax records, and their legal	
	19:21:59 15	descriptions were filed with the original	
PM1-18	16	application, has been mentioned under your	
	17	rules through executive orders through the FERC	
	18	Commission, rules four -- executive orders four	
	19	through six. You've designated the emergency	
	19:22:17 20	response plan as CEII, and you've also	
	21	designated the water suitability assessment	
	22	CEII.	

PM1-17 The FERC works to strike a reasonable balance between the need to protect sensitive, private, and security-related information, with the need for public review and input, and responds to requests accordingly. MP locations along the pipeline are not a secret, and are provided on the maps in Appendix B. We ask landowners with specific environmental comments about potential project impacts to identify their parcel by MP so that we can address their concerns. Nor are the names of the landowners along the pipeline route a secret. NorthernStar filed a landowner list with the FERC to comply with our regulations at 18 CFR 157.69(d)(5). We provide a list of landowners in Appendix A; but without their addresses.

PM1-18 The FERC's requirements for filing CEII and privileged information can be found at 18 CFR 388.12.

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PM1-19 23 PM1 RN-110507-FERC.txt
Since you've restricted all the
24 information to the public, including the
19:22:32 25 required forms under CEII and the Freedom of
□ 32
19:22:35 1 Information Act, to which this speaker has
2 submitted 94 Freedom of Information Acts to
3 federal agencies, the bulk of which were to
4 FERC, all of which have been denied, yet you
19:22:51 5 expect us to make an informed decision on any
6 environmental impacts on this proposal.
7 MR. FRIEDMAN: Thank you for your
8 comments.
9 I believe Vance Fraser is next. After
19:23:14 10 Vance, we have Marjorie Castle. And then --
11 Marjie Castle and then Daniel Serres.
12 MR. VANCE FRASER: Hello. My name is
13 Vance Fraser, f-R-A-S-E-R, a landowner.
14 I once heard a wise man say just because
19:23:35 15 you can do something doesn't mean you should.
16 Just because it's possible to build an LNG
17 facility at Bradwood doesn't mean it's the wise
18 thing to do. Actually, quite the opposite.
PM1-20 19 Since FERC is a federal agency, supposedly
19:23:46 20 concerned with national interests, how is it
21 wise to be sucking our economy dry, sending our
22 energy dollars overseas for imported energy and
23 likely to countries that fund terrorists that
24 kill our troops? Why not boost our own economy
19:24:02 25 and make our nation more secure by recycling
□ 33
19:24:06 1 those energy dollars here at home? Rather than
Page 27

PM1-19 See our response to comment PM1-18.

PM1-20 The purpose of this EIS is to analyze the environmental impacts of the proposed project, not to promote energy development in other regions.

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PM1-20
cont'd

2 promoting development of LNG, why aren't we
3 promoting development of that 500 miles of
4 shale oil between Colorado, Utah, and Wyoming?

19:24:18 5 It wasn't that long ago that President Bush
6 stated that we import too much foreign energy.

PM1-21

7 How is it wise to drive out cheaper
8 Canadian and Rocky Mountain supplies for more
9 expensive LNG, which arrives by ship and can be
19:24:31 10 cut off at any time? How is it wise to make us
11 pay more for foreign LNG just because Northwest
12 Natural Gas wants it, when other pipeline
13 companies are more than willing to bring us
14 North American gas, like the existing Canadian
19:24:45 15 and Williams pipelines along with the new Rocky
16 Mountain pipeline coming our way? How is it
PM1-22 17 wise to import LNG when North American gas
18 won't be drying out seals, causing equipment
19 damage, and explosions like LNG gas has?

PM1-23 19:25:00 20 You are a regulator and are justifying the
21 damage and detrimental impacts to this region
22 due to the supposed need for LNG and are buying
23 into the NorthernStar's and Northwest Gas work
24 (inaudible). NorthernStar has claimed time and
19:25:16 25 again that the LNG gas is for the Northwest and
□

19:25:19 1 that we need it.
2 It is time once and for all to make them
3 prove it, and here is how: It's time to
4 actually regulate. Restrict all LNG that comes
19:25:30 5 into the Northwest to stay in the Northwest.
6 Limit the use of LNG gas to Oregon, Washington,
Page 28

34

PM1-21 As briefly explained in section 1.1, NorthernStar believes that it can import LNG to provide a new supply of natural gas for the Pacific Northwest, to compete with domestic supplies. This section also discusses Canadian and Rocky Mountain production of natural gas. Newly proposed pipelines to bring additional supplies of Canadian and Rocky Mountain gas to Oregon are discussed in section 3.1.2.2.

PM1-22 Natural gas from foreign produced LNG has to be made compatible with existing pipelines in the United States, and should not dry out seals. The Commission issued its Policy Statement on Provisions Governing Gas Quality and Interchangeability in Interstate Natural Gas Company Tariffs (Policy Statement, PL04-3-000) in 2006. Consistent with the Policy Statement, NorthernStar must ensure that the regasified LNG it delivers to interconnecting pipelines meets the gas quality and interchangeability standards of the interconnecting pipelines' tariffs.

PM1-23 As discussed in section 1.1, NorthernStar's target markets are in the Pacific Northwest, not California. A study by Wood Mackenzie Limited indicated that at a sendout rate of 1 Bcf/d about 50 percent of the natural gas from Bradwood Landing would go to Oregon customers, 30 percent to Washington, and less than 20 percent to Idaho.

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PM1-23
cont'd

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7 and Idaho, as well as any electrical generation
8 made from it. If NorthernStar is unwilling to
9 agree to this, then their whole premise is
10 false.
11 We don't need the LNG, and there's no
12 justification to delay other ships on the
13 river, no justification to lose port jobs in
14 the process, no justification to direct --
15 wreck the river for fishermen or recreation,
16 nor farms nor properties, and no reason to
17 bring in the terrorist taxi.
18 If FERC is unwilling to make these
19 restrictions, then FERC is aiding and abetting
20 foreign energy interests, and America is for
21 sale yet again. This whole community is filled
22 with people who think it is a waste of time to
23 come here to speak. If you truly want to know
24 their minds, put it to a vote.
19:26:25 25 Thank you. 35
□

19:26:27 1 MR. FRIEDMAN: Thank you for your
2 comments.
3 Next is Marjorie Castle.
4 MS. MARJORIE CASTLE: Marjorie Castle.
19:26:36 5 M-A-R-J-O-R-I-E, C-A-S-T-L-E. Landowner. I
6 can't tell you exactly where I am along the
7 pipeline route because that's CEII.
PM1-24 8 In the DEIS it states that you did not
9 consider the Palomar pipeline as part of this
10 application because it was directly -- not
11 directly tied to the application or mentioned
Page 29

PM1-24 As described in section 3.1.2.2 and based on information provided by Palomar during the FERC's Pre-filing review process, the main purpose of the Palomar pipeline is to bring Canadian and Rocky Mountain gas to the Portland, Oregon metropolitan area and the Willamette Valley, and compete with the Williams Northwest system, which currently is the only interstate pipeline having direct interconnections with Northwest Natural, the LDC for northwestern Oregon and southwestern Washington. In addition, a segment of the Palomar pipeline would interconnect with the proposed Bradwood Landing LNG terminal near Wauna, Oregon, and provide a second sendout pipeline that could bring new supplies of natural gas from imported LNG to the Portland metropolitan area and to the GTN mainline. The proposed Palomar pipeline would not be a replacement for the proposed Bradwood Landing sendout pipeline; but can be viewed as a newly proposed system alternative. As explained in our final EIS, the Palomar pipeline is considered to be a separate, independent project. The Bradwood Landing Project and Palomar are not inter-dependent. Even if Palomar is not authorized or constructed, the Bradwood Landing Project could still go forward. The Bradwood Landing Project has its own sendout pipeline that would connect its proposed LNG import terminal with the existing Williams Northwest interstate natural gas system near Kelso, Washington. The Palomar pipeline would merely offer NorthernStar another option to market its gas. Palomar is currently being reviewed under the FERC's Pre-filing process (in Docket No. PF07-13), and we intend to do a separate, free-standing, independent EIS for the Palomar Project, to analyze its potential environmental impacts. We have included some preliminary information about the potential environmental impacts of the Palomar pipeline, combined with the Bradwood Landing Project, under Cumulative Impacts in section 4.12 of this EIS.

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PM1-24 12 in the application. However, quoting from
cont'd 13 NorthernStar natural gas's filing on 12/15/2006
14 to the SEC, it states: We have agreed with the
19:27:17 15 Northwest Natural Gas Company, Northwest
16 Natural, to coordinate the permitting of a
17 connecting pipeline under a consulting services
18 agreement, which also provides Northwest
19 Natural with a nonexclusive option to construct
19:27:28 20 and own the connecting pipeline rather the
21 pipeline.
22 It goes on to say that, simultaneously, we
23 are nearing completion of our negotiations with
24 Bradwood's pipeline partner, Northwest Natural,
19:27:44 25 for Northwest Natural to construct and own the
□ 36

19:27:48 1 Bradwood pipeline. If these negotiations
2 result in a definitive agreement, we anticipate
3 transferring to Northwest Natural any FERC
4 authorizations that we may have received that
19:27:59 5 are necessary for Northwest Natural to
6 construct and operate the pipeline; meaning
7 that, since December of 2006, in all
8 possibilities, Northwest Natural Gas has
9 purchased the Bradwood line -- the Bradwood
19:28:14 10 pipeline prior to it even be permitting.
11 It further says, through Northwest
12 Natural's transportation arrangements, gas from
13 Bradwood will have access to TransCanada GTN
14 pipeline, which runs from Kingsgate at the
19:28:30 15 Canadian border to Malin in Northern California
16 as well as markets in Nevada and Idaho. LNG
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PM1-24
cont'd

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17 supplies only -- LNG suppliers owning LNG
18 terminal capacity in Bradwood will have access
19 to 9 billion cubic feet per day of natural gas
19:28:46 20 demand.
21 In addition to the Bradwood pipeline
22 application, we have recently submitted a
23 request for service to TransCanada and
24 Northwest Natural for their open season under
19:28:59 25 which they would construct, own, and operate a
□ 37

19:29:01 1 pipeline that would connect the terminal to
2 Williams Northwest at Molalla and TransCanada's
3 GTN pipeline near Madras.
4 This will provide Bradwood and other
19:29:13 5 shippers with gas transportation service from
6 the LNG terminal to the pipeline systems of
7 both the Northwest Pipeline Company and
8 TransCanada's GTN pipeline, which can deliver
9 approximately 2 billion cubic feet per day into
19:29:29 10 Northern California at the Malin-Oregon
11 interconnect point.
12 If it was not Northwest Natural Gas and
13 NorthernStar's intent to take this gas to
14 California, then why would they state it in
19:29:43 15 their SEC? Why is Palomar not considered in
16 the DEIS? And why is the pipeline being
17 constructed through Cowlitz County?
18 Thank you.
19 MR. FRIEDMAN: Thank you for your
19:30:01 20 comments.
21 We have Daniel Serres, and then Warren.
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22 MR. DANIEL SERRES: My name is Dan Serres,
23 S-E-R-R-E-S, spelling of the last name. I was
24 born in Oregon City, and I didn't think I would
19:30:33 25 be that relevant, a Clackamas County residence,
□ 38

19:30:36 1 until I found out about the Palomar pipeline,
2 but Marjorie already addressed that so I'll
3 take on something else.

PM1-25

4 I want to focus on two things. One is the
19:30:45 5 process by which this DEIS has come to us,
6 which has been disjointed, uninformative, and
7 just unhelpful to the public in terms of
8 understanding the impacts of this project. I
9 would point out the purpose of this project is
19:31:02 10 stated, as you said, to import LNG to provide a
11 new supply of gas to the Pacific Northwest.

12 The Environmental Impact Statement doesn't
13 take a comprehensive view of how to provide
14 either a new supply of gas to the Pacific
19:31:15 15 Northwest or a reliable source of energy,
16 period, to the Pacific Northwest. And again I
17 would refer back to Gloria MacKenzie who gave
18 really excellent testimony on the importance of
19 wind energy in this area.

PM1-26

19:31:30 20 The second key thing I would point out is
21 that there's key omissions in the DEIS. The
22 public is asked to comment on a project it
23 doesn't fully understand. This has been a
24 situation ever since the beginning. You can't
19:31:43 25 hear -- many of the questions you heard, you
□ 39

PM1-25 The EIS is not intended to provide a comprehensive view of how to provide a new supply of natural gas or a reliable source of energy to the Pacific Northwest. For a discussion of the purpose of the EIS, see section 1.2.

PM1-26 We do not think there are any key omissions in the EIS. We believe this document is adequate to comply with the NEPA. The final EIS addresses comments on the draft EIS in Appendix K. Maps of the pipeline route are provided in Appendix B.

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PM1 RN-110507-FERC.txt

PM1-26 19:31:45 1 were there, at the scoping session remain
cont'd 2 unanswered. Simple questions: Where is the
3 pipeline going? Am I on the pipeline? There
4 are people in the room that they might be, but
19:31:56 5 they're not really sure.

PM1-27 6 It doesn't make any sense to be in this
7 stage of the process and not have a clear
8 understanding of the process. Three tanks or
9 two? There are outstanding permits in the
19:32:07 10 process that say three tanks and two. I will
11 submit detailed written comments on that issue.

PM1-28 12 Other things, the public's being asked to
13 evaluate what the environmental impact is going
14 to be of this project. We can't see the water
19:32:22 15 assessment, presumably a couple hundred pages.
16 We've seen a summary of that report, a water
17 suitability report. We can't see the emergency
18 response plan. Everybody here, regardless of
19 whether they're wearing a blue pin or red one,
19:32:37 20 is probably going to be a participant of any
21 emergency response plan that is formally part
22 of this project.
23 It makes no sense, as Carol Carver said
24 first of all to wait until the permit is issued
19:32:46 25 and, secondly, to keep the public in the dark.
□

19:32:49 1 Quite literally in the dark.

PM1-29 2 We can't see the ballast water on the
3 (inaudible). I mean, I don't see why this is
4 critical energy obstruction information. I

Page 33

40

PM1-27 The original JPA submitted to the COE included three LNG storage tanks in the proposed action; however, that permit application was subsequently revised to include only two tanks. All current permit applications that we are aware of list two LNG storage tanks in the project description.

PM1-28 The WSA was evaluated by the Coast Guard as part of their process of preparing the WSR. That process does not include a public review and comment component; however, the WSR was provided in the draft EIS for review and comment. See also our response to comment PM1-13 and PM1-1 on the ERP.

PM1-29 The screen system for the ballast water intake was originally classified as "CEII" but was subsequently reclassified as "confidential." Engineering views of the pump station have been submitted to the FERC and other appropriate agencies for review; however, these design drawings are considered proprietary information and are not available to the public.

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PM1-29 19:33:01 5 think it's -- it's an example of how the public
cont'd 6 can't tell from that public state fisheries and
7 local economy are being accurately vetted in
8 this DEIS.
9 Finally, it says that FERC should not
PM1-30 19:33:14 10 infer mitigation in any of those three areas --
11 health, safety, and fisheries. And health and
12 safety are key issues on the pipeline because
13 this pipeline is in extremely geotechnically
14 complicated areas, like the first two miles of
19:33:27 15 the pipeline, which go right through a cliff
16 that has slid off multiple times the past few
17 years. The railroad below was closed last
18 winter because of the slide in the same general
19 area where they were going to drill right
19:33:42 20 through in the first two miles.
21 The description in the EIS as to why that
22 route was chosen rather than going through the
23 railroad --
24 (Reporter requests clarification.)
19:33:58 25 MR. DANIEL SERRES: Sure. This will all
□ 41
19:33:59 1 be in writing. Don't worry about it.
PM1-31 2 Finally, I'll point out the ballast water.
3 You have to measure the impacts to fisheries as
4 if there was ballast water screening. At this
19:34:09 5 point the public -- first of all, it doesn't
6 want to see the screening. Secondly, as far as
7 deferring implementation of any ballast water
8 screening to a third party, you're saying,
9 well, we're going to ask NorthernStar to ensure

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PM1-30 As described in section 4.1.4.3, within the first 2 miles of the sendout pipeline (between MPs 0.1 and 1.3), the pipeline is proposed to be installed using the HDD construction method specifically to mitigate impacts associated with potentially unstable slopes. The HDD borehole would be designed based on additional geotechnical studies that would be completed prior to pipeline construction to ensure pipeline integrity.

PM1-31 As described in section 4.5.2.1, NorthernStar would offer incentive-based contractual agreements for vessels to accommodate the screened water supply system at the wharf. The screened water intake design was modified based on comments from the NMFS and the revised screen designs have been approved by the NMFS. Post installation flow mapping would be conducted to assess performance of the system prior to operation.

As discussed further in section 4.5.2.1, NorthernStar has indicated it may not be feasible to require that all LNG carriers be retrofitted to utilize the screened water supply system. Sections 4.3.2.3 and 4.5.2.1 of the EIS have been revised to include a discussion of impacts on water quality and aquatic resources that could occur if LNG carriers do not use NorthernStar's proposed filtered water supply system. We conclude that impacts on sensitive aquatic resources would not be adequately mitigated without a screening mechanism. Therefore, we are recommending that NorthernStar develop a plan to deliver screened water to LNG carriers at the terminal. In addition, we are recommending that NorthernStar develop performance standards for water quality impacts associated with LNG carrier discharges of cooling water at the wharf. We will conduct additional detailed analyses of the screened water supply system and the performance standards in our revised BA and EFH Assessment. The FWS and NMFS will prepare their BOs, determining whether or not the federal actions associated with this project would likely jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat. The FERC would not allow construction to proceed until after we have concluded formal consultation with the NMFS and FWS.

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PM1-31 | 19:34:24 10 PM1 RN-110507-FERC.txt
cont'd | 11 and come up with a plan that any ship will have
12 ballast water screening.
13 I see nothing in the DEIS to enforce that,
14 whether it be NOAA or FERC. Unless you exhibit
mitigation you areally aren't assured it will
19:34:36 15 succeed. Okay? Yeah, I'll wrap up. Then
16 mitigation -- or your mitigation plan falls
17 apart. You have to give a reasonable assurance
18 of success for mitigation for the fish.
19 And finally, I want to say that along the
19:34:51 20 pipeline, very similar issues, along with
21 response to the various issues where, again,
22 these issues have problems. We're going to
23 mitigate this way or we're going to mitigate
24 that way. If they're kept from the public and
19:35:02 25 deferred to some agency at a later process
□ 42

19:35:05 1 that's not public, then this DEIS is deficient
2 and (inaudible) environment and into the local
3 economy. Thank you.
4 MR. FRIEDMAN: Thank you for your
19:35:18 5 commence. Almost all are these good going to
6 be addressed in the FEIS because they're
7 complex.
8 There are two things I can address. First
9 of all, pipeline route is disclosed in the
19:35:29 10 DEIS. You can actually go to the back of the
11 DEIS and see the route on USGS quadrant maps.
12 Also, NorthernStar's application is only for
13 two storage tanks. If the FERC authorizes this
14 facility, it would only be for two tanks.

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19:35:48 15 PM1 RN-110507-FERC.txt
Next speaker, please.

16 MR. WARREN MAKKELA: Good evening. My
17 name is Warren Makkela. M-A-K-K-E-L-A,
18 (inaudible.) I represent the Association of
19 Lower Columbia River Flood Control. These are
19:36:10 20 drainage entities within Multnomah and Columbia
21 counties.
22 Specifically addressing the route of the
23 pipeline which will cross levees underneath --
24 directly underneath levees within our member
19:36:28 25 districts, first, they are the Wetland Drainage
□

19:36:32 1 Improvement Company, the Web District
2 Improvement Company, the Midland Drainage
3 Improvement Company, and the Beaver Drainage
4 Improvement Company, informally Drainage.

PM1-32 19:36:44 5 These districts are organized under ORS
6 Chapter 554, and our authority and mission is
7 to provide flood control and drainage, flood
8 control from floods on the Columbia River and
9 drainage from winter storms. Our member
19:37:08 10 districts are concerned about boring --
11 directly boring beneath levees. We are
12 obligated and -- they're addressed here -- are
13 obligated to comply with the contracts with the
14 United States because of -- in compliance with
19:37:32 15 the 1950 and 1938 Federal Flood Control Act.
16 The districts have received benefits from
17 the United States. In return, we are
18 obligated, the member districts are obligated,
19 to abide by the published United States Corps

PM1-32 The comments of the Association of Lower Columbia River Flood Control regarding denying access to installing the proposed pipeline by boring beneath its levee easements are acknowledged. We understand that NorthernStar is working with the local flood control districts and the COE to address this issue. NorthernStar would be required to adhere to conditions imposed by the local levee districts' construction easements and its COE permit regarding the crossings of levees.

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PM1-32 19:37:52 20 PM1 RN-110507-FERC.txt
cont'd 21 of Engineers Levee Improvement Standards. This
22 does not allow direct boring beneath levees.
23 Therefore, we're in a position to have to deny
24 access to our -- boring beneath our levee
easements.

PM1-33 19:38:14 25 In addition, there are the other questions 44
□
19:38:18 1 outside of federal -- United States Army Corps
2 of Engineers jurisdictions are drainage ditches
3 (inaudible). They exist and are maintained on
4 a recyclable basis of five to seven years, and
19:38:35 5 we are concerned that the pipeline be well
6 protected, armored or deep enough, that there
7 is no way that we can damage the pipeline in
8 the event of an accident -- or in the event of
9 contacting the pipeline through our digging
19:38:52 10 operations. Therefore, we ask that the
11 pipeline be protected in some manner or other,
12 have them develop these -- or beneath the
13 drainage ditches.
14 Thank you. I will give you a copy here
19:39:05 15 and make it a part of the record with the
16 Corps' standards and procedures.
17 MR. FRIEDMAN: Thank you. Whenever I get
18 something from the audience like this, that's
19 in written form, I will put it in the record.
19:39:34 20 MS. PATRICIA TERHAAR: Walt Multanen. And
21 then Casey Kegg.
22 MR. WALT MULTANEN: Walt Multanen.
23 M-U-L-T-A-N-E-N. I'm a property owner,
24 possibly enjoined within a few feet of the

PM1-33 NorthernStar would cross small perennial and intermediate waterbodies in accordance with the FERC staff's Procedures and the proposed alternative measures described in section 4.4.1.3 as well as applicable permits. In addition, NorthernStar would participate in all One-Call systems and would locate and flag all underground utilities (i.e., cables, conduits, and pipelines) during surveying and staking activities to prevent accidental damage to these utilities during construction.

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K-38

PM1 RN-110507-FERC.txt
19:40:07 25 proposed pipeline. 45
□

19:40:08 1 Any and all comments that I was going to
2 make have already been made. A lot of thoughts
3 that I never entertained have been brought to
4 the surface, and so all I can do is second the
19:40:22 5 motion that the Bradwood Landing permit be
6 denied. Thank you.
7 MR. FRIEDMAN: Thank you for your
8 comments.
9 Casey Kegg is next. And after that, Randy
19:40:43 10 Martin.
11 MR. CASEY KEGG: Good evening. My name is
12 Casey Kegg, K-E-G-G. I'm a single father of
13 two kids. I currently live in Astoria, and I
14 rent a room in Westport. Right now I'm wiring
19:41:05 15 number seven paper mill. I'm here tonight on
16 behalf of the IBEW Local 48, a union
17 organization currently with 3500 members. Some
18 of them are here tonight out in the audience.
19 We strongly support the Bradwood project.
19:41:20 20 We think it's a clean and a safe project;
21 believe in the local jobs, union work; good for
22 the schools and the economy, both local and
23 state. On behalf of myself and the IBEW Local
24 48, we'd like to thank you for listening to our
19:41:37 25 viewpoints. 46
□

19:41:40 1 MR. FRIEDMAN: Thank you.
2 MR. RANDY MARTIN: Randy Martin. That's
3 R-A-N-D-Y, M-A-R-T-I-N. I'm an electrician
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PM1-34 Comment noted.

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4 chairman of the IBEW Local 48 coast unit and
19:42:10 5 one of the delegates to the Clatsop/Tillamook
6 AFL/CIO Central Labor Council. Subjective
7 statements are less useful to the FERC staff,
8 so I'll just try to stick to the facts.

9 I was there when our Astoria mayoral
19:42:30 10 council and the IBEW coast unit gave its
11 endorsement of the Bradwood Landing project.
12 NorthernStar's slogan of good jobs and clean
13 energy just about says it all, so I don't have
14 a lot to add. I just want to second their
19:42:48 15 slogan a bit.

PM1-35

16 Good jobs. My family came to Westport,
17 Oregon, almost 20 years ago after chasing a
18 good job through five states in two years, on
19 the road in a travel trailer. That job was
19:43:04 20 provided in part by natural gas used to power
21 the paper machines and the boilers at the now
22 Georgia-Pacific-owned Wauna mill.

23 During my 20 years here, I've helped
24 install Northwest Natural Gas's turbine
19:43:21 25 compressors up at Mist, the pipelines there.

19:43:24 1 They used those compressors and pipelines to
2 inject and extract natural gas from their Mist
3 storage field. I might add, with a spotless
4 safety record.

19:43:40 5 I want to continue the partnership with
6 good supplies of natural gas, with good
7 suppliers of natural gas. These jobs were in
8 part provided by natural gas. I want to avoid

Page 39

47

PM1-35 Comment noted.

K-39

Public Meetings

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K-40

PM1 RN-110507-FERC.txt

PM1-35 9 the economic hardship that my family had to go
cont'd 19:44:04 10 through searching for a good job throughout the
11 American West.

PM1-36 12 The other slogan, clean energy. We need a
13 good, clean supply of energy, and a lot of
14 people using that term here, but there's just
19:44:23 15 two products right there that I know perhaps
16 put to use. Would you rather see a new nuke
17 down there or oil refinery? Maybe a coal-fired
18 generator? Perhaps now that another promising
19 industrial site has been identified along the
19:44:42 20 Columbia River, who knows what could come next.

PM1-37 21 A bird in the hand, especially an
22 environmentally benign bird, may be the best
23 way to go. NorthernStar has promised to do
24 their best to mitigate environmental damages
19:45:01 25 and replace that habitat disturbed for whole. 48
□

19:45:07 1 Let's not be those not-in-my-backyard-type
2 people who would deny future generations clean
3 energy and new jobs.

4 MR. FRIEDMAN: Thank you. I believe that
19:45:21 5 Mr. Martin was the last speaker on the list.
6 Is there anyone who has not yet spoken who
7 wishes to speak? If so, please raise your
8 hand.

9 All right. At this time if anyone spoke
19:45:34 10 earlier who did not -- who feels they have more
11 to say, wants another three minutes, I'll allow
12 it.

13 MS. GLORIA MacKENZIE: I don't need three
Page 40

PM1-36 Comment noted.

PM1-37 Comment noted.

Public Meetings

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PM1 RN-110507-FERC.txt

14 minutes.

19:45:47 15 MR. FRIEDMAN: I do need you to go to the
16 microphone. Again, any time anyone speaks,
17 they need to state their name and spell it for
18 the court reporter.

19 MS. GLORIA MacKENZIE: My name is Gloria
19:45:59 20 MacKenzie. M-A-C-K-E-N-Z-I-E.

PM1-38 21 I don't have the specifics with me, but I
22 believe it is the Corps of Engineers' permit
23 application, dated I believe October 18th,
24 where it states that the pipeline route is
19:46:20 25 Germany Creek, and that is a definite

49

19:46:24 1 difference between the DEIS. And I did call,
2 and they did say at the Corps of Engineers that
3 they believe it might be Germany Creek and not
4 Abernathy Creek. So -- and I'm sorry, I don't
19:46:41 5 have the paperwork. I just wanted to clear up
6 that one point that you seem to be not sure of,
7 Mr. Friedman. Thank you.

8 MR. FRIEDMAN: Like I said earlier, the
9 pipeline is in the DEIS. You can look at it.

19:46:58 10 MS. GLORIA MacKENZIE: Okay. But you look
11 at the Corps of Engineers' paperwork, their
12 application, because it is definitely
13 different.

14 MR. FRIEDMAN: That's something we'll look
19:47:06 15 at before we recommend the DEIS.

16 MS. GLORIA MacKENZIE: Thank you.

17 MR. FRIEDMAN: Thank you.

18 Are there any more speakers from the
Page 41

PM1-38 The pipeline route is shown in Appendix B. The pipeline would cross the Columbia River west of Germany Creek.

K-41

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PM1 RN-110507-FERC.txt

19 floor? Please come on up and get your three
19:47:16 20 minutes. Just make sure you restate your name
21 for the record and spell it.

PM1-39

22 MR. BILL CASTLE: Thank you. My name is
23 Bill Castle, C-A-S-T-L-E. I'm on the pipeline
24 route, and I would challenge FERC as to where
19:47:29 25 the pipeline is. You cannot tell me within a

50

19:47:32 1 hundred feet where it's going to be going under
2 the Columbia River, from the Washington side.
3 We have seen three different satellite images
4 showing different spots in which this is going
19:47:44 5 to be.

6 We've been told in the very beginning that
7 our five acres was going to be the drill site.
8 As of last -- two weeks ago, down in Astoria,
9 Mr. Garrett did come up to me and tell me that
19:47:58 10 it is not on our property, but he would also
11 not tell me exactly where it is. If I'm not
12 mistaken, the draft environmental statement
13 says they can move that pipeline 30 days prior
14 to construction.

19:48:09 15 We've seen a report that also states that
16 up to three possibilities that a geological
17 outfit in Portland did that right back up on
18 our property, is the most economical, yet we're
19 not privy to that information.

PM1-40

19:48:25 20 This also is a concern whether it's on the
21 ridge between Mill Creek and Abernathy, it is
22 not at Germany Creek, that there's
23 approximately 20 wells that are going to be

Page 42

PM1-39 The pipeline route is shown in Appendix B.

PM1-40 As described in section 4.3.1.4, NorthernStar has prepared a preliminary well protection plan that addresses monitoring and mitigation for potential impacts on wells during pipeline construction, including HDD activities. The plan was filed with the FERC on February 19, 2008 is available for viewing on the FERC's internet web page at www.ferc.gov, through the eLibrary link. The plan states that NorthernStar would investigate the regional hydrology and local boring logs, gather information from well owners, locate the wells in the field and on maps, and evaluate geology, water levels, and depths drilled using cross sections of the HDD profile. Such an evaluation would identify any wells that are completed in a regionally shallow aquifer and assess the relative risk of impact and potential need for mitigation.

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PM1 RN-110507-FERC.txt

PM1-40 24 affected by this. According to this draft
cont'd 19:48:44 25 environmental statement, what's defined as a 51
□

19:48:46 1 shallow well? we drilled 140 feet, got six
2 gallon a minute. We drill to 522 feet to get
3 14 gallons a minute. Is that defined as a
4 shallow well?

19:48:59 5 If they disturb the water, if they drill
6 within 120 feet of our well, I would bet that's
7 going to disturb that shale aquifer, that the
8 water runs through in that aquifer, especially
9 if they use their bentonite process.

PM1-41 19:49:17 10 The other thing that we have written, my
11 wife and I have written to the FERC is about
12 the hillside they're going to drill on. Even
13 if it is not on our property, I cannot get a
14 straight answer from even Mr. Garrett; get only
19:49:26 15 told that I'm using the best engineers that
16 money can buy; that I challenge you cannot fool
17 Mother Nature on this issue when we live in an
18 area in which the hillsides fall off the top by
19 themselves.

19:49:41 20 It's estimated that it will take between
21 five and 11 million pounds of pressure to pull
22 this pipeline under the river. This hillside
23 where this is going to be at is steeper than
24 one to one. Now, not even you guys back here
19:49:53 25 that live here, do you suppose that hillside 52
□

19:49:57 1 might fall off?

PM1-41 The HDD boreholes would be conducted by professional drilling contractors based on information obtained from geotechnical studies. The HDD would avoid, wherever possible, unstable areas that could generate a landslide.

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2 PM1 RN-110507-FERC.txt
I don't get any straight answers, and
3 FERC's had this information since the first
4 filing or permitting that was mailed back in --
19:50:04 5 almost two and a half years ago -- excuse me --
6 15 months, thereabouts. Nobody's answered
7 these questions yet, and I think they need to
8 be addressed.

9 MR. FRIEDMAN: Thank you for your
19:50:16 10 comments.

11 Mr. MacKenzie? Does anyone else want to
12 speak? Again, please restate your name and
13 spell it for the court reporter.

14 MR. DUNCAN MacKENZIE: My name is Duncan
19:50:26 15 MacKenzie. D-U-N-C-A-N, M-A-C-K-E-N-Z-I-E.

PM1-42 16 Reference was made to the operational
17 noise aspects of the LNG terminals found in the
18 DEIS on page 4-392 and table 4.10.2-4. There
19 appear to be a number of missing equipment

19:50:44 20 elements in this table, most notably the noise
21 contributions arising from where nitrogen and
22 unknown quantity of vapor return blowers and
23 most blaringly the five 2,335-horsepower

PM1-43 24 sendout pumps. The overall decibel levels
19:51:00 25 figures cited are uncharacterized as to whether

53

19:51:02 1 the value is from a single unit or multiple
2 units, and whether or not the figure includes
3 the motor associated device or is the device
4 alone.

PM1-44 19:51:11 5 Furthermore, the number of units of
6 specific type is undocumented. It is the -- it

PM1-42 Nitrogen injection equipment is not currently planned for the project. If it is added at a later time, an additional acoustical evaluation for this added equipment would be completed. As indicated by Table 4.10.2-4, the sendout pumps are referred to as the LNG Booster Pumps.

PM1-43 The noise values listed are from a single unit at the listed reference distance. The noise measurement at a distance of 1 meter would incorporate the noise associated with the motor and any other ancillary equipment.

PM1-44 The overall sound power level is from the combined equipment package. The modeling that was completed for the project included the simultaneous operation of all pieces of equipment, although in practice all equipment may not be operating at the same time.

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PM1-44 7 is noted that the noise level of the submerged
cont'd 8 combustion vaporizer is 118 decibels on an
9 unweighted scale. Is this a generalized
10 composite value comprised a generous source of
11 suppressed fund of vaporizers, such as
12 combustion air blowers, blower motors, blower
13 intake and exhaust fans? Is this one unit or
14 the worst case of seven units operating
15 simultaneously?

PM1-45 16 If the plant is expanded to the three
17 proposed additional SDPs, how much will this
18 increase the noise level? 118 dB noise level
19 of the vaporizer appears to be an overall
20 measurement only without characterization shown
21 for which frequencies the various levels might
22 occur. If there is a significant low-frequency
23 component to this sound, will it affect the
24 overall reception of the noise?

19:52:00 25 Finally, as found in the applicant's

54

PM1-46 19:52:02 1 Resource Report 9, submission section 4.9,
2 sound propagation factors on page 9(b)-11,
3 hills surrounding the facility were modeled
4 from GIS contours at 20-meter height intervals
19:52:15 5 to simulate shielding from the terrain at
6 noise-sensitive areas to the west of the
7 facility. This modeling assumption needs more
8 as the noise-sensitive area designated as M2
9 inhabited areas to the east of the site on
19:52:28 10 Puget Island. The hills, rather than shielding
11 of the shoreline area in Puget Island, serve as

Page 45

PM1-45 If the plant is expanded and additional equipment is added, the noise associated with the additional equipment would be logarithmically added to the background noise. In general, doubling the sound power level by adding additional equipment adds 3 dB to the overall noise. In practice, the addition of equipment typically would not double the overall sound power level which would result in a noise increase that would be less than 3 dB. The threshold for perception for noise change is 3 dB. The SCVs would be enclosed which would reduce both high and low frequency noise for an overall estimated noise reduction of 10 dB.

PM1-46 As provided in Resource Report 9, the water between the site and noise receptor N2 was modeled as a perfect sound reflector to provide no attenuation. The rock cliff to the south, around the corner from the proposed LNG facility should not provide any reflective sound from the facility due to the facility location being shielded from the rock cliff. In addition, the sloping hills behind the proposed LNG terminal are not vertical rock cliffs, are foliated and would tend to absorb noise, potentially reflect noise upward and not reflect the noise laterally east across the open water.

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PM1-46 cont'd 12 PM1 RN-110507-FERC.txt
13 a reflective surface instead, especially the
rock face at the southern end of the site.

PM1-47 14 The overall presentation of the operation
15 of noise aspects associated with proposed LNG
16 terminals is, at best, cursory and does not
17 include significant equipment elements. It's
18 requested that FERC recommend the applicant
19 provide a far more complete and realistic
19:52:55 20 assessment of the noise arising from the
21 operations of the site.
22 MR. FRIEDMAN: Thank you.
23 Anyone else want to have an opportunity?
24 Please state and spell your name for the court
19:53:07 25 reporter.

PM1-48 19:53:08 1 MR. STEVE DRAGICH: D-R-A-G-I-C-H. I'll
2 speak specifically to the Corps of Engineers
3 401 and 404 permit application, issued on
4 October 18th, 2007, specifically the river mile
19:53:24 5 that they designated for the crossing at the
6 Columbia River.
7 Under the National Oceanographic and
8 Atmospheric Administration that prints most of
9 the navigational charts in the United States,
19:53:37 10 they designate river miles. At the crossing
11 location, they designated in the Corps permit
12 river mile 54. This does not exist on any know
13 charts. They're in five-mile intervals, and
14 the nearest river mile is 55, which is
19:53:56 15 approximately between the Abernathy point and
16 the Bunker Hill point on the Washington state

55

PM1-47 The listed noise equipment reflects the predominant noise producing equipment sources, as documented at existing LNG facilities. In section 4.10.2.2, we recommend that NorthernStar make all reasonable efforts to ensure its predicted noise levels from the LNG terminal are not exceeded at the NSAs and file noise surveys with the Secretary no later than 60 days after placing the LNG terminal in service. However, if the noise attributable to the operation of the LNG terminal exceeds 55 dBA L_{dn} at an NSA, NorthernStar should file a report on what changes are needed and install additional noise controls to meet the level within 1 year of the in-service dates. NorthernStar should confirm compliance with these requirements by filing a second noise survey with the Secretary no later than 60 days after it installs the additional noise controls.

PM1-48 The 5-mile river mile intervals labeled on the referenced maps do not indicate that the intervening river mile locations do not exist. A location designation of river mile 54 is appropriate to show the specific crossing location of the proposed pipeline route.

PM1-48 17 PM1 RN-110507-FERC.txt
 side of the river. This is just another
 cont'd 18 example of the vagueness in the permit
 19 application when one federal agency is unsure
 19:54:15 20 of where the exact crossing location is.

PM1-49 21 Now, you mention the USGS quadrant maps.
 22 These are basically contour maps. In this area
 23 of river crossing there are four quadrants:
 24 The Clatskanie, the Stella, and the Riderwood
 19:54:34 25 (phonetic). At a photo scale reciprocal which
 □

19:54:38 1 the maps were derived from, which are aerial
 2 photos, the first flight mentioned in this area
 3 was taken in 1923. During the second -- before
 4 the Second World War they were -- a reflight
 19:54:52 5 was taken, which your maps in the back of your
 6 DEIS are based on, were taken in 1940.
 7 And I have copies from FERC on the
 8 supposed -- one of the proposed pipeline routes
 9 that are so illegible that you can't even see
 19:55:12 10 the contours from the USGS maps. This Corps
 11 permit for the clean water and wetlands permit
 12 is just another example of how vague the permit
 13 process has gone in this proposal.

14 MR. FRIEDMAN: Thank you for your
 19:55:32 15 comments.
 16 Is there anyone else who wishes to speak?
 17 MR. DANIEL SERRES: Dan Serres again.

PM1-50 18 S-E-R-R-E-S. I just have a couple of points.
 19 First I want to make clear the question is both
 19:55:48 20 where the pipeline's going, because the maps,
 21 as Mr. Dragich pointed out, are not incredibly

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PM1-49 The pipeline route is clearly legible on the maps in Appendix B. These are copies of standard 7.5-minute (1:24,000) scale topographic quadrangle maps produced by the USGS at different times. For example the Cathlamet, Washington quadrangle map, including the location of the proposed Bradwood Landing LNG terminal, was dated as surveyed by the USGS in 1985.

PM1-50 The maps of the pipeline route provided in Appendix B are at a standard (1:24,000) resolution that we believe is adequate to indicate the proposed route, but are not sufficient for detailed design purposes. The filed aerial alignment sheets (at a scale of 1:6,000) identify the detailed proposed route. The socioeconomic impacts and benefits of this proposed project are discussed in section 4.8 of our EIS.

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PM1-50

cont'd

22 PM1 RN-110507-FERC.txt
high resolution. Actually, the best maps I
23 have seen are in the bio assessment for this
24 facility.

19:56:01 25 The question is not so much that actually
□ 57

19:56:04 1 as it is who's on the pipeline? And that's --
2 that's pretty important for evaluating
3 socioeconomic impact of this project. I think,
4 in general, socioeconomic impacts on this
19:56:15 5 project is entirely weighted on one side. We
6 have the benefits, you know, with huge
7 assumptions made about natural gas or LNG
8 coming into the area.

9 Secondly, I wanted to point out -- let me
19:56:31 10 see. I lost my spot. Sorry. That's it.
11 Thank you.

12 MR. FRIEDMAN: Thank you for your
13 comments.

14 Is there anyone else who wishes to speak?

19:56:48 15 All right.

16 MS. MARJORIE CASTLE: Marjorie Castle,
17 C-A-S-T-L-E, landowner.

PM1-51

18 In the draft EIS it states, as
19 NorthernStar has stated, that there would be
19:57:01 20 125 deliveries per year, meaning 125 vessels in
21 the river. NorthernStar anticipated 125
22 deliveries for a total of 25 million cubic
23 meters of LNG per year. However, according to
24 the Sandia study and the waterways suitability
19:57:22 25 assessment, the Coast Guard is restricting
□ 58

PM1-51 The maximum number of annual LNG carrier trips associated with the Bradwood Landing Project would be 125 regardless of the LNG carrier capacity.

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K-49

PM1-51 19:57:26 1 NorthernStar to the smaller vessels no greater
cont'd 2 than 148,000 cubic meters, until additional
3 analysis addressing vessels with higher cargo
4 capabilities is completed.
19:57:38 5 NorthernStar, though, has continued to use
6 the figures of 125 deliveries per year, or a
7 total of 18,500 -- or 18,500,000 cubic meters
8 of gas using the smaller 140 -- up to
9 140,000-cubic-meter vessels. That means that
19:57:58 10 they would be accepting a loss of 6.5 million
11 cubic meters of gas per year.
12 One of two things is happening here.
13 NorthernStar either does not have customers to
14 warrant the need for the additional deliveries
19:58:12 15 to pick up the loss in revenue, or NorthernStar
16 is being less than truthful to us about how
17 many deliveries will actually occur using the
18 smaller ships and that they actually anticipate
19 as many as 169 vessels per year in the river.
19:58:30 20 This would mean an LNG ship would be coming up
21 the river, one per day, according to their
22 figures; at the pier, 24-hour unloading period;
23 or going down the river another day, for over
24 500 days in a 365-day year.
19:58:48 25 Questions that I think that should be
□ 59
19:58:50 1 addressed in the final EIS:
2 How many ships will indeed be in the river
3 during the course of a year?
PM1-52 4 And what impact will that have on the
19:58:59 5 shipping of all ports along the Columbia and
Page 49

PM1-52 Our discussion of potential impacts of LNG carriers in the waterway to the LNG terminal on other commercial and recreational ship traffic on the lower Columbia River is included in section 4.8.1.7. We believe this project would not result in significant impacts on upriver ports.

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PM1-53 6 the Snake river system, socioeconomics?
7 what will the cumulative environmental and
8 endangered species impact be if NorthernStar
9 does increase the amount of shipments per year?

PM1-54 19:59:14 10 If the research is completed to the
11 satisfaction of the Coast Guard and the larger
12 mega vessels are allowed into the river, what
13 will be the impact on all identified
14 environmental issues as well as the socioeconomic
19:59:25 15 impact on all other stakeholders along the
16 Columbia and Snake river systems?

PM1-55 17 What is the plan of action to be taken if
18 the 1200-foot mega tankers are allowed and
19 erosion of beachfront occurs, leading to
19:59:39 20 lawsuits?

PM1-56 21 Who will monitor the truthfulness of the
22 information in the NorthernStar's land use
23 application and be accountable to the people
24 and environment for actions they perform in
19:59:50 25 opposition to what was understood, since
□ 60

19:59:51 1 several justifications for adoption of
2 applications and the permitting process are
3 based on, "it is our understanding"?
4 Thank you.

20:00:04 5 MR. FRIEDMAN: Thank you.
6 Is there anyone else? Okay.
7 MR. VANCE FRASER: Vance Fraser again.
8 F-R-A-S-E-R.

PM1-57 9 The DEIS should include a sensitivity
20:00:18 10 analysis on the impacts that would occur when
Page 50

- PM1-53 NorthernStar has no current plans to increase the capacity of its project. As discussed in section 2.9, before any expansion of the proposed facilities, NorthernStar would be required to seek the appropriate authorization from the FERC. The FERC would conduct a separate environmental analysis under NEPA before authorizing a proposed expansion of NorthernStar's facilities.
- PM1-54 Should NorthernStar wish to receive larger LNG vessels in the future, in addition to determining that safety and security measures are adequate to accommodate the larger LNG vessels, supplemental review under NEPA and other applicable laws and regulations would be required by the Coast Guard. Furthermore, the number of ships calling at the LNG terminal is tied to the offload capabilities at the terminal. Any future increase in ships would necessitate additional storage capacity. As discussed in section 2.9, before any future increase in storage capacity, NorthernStar would be required to seek appropriate authorization from the FERC. The FERC would conduct a separate environmental analysis under the NEPA before authorizing a proposed expansion of NorthernStar's facilities.
- PM1-55 Shoreline erosion is discussed in section 4.1.2.3.
- PM1-56 The FERC staff, our third-party environmental consultants, cooperating agencies, and other federal, state, and local reviewing agencies are responsible for fact checking and verifying the claims made by the applicants. Clatsop County independently reviewed NorthernStar's land use applications and the County Board of Commissioners accepted the proposed land use changes in a final ruling on March 20, 2008.
- PM1-57 We address the potential impacts associated with multiple LNG terminals located in close geographic proximity in the cumulative impacts section (4.12) of this EIS. However, the FERC will review each proposed LNG terminal individually. We discuss the number of jobs this project would generate in section 4.8 (socioeconomics).

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PM1-57 11 multiple LNG facilities are allowed on the
cont'd 12 Columbia River by equal protection law, and far
13 more jobs will be lost than gained at the ports
14 when that occurs.

PM1-58 20:00:38 15 Secondly, Oregon is simply being used, and
16 I do mean "used," as a backboard to California,
17 regardless of what any made-up studies the
18 promoters say. The California Lands
19 Commissioner has stated so, and Oregon Public
20:00:56 20 Utilities Commissioner has also stated that the
21 majority of the imported and regasified LNG
22 would go to California.

PM1-59 23 Why aren't these statements in the DEIS,
24 rather than just quoting the Northwest Natural
20:01:14 25 Gas Association? Why aren't the results of 61

20:01:21 1 existing pipeline capacity meetings, which
2 state "no increase needed," also included in
3 the EIS?
4 Thank you.

20:01:33 5 MR. FRIEDMAN: Thank you.
6 Has everyone had an opportunity to speak
7 who wanted to? If that's the case, at this
8 time I'd like to wrap up this meeting, close
9 up. On behalf of the Federal Energy Regulatory
20:01:47 10 Commission, I want to thank you all for coming
11 here tonight, providing your comments on the
12 DEIS for the Bradwood Landing LNG project. Let
13 the record show that this meeting concluded at
14 approximately 8:00 p.m. Thank you.
15 (MEETING ADJOURNED AT 8:00 P.M.)
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PM1-58 See our response to comment PM1-23.

PM1-59 See our response to comment PM1-8.

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21 Testimony by Mr. Vance Fraser 60

22 * * *

23

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1 CERTIFICATE

2 I, Robin L. Nodland, a Washington

3 Certified Shorthand Reporter, an Oregon

4 Certified Shorthand Reporter, a Registered

5 Diplomat Reporter, and a Certified Realtime

6 Reporter, do hereby certify that I reported in

7 stenotype the proceedings had upon the hearing

8 of this matter, previously captioned herein;

9 that I transcribed my stenotype notes through

10 computer-aided transcription; and that the

11 foregoing transcript constitutes a full, true

12 and accurate record of all proceedings had

13 during the hearing of said matter, and of the

14 whole thereof.

15 Witness my hand at Portland, Oregon, this

16 30th day of November, 2007.

17

18

19

20 Washington CSR No. 2530

21 Oregon CSR No. 90-0056

22

23

24

25

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1

1 U.S. DEPARTMENT OF ENERGY
2 FEDERAL ENERGY REGULATORY COMMISSION

3
4 BRADWOOD LANDING LNG PROJECT
5 FERC DOCKET NUMBERS CP06-365 and 366

6
7
8 PUBLIC MEETING
9 TRANSCRIPT OF PROCEEDINGS

10 * * *

11
12
13 Tuesday, November 6, 2007
14 9:00 a.m.

15
16 Clatskanie River Inn
17 600 East Columbia River Highway
18 Clatskanie, Oregon

19 * * *

20
21 BEFORE: Mr. Paul D. Friedman
22 Federal Energy Regulatory Commission
23 Office of Energy Projects

24 * * *

25 2

1 P R O C E E D I N G S

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Public Meeting Transcript of Proceedings
Tuesday, November 6, 2007, 9:00 a.m.
Clatskanie, Oregon

The introductory comments for this public meeting are not included in the FEIS because they are very similar to those of the Monday, November 5, 2007, 6:30 p.m. meeting in Cathlamet, Oregon, which are included. The complete transcript of the Tuesday, November 6, 2007, 6:30 p.m. meeting in Clatskanie, Washington can be obtained at the FERC's internet website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP06-366). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll free at 1-866-208-3676, or for TTY, contact (202) 502-8659.

Public Meetings

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PM2 RN-110607-FERCam.txt

09:22:20 1 in order today. People who have not had an
2 opportunity to speak will go first.

3 This is a meeting for you, the public, to
4 comment on the DEIS. It is not a question or
09:22:35 5 answer forum. To the extent that I may know
6 the answer to your question, I'll address it,
7 if possible. However, most of your comments
8 will probably be too complex for me to answer
9 off the cuff, and you'll have to wait until the

09:22:51 10 FEIS is issued to see our researched answer to
11 those questions. I will address questions of
12 an administrative or process nature.

13 Before we start hearing from speakers, I
14 suggest that we take a short break, about a
09:23:09 15 minute, given how few people are in the room.
16 So anyone who has not had an opportunity to
17 sign up at the speakers' list can do so at this
18 point. If you haven't signed up on the
19 speakers' list, Janelle has it, please do so
09:23:22 20 now, and then we'll give the floor to the
21 public.

22 (Brief recess.)
23 MR. FRIEDMAN: Is there anyone who has not
24 signed up for the speaker's list who wants to?

09:24:00 25 Please do so now, because then Janelle's going
18

09:24:02 1 to bring it up to me.
2 So the only thing that I ask is that you

Public Meetings

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PM2 RN-110607-FERCam.txt
3 stand up where you're sitting. We don't have a
4 microphone or a podium. You speak as loudly as
09:24:38 5 you can. Speak as slowly as you can. Don't
6 worry about the three minutes. It's more
7 important that we get what you have to say
8 accurately from the court reporter. If you
9 have very detailed comments, you're better off
09:24:51 10 sending them to us electronically or through
11 the U.S. mail rather than trying to spend half
12 an hour trying to tell them to us here
13 tonight -- or here this morning.
14 I ask that each speaker stand up, state
09:25:04 15 their name clearly for the record, and spell
16 their last name, identify any organization they
17 may be representing. If you are a landowner
18 along the pipeline route, please indicate where
19 your property is located according to mile
09:25:17 20 marks. And if you need to find out where your
21 property is located, I have a copy of the DEIS
22 with me that shows mile marks.
23 So the first person on our list is Betty
24 Reeves.
09:25:32 25 MS. BETTY REEVES: I think you answered my
19
09:25:33 1 question, so...
2 MR. FRIEDMAN: Okay. Next -- and if I
3 mispronounce your name, please correct me. I'm
4 sorry. Marvin Albert.
09:25:42 5 MR. MARVIN ABBOTT: Abbott.
6 MR. FRIEDMAN: Abbott. I'm sorry.

Public Meetings

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PM2 RN-110607-FERCam.txt
7 MR. MARVIN ABBOTT: I'm Marvin Abbott.
8 Last name is A-B-B-O-T-T. And I'm here to
9 speak in favor of the project, whether that's
09:25:51 10 of significance or not, but in favor of labor.
11 I'm a business rep for the Machinists'
12 Union. I've been a business rep for about 30
13 years. I personally am assigned to operations
14 in Washington, Oregon, California, particularly
09:26:03 15 people in this community know Stimson Lumber
16 Company. That's one that I personally
17 represent. And so I've had quite a bit of
18 involvement in this community and this area and
19 know quite a few people here.

PM2-1

09:26:15 20 And it is certainly a rural community
21 where there's no question that jobs are very,
22 very critical. These are the types of jobs
23 that support the whole -- the whole community,
24 not just a few. A lot of people here in
09:26:28 25 Clatskanie that work here are from Kelso,
20

09:26:30 1 Longview, all those other types of things.
2 So, I think jobs is an extremely important
3 issue and particularly family-wage jobs. Most
4 small communities have a couple of antique
09:26:40 5 shops, but if there isn't a Stimson and a
6 NorthStar, then there isn't much to support
7 that community. So a family wage will be a
8 major factor in this as far as I'm concerned.

PM2-2

9 With that being said, I know, from what
09:26:51 10 I've -- from what I've learned, that NorthStar

PM2-1 Comment noted.

PM2-2 Comment noted.

Public Meetings

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PM2-2
cont'd

PM2 RN-110607-FERCam.txt
has got a good track record of environmental
stuff, and I really do believe that -- that the
overall benefit of this would be that, clearly,
it would add economic value to the properties
to -- to the families and the communities here,
and so it would be a benefit to the people in
the area.
MR. FRIEDMAN: Thank you.
Next on my list is Gary Herber.
MR. GARY HERBER: My name is Gary Herber.
That's H-E-R-B-E-R. I am a property owner
that's going to be affected by this. In
addition, they are planning on using my
property to dig underneath one of the sloughs.
The one question I have asked, and the

PM2-3

09:27:35 1 slide barely touched on it -- because every
2 time I come to one of these meetings I go away
3 with the feeling that this is a done deal and
4 that the people that are directly affected are
09:27:45 5 just being listened to out of courtesy, to be
6 honest.

PM2-4

7 The one question I have is what kind of
8 compensation are we looking at for the loss of
9 our property and, in some cases, you know, the
09:27:59 10 danger of what's going on on our property?
11 Your slide touched on that, said they should
12 act in good faith. That doesn't mean that they
13 will act in good faith.
14 Who is overseeing this? Is there some

Page 18

PM2-3

No decision has yet been made about the proposed Bradwood Landing Project. After we issue the EIS, the Commission will consider the environmental impacts of the project, together with non-environmental data compiled by staff, and make its decision in an Order which discloses whether or not the project should be authorized.

PM2-4

As discussed in section 4.8.3.3, NorthernStar would compensate the landowner for use of the land. The easement agreement between NorthernStar and the landowner would specify compensation for damage to property during construction, loss of use during construction, and loss of renewable and nonrenewable or other resources. NorthernStar would seek to negotiate a mutually acceptable agreement. However, a FERC Certificate conveys with it the right of eminent domain under section 7h of the NGA. Therefore, if negotiations fail to produce an agreement, NorthernStar could initiate condemnation proceedings, and the value of the easement and the amounts for compensatory damages would be determined by the local district court. Pipeline safety is addressed in section 4.11.9 of this EIS.

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PM2-4
cont'd

PM2 RN-110607-FERCam.txt
09:28:14 15 figure in mind? Who do I ask? I've asked at
16 every meeting I've gone to. I've never
17 received an answer. I think it's time we get
18 some kind of a clue as to how much is at stake
19 here. Thank you.

09:28:25 20 MR. FRIEDMAN: Okay. I can answer some of
21 those questions. The value of compensation is
22 negotiated between you and NorthernStar.
23 That's who determines that.

24 MR. GARY HERBER: Attorneys probably then.

09:28:38 25 MR. FRIEDMAN: All right. And if you
22

09:28:39 1 cannot reach an agreement, the local court, not
2 the FERC, but a local district court will
3 decide in an eminent domain hearing what the
4 value of your property is and what the
09:28:48 5 compensation should be. So that's made
6 locally, in the local county courts. All
7 right?

8 What was -- your other question was about
9 what, Gary?

09:29:02 10 MR. GARY HERBER: Oh, I don't know now.
11 You answered my question, though, because I was
12 told by the natural gas company that I would
13 have to hire an attorney.

14 MR. FRIEDMAN: Oh, I know what it was. It
09:29:13 15 was about whether or not it's a done deal.
16 That's an important statement. I've heard that
17 at numerous meetings. That's a total
18 misconception. It's not a done deal until two

PM2 RN-110607-FERCam.txt
 19 tings -- three things happen:
 09:29:25 20 One, the Commission makes a final
 21 decision. All right? I've already gone over
 22 this morning that they're not going to make the
 23 final decision until: One, we've done an FEIS;
 24 two, we've looked at the nonenvironmental
 09:29:35 25 issues about markets, rates, and needs; and,
 23
 09:29:37 1 three, after the decision is made, then
 2 NorthernStar has to implement all the
 3 conditions of the order. And I believe there
 4 are something like 98 conditions in the DEIS.
 09:29:48 5 Only then would we allow this project to go
 6 forward.
 7 I can also tell you something that you may
 8 or may not know, which is that the FERC has
 9 authorized numerous LNG facilities all across
 09:29:59 10 the United States, some of which have never
 11 been built even though they had authorization.
 12 For example, I was a project manager for an LNG
 13 facility in Corpus Christi, Texas. They have
 14 an order. They have a certificate. They can
 09:30:14 15 build tomorrow if they chose to. They have not
 16 built. The reason is they have no market for
 17 the gas.
 18 Under Section 3 of the Natural Gas Act,
 19 the company is at a hundred percent risk for
 09:30:28 20 all market issues relating to the importation
 21 of LNG. What that means is that these
 22 facilities cost over \$500 million. And no

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PM2 RN-110607-FERCam.txt
23 company is going to go forward until they
24 believe the economics are ripe for them to do
09:30:44 25 so.
24

09:30:45 1 All right. Now our next speaker is Kyle
2 Munson.
3 MR. KYLE MUNSON: My name is Kyle Munson.
4 That's M-U-N-S-O-N. I represent Transmarine
09:30:54 5 Navigation. We're a shipping agency. We
6 represent charters and owners who are bringing
7 the ships in. Currently work petroleum tankers
8 coming up and down the Columbia and Willamette
9 rivers as well as grain ships.

PM2-5 09:31:11 10 And I just wanted to express being for
11 this project. The economic impact that I think
12 a lot of people probably don't look at is that
13 the service sector, working with these ships,
14 each ship that comes in, somebody has to
09:31:25 15 arrange pilots, tugs, people that are
16 coordinating all of that. You've got stores'
17 deliveries. You've got barging companies.

18 I think that the economic impact of a
19 project like this would far outreach just the
09:31:39 20 people working at the plant. There are a lot
21 of service jobs that are tied in with the
22 shipping industry, and it could be a real good
23 deal for Oregon's economy.

24 MR. FRIEDMAN: Thank you for your
09:31:50 25 comments.
25

PM2-5 Comment noted.

Public Meetings

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PM2 RN-110607-FERCam.txt

09:31:53 1 Next I have Rick Stonex. And please
2 correct me if I mispronounce your name.
3 MR. RICK STONEX: Stonex, S-T-O-N-E-X.
4 MR. FRIEDMAN: I'm sorry.
09:32:03 5 MR. RICK STONEX: I represent Greenwood
6 Resources. We manage the Lower Columbia Poplar
7 Tree Farm here in the area, and I'm also
8 representing Midland Diking District. Our land
9 is impacted, for the Greenwood Resources, from
09:32:17 10 about mile six to 16 on the pipeline, I would
11 guess. Midland Diking District is within that.

K-63
PM2-6 12 As for Greenwood Resources -- I've got two
13 hats on here. For Greenwood Resources, we
14 support the project and believe that the
09:32:31 15 environmental impact is outweighed by the
16 economic benefits to the region. For both
PM2-7 17 Midland and Greenwood Resources, there's
18 concerns about levy crossings within Oregon
19 under the pipeline and the internal diking
09:32:43 20 structure.

21 And I think Warren Makkela from Beaver
22 district addressed most of that, and I just
23 want to reiterate that we stand by his comments
24 for both Midland Diking District and Greenwood
09:32:54 25 Resources and Greenwood Resources.

26

09:32:56 1 MR. FRIEDMAN: Thank you very much for
2 your comments.
3 Next is Marc Averbach.
Page 22

PM2-6 Comment noted.

PM2-7 Updated sections 4.2 and 4.3 address impacts on soils and sediments, and water resources, respectively. See also our response to comment PM1-32.

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PM2 RN-110607-FERCam.txt

4 MR. MARC AVERBACH: Thank you. My
09:33:04 5 comments were referred to Section 2.1 --
6 MR. FRIEDMAN: Mark, can you stand up,
7 please?
8 MR. MARC AVERBACH: No, not really.
9 MR. FRIEDMAN: Okay. That's fine.
09:33:11 10 MR. MARC AVERBACH: I prefer not to.
11 MR. FRIEDMAN: Marc, can you spell your
12 name for the court reporter.
13 MR. MARC AVERBACH: Yes. A-V-E-R-B, as in
14 boy, A-C-H. My comments refer to section 2.1.6
09:33:20 15 of the DEIS, the Palomar pipeline. I'm an
16 affected landowner on the pipeline.
17 MR. FRIEDMAN: On Palomar?
18 SPEAKER: On Palomar. I understand it's
19 only tangentially referenced in the DEIS.
09:33:33 20 To quote from the DEIS, it says: However,
21 as of the date of the writing of the draft EIS,
22 Palomar has not yet submitted its formal
23 request to initiate prefiling process with the
24 FERC.
09:33:43 25 As you know, they are now in a

27

09:33:45 1 notice-of-intent period.
2 The Palomar pipeline -- it also says the
3 Palomar pipeline would then proceed northwest
4 to interconnect with the Northwest Natural's
09:33:53 5 existing source shield at Mist. From Mist, the
6 Palomar pipeline could branch off to serve the
7 proposed Bradwood Landing LNG import terminal.
Page 23

PM2-8 The final EIS has been updated in section 3.1.2.2 to indicate that on August 30, 2007, the FERC accepted a request from Palomar, to initiate the Pre-filing environmental review process for its proposed new pipeline project in Oregon, in Docket No. PF07-13-000.

PM2-9 See our response to comments PM1-24 and CO4-1 regarding the purpose and route of the Palomar pipeline.

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PM2-9
cont'd

PM2-10

PM2-11

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8 On a map I have in my possession labeled

9 in part Northwest Natural/TransCanada Palomar

09:34:07 10 gas transmission project dated 5/21/07. The

11 pipeline route is more accurately described as

12 making a beeline for Bradwood with a spur to

13 Mist. Indeed, a Palomar representative told me

14 in mid-October the following: That the Mist

09:34:22 15 spur was off the table; that the Clatsop County

16 portion of the pipeline would only be built if

17 Bradwood was built, but the intent of the

18 pipeline was to get gas to California.

19 There's several sections about the

09:34:39 20 pipeline -- the Palomar pipeline being only

21 secondary to the Bradwood facility, and its

22 main pipeline being the connection to Williams.

23 So I think you will hear, or already have heard

24 evidence perhaps last night, that the Williams

09:34:52 25 pipeline is possibly inadequate for the

28

09:34:56 1 capacity of Bradwood and, indeed, the main

2 pipeline may be Palomar.

3 The DEIS says that Palomar indicated that

4 its project is not dependent upon the

09:35:06 5 authorization or construction of the Bradwood

6 Landing project. If the Bradwood Landing

7 project is not authorized or not built, Palomar

8 could still serve the Portland metropolitan

9 area and extend its pipeline out of Northwest

09:35:18 10 Natural's Mist storage field. Palomar would

11 just not build the last segment between Mist

Page 24

PM2-10 The proposed sendout pipeline for the Bradwood Landing Project would connect to the Williams Northwest pipeline. The Palomar pipeline can be viewed as a system alternative (see our response to comment PM2-9). Regarding the Williams Northwest pipeline capacity, see our response to comment PM1-10.

PM2-11 The final EIS has been corrected to indicate that the only connection with the Mist storage field would be indirectly through Northwest Natural's local distribution system. It is only the last segment of the proposed pipeline to Bradwood Landing that would not be built if the Bradwood Landing Project is not authorized.

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PM2-11
cont'd

PM2-12

PM2-13

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12 and Bradwood Landing.

13 And as I said earlier, I've been told by

14 Palomar that the Mist spur is off the table,

09:35:30 15 there's no such connection on the -- on the

16 plan at this point, and that the Clatsop County

17 portion of the pipeline would only be built if

18 Bradwood was built.

19 And then the DEIS goes on to say that FERC

09:35:45 20 would consider the Palomar project

21 independently, but I think, given the above, it

22 is clear that the Palomar pipeline is an

23 entirely foreseeable and possibly necessary

24 outcome of approving Bradwood and should be

09:35:57 25 considered in total or at least in part in the

29

09:36:01 1 Bradwood DEIS.

2 How much time do I have?

3 MR. FRIEDMAN: You've got 15 more seconds.

4 MR. MARC AVERBACH: Bradwood also makes a

09:36:06 5 big deal out of having made --

6 MR. FRIEDMAN: You don't have to speak

7 fast. You can slow down. I'll give you a few

8 more seconds.

9 MR. MARC AVERBACH: Bradwood makes a big

09:36:13 10 deal out of having made the site, at 40 acres,

11 as compact as possible. But in the book LNG --

12 I won't read the whole thing, but it's just

13 titled "LNG," on page 180, the SES project at

14 the Port of Long Beach is described as only 24

09:36:28 15 acres. Surely then Bradwood is not as compact

Page 25

PM2-12 We consider the Palomar pipeline as a system alternative in the EIS.

PM2-13 Every LNG facility is unique in its design. Section 3.1.6.2 describes NorthernStar's efforts to reduce the footprint of the Bradwood Landing LNG terminal.

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PM2-13
cont'd

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16 as possible, and Bradwood should be required to
17 explore alternative locations as opposed to the
18 most compact design possible.
19 Thank you.
09:36:39 20 MR. FRIEDMAN: Thank you for your
21 comments.
22 All right. Is there anyone who did not
23 speak last night who would like to speak now?
24 All right. Now I'm going to call the
09:36:50 25 people who had a chance to speak last night.
30

09:36:52 1 So this is their second chance to speak again.
2 Mr. Dragich, you can go first, but please,
3 again, you have to say your name and spell it
4 for the court reporter.
09:37:03 5 MR. STEVE DRAGICH: Yes. Mr. Dragich,
6 D-R-A-G-I-C-H, speaking today as an ex-tactical
7 firefighter, first responder for the State of
8 Washington.
9 Specifically about a comment you made last
09:37:16 10 night, Mr. Friedman, about the clarity of the
11 maps and the information passed on to the
12 people that live adjacent and on top of the
13 pipeline. I'm resubmitting these maps that
14 were sent to me by your agency, FERC, in
09:37:33 15 December of 2005. I refer to your comment
16 about clarity. I'm sure you can see the route
17 of the pipeline. So I'm resubmitting these
18 back to FERC as inadequate.
19 (Handing document.)
Page 26

PM2-14

PM2-14 The maps of the pipeline route provided in Appendix B are at a standard (1:24,000) resolution that we believe is adequate to indicate the proposed route, but are not sufficient for detailed design purposes. The filed aerial alignment sheets (at a scale of 1:6,000) identify the detailed proposed route.

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PM2-15 | 09:37:54 20 PM2 RN-110607-FERCam.txt
 21 MR. STEVE DRAGICH: My other comment deals
 22 with emergency response, specifically the
 23 connection in Cowlitz County in the state of
 24 Washington. The proponent, through the
 09:38:07 25 Northwest Natural Gas Industrial Association,
 filed suit against our utilities and 31

09:38:14 1 transportation commission, blocking the issuing
 2 of pipeline route maps, including to first
 3 responders, who have to respond to any incident
 4 that would happen to this proposal, should they
 09:38:31 5 happen at all.
 6 The presiding judge, Judge Hicks, Ronald
 7 Hicks, Superior Court, Thurston County,
 8 Washington, called the prevention of the issue
 9 of pipeline route maps, even to emergency
 09:38:47 10 response personnel, inane. The very next day,
 11 March 16th, 2007, the Northwest Industrial Gas
 12 Association appealed Judge Hicks's order to the
 13 appellate division of the appeals court,
 14 division 3, state of Washington.

09:39:08 15 On August 29th, when the land use hearings
 16 were proceeding in Clatsop County on this
 17 proposal, the Washington appeals court
 18 overturned Judge Hicks's decision. We will not
 19 be allowed any route maps in the state of
 09:39:24 20 Washington unless it's appealed to our
 21 Washington State Supreme Court.

PM2-16 | 22 In Cowlitz County alone there's been three
 23 incidences, major incidences, of the Williams
 Page 27

PM2-15 Section 4.11.9 addresses pipeline safety.

PM2-16 A discussion of regional pipeline incidents has been added to section 4.11.9 of the EIS.

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PM2-16
cont'd

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24 gas line exploding. Two I've witnessed
09:39:40 25 personally. As for the honesty of the pipeline
32

09:39:47 1 operators and the proponents, even in Cowlitz
2 County the incidences that we've had, in my
3 former department, the court records have been
4 sealed and the people living with this project
09:40:03 5 are not even allowed to see the incident
6 reports, even if you're an emergency responder
7 like myself.
8 So any integrity these people may have and
9 what's transpired just this past year totally
09:40:23 10 negates any honesty they may have in the
11 proposal like this.
12 MR. FRIEDMAN: Thank you for your
13 comments.
14 Next is Duncan MacKenzie.
09:40:34 15 MR. DUNCAN MacKENZIE: My name is Duncan
16 MacKenzie, M-A-C-K-E-N-Z-I-E.

PM2-17

17 Reference is made to the information
18 regarding cruise ship operations as noted on
19 table 4.8.1-5 on page 4-328 of the DEIS and as
09:40:49 20 discussed on page 4-332. The presented
21 information does not fully address the true
22 scope of all cruise ship operations associated
23 with the lower Columbia River affected by LNG
24 carrier operations.
09:41:00 25 As found in the DEIS, only the portion of
33

PM2-17 We have revised portions of the EIS to also discuss the river cruise vessels that travel between Portland and Astoria. These river cruise vessels are distinguished from the large ocean-going cruise ships which dock at Pier 1 and are specifically addressed by the WSR.

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PM2-17
cont'd

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09:41:02 1 the river from the mouth of the Columbia River
2 to the Port of Astoria is considered. No
3 consideration is given to cruise ship
4 operations upstream from the Port of Astoria to
09:41:10 5 beyond river mile 38.
6 Two cruise ship lines currently operate on
7 the Columbia River between Portland and Astoria
8 on a regular and scheduled basis. Majestic
9 America Line, formerly known as America West,
09:41:24 10 operates the cruise ship EMPRESS OF THE NORTH,
11 QUEEN OF THE WEST, and COLUMBIA QUEEN. The
12 Cruise West division of West Travel
13 Incorporated operates the SPIRIT OF 98, the
14 SPIRIT OF DISCOVERY, and the SPIRIT OF ALASKA.
09:41:33 15 While these are not large cruise ships --
16 the largest being about 223 guests, 84 crew --
17 these ships have been in operation for a number
18 of years, carry tourists to several ports along
19 the Columbia and Snake rivers, adding not only
09:41:46 20 to the economies of Astoria and Portland, but
21 these ports of call as well. The itineraries
22 of these ships take them not only past the
23 Bradwood Landing terminal site, but places the
24 ships in the traffic pattern of the lower
09:41:59 25 Columbia River.

34

09:41:59 1 The Majestic America Line and Columbia
2 River Cruise Northwest Rivers has approximately
3 eight to ten sailings per month. A review of

PM2-17
cont'd

PM2 RN-110607-FERCam.txt
the combined schedules for Majestic America and
Cruise West notes a combined total of almost a
hundred sailings. The quantity of cruise ship
calls noted in the DEIS in the note table was
26 in 2006 and does not appear to include the
port calls arising from the operation of these
two cruise lines.

PM2-18

The economic report prepared by the
proponent's economic consultant does not
address the tangible economic impact of the
port calls and docking fees, nor does it
reflect the jobs represented by the direct crew
personnel, administrative personnel, or outside
vendors associated with the operation of these
ships.

PM2-19

Additionally, if as noted in the DEIS, a
cruise ship and an LNG vessel would not be
placed in a meeting situation as the proponent
factored the movements of the noted vessels
into the scheduling of construction dredging,
maintenance dredging, or LNG carrier
operations. In view of the significant

potential economic impact and scheduling issues
raised by the operations of these cruise ships,
it is recommended that the draft EIS be revised
to accurately reflect ongoing cruise ship
operation from Astoria to above Columbia River
mile 38.
MR. FRIEDMAN: Thank you, Mr. MacKenzie.

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PM2-18 We discuss potential impacts on the cruise ship industry in sections 4.8.1.7 and 4.8.1.8. We do not believe that the project would have any significant impacts on the cruise ship industry. Therefore, the economic benefits of cruise ships docking at Astoria would not be affected or lessened.

PM2-19 The Columbia River would not be closed to other users. The safety/security zone would establish the Coast Guard's authority in the area surrounding the LNG vessel to ensure safety during the transit. With proper scheduling of cruise sailings relative to LNG ship transits, the LNG ship traffic would not impact the cruise ships.

Public Meetings

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PM2-20

8 PM2 RN-110607-FERCam.txt
Next on my list is Vance Fraser.

9 MR. VANCE FRASER: Vance Fraser, spelled

09:43:19 10 F-R-A-S-E-R.

11 I have to say that it appears to me that

12 FERC was pushed into publishing this DEIS

13 prematurely. It doesn't present all of the

14 facts, nor many legitimate alternatives.

09:43:34 15 There's also a lot of erroneous information, so

16 much so that I question even the need for these

17 comment meetings at this time. I have never

18 seen such a biased love letter to the

19 benefactor of an EIS, and recommend FERC to go

09:43:50 20 back and hire an unbiased firm to do this DEIS.

21 This one's wholly inadequate.

PM2-21

22 I only skimmed through the DEIS last

23 night, and it is rife with wrong information

24 and bias. For example, on page 3-3, claims

09:44:06 25 that industries may not be able to change from
36

09:44:09 1 natural gas due to their equipment, this is

2 ridiculous. Industries that switch to natural

3 gas do so due to price, and they'll switch to

4 another type of energy found to be less

09:44:19 5 expensive and reliable. Those that cannot

6 afford a switch won't be able to afford the

7 natural gas when the prices rise.

PM2-22

8 Page 3-6, Trojan Nuclear Plant was not

9 closed, in large part, due to public opinion as

09:44:33 10 claimed. It passed a vote of the people and

11 was later shut down due to equipment failures.

Page 31

PM2-20 See our response to comment PM1-26. We believe the EIS is unbiased, produced by an independent staff, and presents all the facts necessary for an adequate environmental review, including alternatives (see Section 3). The draft EIS was not rushed into production. NorthernStar entered the Pre-filing review process in March 2005, filed its applications in June 2006, and the FERC issued the draft EIS in August 2007.

PM2-21 See our response to comment PM2-20.

PM2-22 The discussion of the Trojan nuclear power plant has been revised in section 3.1.1.3 of our final EIS.

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PM2-22
cont'd

12 One can infer that the cost to replace the
13 steam turbine generator was more than the
14 project profits for the life of the plant, or
09:44:46 15 the plant had more serious problems, or likely
16 a combination of both.

PM2-23

17 On page 3-36, if all that was claimed in
18 this section were true, then the Bradwood site
19 would certainly not be chosen. One part of
09:45:04 20 that, ships have to transit past Astoria, which
21 has residential waterfront. Number two,
22 minimal dredging would not be Bradwood. Kalama
23 has deep-water port. Partial availability is
24 mostly a function of price. Item four, it is
09:45:20 25 just as possible that an undisturbed site may
37

09:45:25 1 require less work than a previously disturbed
2 one. On proximity to existing interstate
3 pipelines that cross fewer bodies of water and
4 impact less wetlands, certainly wouldn't be
09:45:38 5 Bradwood. Kalama and Goebel area come to mind
6 and so on.

PM2-24

7 Page 3-32, the table has an "NA," not
8 applicable, for rough seas. Has FERC even
9 bothered to investigate problems at other
09:45:54 10 similarly situated LNG facilities? Apparently
11 not. Rough seas can be generated by passing
12 ship wakes. The table shows low environmental
13 impacts for Bradwood and the sendout pipeline,
14 which is basically preposterous. It completely
09:46:09 15 ignores the facts and is obviously biased.

Page 32

PM2-23 A project proponent selects the location for its proposed facilities, and the FERC analyzes the environmental impacts of constructing and operating those facilities at that location. Section 3.1.5.3 of our EIS presents the factors considered by NorthernStar in selecting the Bradwood Landing location for its proposed LNG terminal. We reviewed those factors and agreed that the proposed Bradwood Landing LNG terminal would be located on an available tract of land that was formerly the site of an industrial facility, situated in a mostly rural region that is not densely populated. Dredging at the proposed Bradwood Landing terminal would be less than at the proposed Oregon LNG terminal in Warrenton, and the Bradwood Landing sendout pipeline would be shorter than the pipeline proposed for the Oregon LNG Project. Kalama was not selected as the proposed project location because of the longer distance for LNG carrier transit, and other factors.

PM2-24 Section 3.1.4 of this final EIS compares the proposed site of the Bradwood Landing LNG terminal onshore to an alternative location off the Oregon coast. Studies (ABS) have shown that there are "rough seas" with large waves off the Oregon coast. The waves produced by ship wakes on the Columbia River are not comparable in size to weather produced waves offshore. Off the shore of Oregon, wave heights average between 5 and 10 feet. A recent study by the Port of Vancouver, Washington (Pearson et al., 2008) found that waves from ship wakes in the lower Columbia River average between 0.3 foot to 2.3 feet in height, with a mean height of 0.8 foot. Impacts on the CWTd and mitigation are described in section 4.6.

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PM2-24
cont'd

PM2-25

PM2-26

PM2-27

PM2-28

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Bradwood impedes the necessary transit of
endangered white tail deer, the destruction to
the salmon grounds in this. It is also
interesting to note that in maps, Tenasillahe
Island is just noted as Tenasillahe Island
rather than as part of the white tail deer
refuge, and it's just across the river from
Bradwood.

How all the proposed pipeline impacts can
be considered low is also ridiculous. However,
38

one thing is clear from the table, that is
cost. FERC appears more than willing to
sacrifice our security, our lives, our jobs,
and our prosperity, and our property to save
NorthernStar money.

Page 3-49. The major pipeline route
alternatives must not include an alternative
facility site, nor other valid alternative
sites not included in this DEIS. There are
certainly pipeline routes which would cause
much less impact.

MR. FRIEDMAN: Vance, can you please wrap
it up.

MR. VANCE FRASER: What's that?

MR. FRIEDMAN: Can you wrap it up?

MR. VANCE FRASER: Sure. That's the end
of that. The jobs that I've heard, you know,
jobs considerations, basically I view them as
irrelevant. None of these job proponents care

Page 33

PM2-25 In numerous places the text indicates that Tenasillahe Island is part of the JBHNWR created to protect the Columbian white-tailed deer. See sections 4.6.1.1 and 4.7.1.4.

PM2-26 Cost considerations were only a minor component of our analyses. Safety, on the other hand, was a major consideration. See section 4.11.

PM2-27 The pipeline route alternatives were all assumed to originate at the proposed Bradwood Landing LNG terminal. As explained in section 3.1.8 of the final EIS, we did not identify another pipeline route alternative that offered significantly less environmental impacts than the route proposed by NorthernStar. The proposed Bradwood Landing pipeline would follow the existing KB pipeline for about 22 percent of its route, and we believe that following existing rights-of-way would minimize environmental impacts.

PM2-28 There is no evidence that this project would result in a loss of jobs. In fact, as discussed in section 4.8 (socioeconomics) the project would have economic benefits and would generate jobs. Nor should the project have significant negative impacts on commercial shipping in the waterway, as explained in section 4.8.1.7.

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PM2-28
cont'd

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09:47:33 20 about my job or my neighbor's job is lost, only
21 that they may get a job or make some money; not
22 how much I and others may lose and all the
23 other businesses lose. If the good man really
24 cared about grain exporters, he'd be against
09:47:49 25 the project because they will be blocked by

39

09:47:52 1 this -- the ships transitting the river.
2 MR. FRIEDMAN: Thank you very much for
3 your comments.
4 At this time is there anyone else who has
09:47:59 5 something to say?
6 Yes, Marc. Go ahead. You have to restate
7 your name for the court reporter.
8 MR. MARC AVERBACH: Yes. My name's Marc
9 Averbach. You have the spelling.

09:48:12 10 This is the book I referred to earlier,
11 "LNG: A level-headed look at the liquified
12 natural gas controversy." It's generally
13 favorable to LNG, but it does make the

PM2-29

14 following point about -- on page 214: who is
09:48:25 15 looking out for us in the process of making
16 such decisions? No one is. This to me is the
17 most unfortunate part of the whole situation.
18 There's a long, drawn-out, and complicated
19 government mandated process to gain permit -- a
09:48:36 20 permit for an LNG import facility, with all
21 sorts of documentation required of all kinds of
22 issues.
23 But despite a sequence of federal -- of

Page 34

PM2-29 Project locations are selected by applicants, and the FERC conducts an independent environmental assessment. The Commission is ultimately responsible for authorizing a project, but only after it has determined that the project would be in the public convenience and necessity, and has considered the entire administrative record, including public comments, environmental effects, and non-environmental market data.

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PM2-29
cont'd

PM2-29 24 PM2 RN-110607-FERCam.txt
federal policies, most recently the Federal
09:48:47 25 Energy Policy Act produced in 2005, there was
40

09:48:50 1 no overall guidance as to where an appropriate
2 site might or might not be. No agency is
3 empowered to do any proactive planning.
4 Looking at the country as a whole and saying
09:49:01 5 the United States needs to have this many LNG
6 ports and these are the best locations for
7 them, so don't even bother talking to us about
8 siting an LNG facility anywhere else. This is
9 the most glaring error, among several.
09:49:13 10 And I think we feel -- speaking for people
11 who are opposed to this project, we kind of
12 feel under attack and inundated by numerous LNG
13 plants and pipelines, lots of mailings. I know
14 some of my neighbors have actually disregarded
09:49:30 15 some of the notices because they thought they
16 were related to Oregon LNG, and they didn't
17 realize it was a notice that they were actually
18 on a pipeline route. So it's becoming a little
19 bit overwhelming.

PM2-30 09:49:41 20 And I think also it's startling because we
21 think we're being put in line for LNG because
22 the market that really wants it, California,
23 doesn't want the facilities there, but then
24 we're stuck with them, and with a very
09:49:53 25 expensive infrastructure to pipe it all the way
41

PM2-30 See our response to comment PM1-23.

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PM2-31

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09:49:55 1 to California.
2 One of the questions that FERC considers
3 in its Environmental Impact Statement is what
4 alternatives are there to this particular
09:50:05 5 project before -- that can fulfill the same
6 objectives? So far, they've shown a pattern of
7 tautologically answering in terms of the
8 project itself, with each EIS concluding that
9 the particular project under discussion is
09:50:19 10 best. An application says its goal is to
11 provide natural gas directly to a particular
12 market. So if another alternative wouldn't
13 provide natural gas directly to that market
14 but, rather, by pipeline, FERC says it was
09:50:33 15 incompatible.
16 And Bradwood engages in this kind of
17 tautologically -- tautological thinking when it
18 gives reasons why its site is particularly
19 suited to an LNG plant at that location. In
09:50:51 20 its property use application -- and it's before
21 Clatsop County -- they claim that the reason
22 the site was particularly desirable was it was
23 at river mile 39. Therefore, I assume saying
24 any other site that is not at river mile 39 is
09:51:05 25 not as suitable; that it has railroad access,
42
09:51:07 1 that it has dredge material disposal at the
2 site, that it's a relatively isolated location
3 and it has an existing dock. But actually
4 Skipanon LNG has none of these features.
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PM2-31 Our alternatives analysis concluded that none of the alternatives were clearly superior to the proposed action when considering environmental impacts and feasibility.

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cont'd

09:51:19 5 Therefore, Bradwood has not really
6 presented credible evidence that it has
7 thoroughly examined alternatives given the
8 least -- or the actual set of criteria that
9 define what's needed for an LNG facility.

09:51:31 10 Thank you.

11 MR. FRIEDMAN: Marc, thanks for your
12 comments, and I do have some thoughts on that.

13 Numerous people at various meetings that
14 I've attended have spoken on the issue of why

09:51:45 15 isn't the FERC looking at national planning?

16 And the reason is quite simple. Congress has
17 not given us that -- has not given us that
18 task. FERC only does what Congress tells us to
19 do. So there's the answer to that question.

09:52:03 20 I understand the feeling that Oregon --
21 the citizens of Oregon have been inundated with
22 numerous, competing in some cases, projects.
23 To some extent that's true. For those of you
24 who don't know the whole picture in Oregon,

09:52:20 25 there is an LNG facility currently proposed

43

09:52:22 1 before FERC in Coos Bay called Jordan Cove with
2 a pipeline that extends from there to Malin,
3 Oregon.

4 There is the Oregon LNG proposal. That's
09:52:36 5 in prefiling. That's at the Skipanon site.

6 And then there is this Palomar pipeline, which
7 is not an LNG proposal, but its pipeline does
8 parallel the sendout pipeline for Oregon LNG to

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9 some extent through Clatsop and parts of the
09:52:54 10 willamette Valley, Clatsop County and parts of
11 the willamette Valley.

12 So the way it works is that FERC doesn't
13 think up these ideas. A project proponent
14 comes to the FERC and asks us to grant them
09:53:07 15 permission to build the facilities that they
16 are proposing. FERC then does analysis as to
17 what are the environmental impacts of those
18 proposals and ultimately what is the need for
19 it.

09:53:22 20 In many past cases, FERC has authorized
21 two competing projects that serve the exact
22 same marketplace and have similar environmental
23 impacts. I'll give you an example of what's
24 called the Wy-Cal pipeline and the Kern River
09:53:37 25 pipeline. They were both authorized. They
44

09:53:39 1 extended from Wyoming to California. Only one
2 of those projects got built because, in the
3 end, the market decides. But FERC was willing
4 to authorize both of them, and that's just the
09:53:51 5 way we operate.

6 Yes, sir. Is there a question in back?
7 Yes.

8 MR. VANCE FRASER: Yeah. About that part
9 about --

09:54:01 10 (Reporter requests clarification.)

11 MR. VANCE FRASER: Vance Fraser,
12 F-R-A-S-E-R.

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PM2-32

13 The comment about FERC only does what
14 Congress authorizes, if I'm not mistaken, Ron
09:54:12 15 Wyden asked you all to do some national work as
16 far as rating the different sites and that it's
17 been stated that -- I think by a FERC
18 commissioner, that about only seven LNG
19 facilities would be required in the whole
09:54:32 20 nation, and that you could do a rating and
21 check off the ones that would have the worst
22 impacts would be the lesser desired locations.
23 And I'd like to know what has happened with
24 that request.

09:54:48 25 MR. FRIEDMAN: Ron Wyden -- Senator 45

09:54:50 1 Wyden's comments letter is in the FERC record,
2 and so is the response from the Chairman of
3 Commission to Senator Wyden. Those are all
4 part of the public record, and you can read
09:54:58 5 those.

6 MR. VANCE FRASER: This is before that.

7 MR. FRIEDMAN: Yes, Marc?

PM2-33

8 MR. MARC AVERBACH: Yes. I think in
9 response to your suggestion that FERC doesn't
09:55:08 10 have the authority to look at national
11 planning, I think would be -- I guess if I were
12 on the other side, I would say that FERC
13 looking at the situation development should say
14 this is madness and ask for such authority.

PM2-34

09:55:23 15 And I think the fact that you authorize
16 multiple pipelines, I just want to say
Page 39

PM2-32

Joseph Kelliher, Chairman of the Commission, wrote an April 11, 2007 response to Senator Wyden's March 6, 2007 letter. These letters are in the public record for this proceeding. In response to questions raised in March 7, 2008 by members of Oregon's Congressional Delegation about regional planning, Chairman Kelliher wrote letters on April 2, 2008 indicating that the FERC reviews natural gas applications individually, on their own merits, to assess site-specific impacts.

PM2-33

See our response to comment PM2-32.

PM2-34

As described in section 3.1.2.2, the Palomar pipeline is a separate project from the Bradwood Landing Project with a different purpose.

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18-K

PM2-34
cont'd

PM2 RN-110607-FERCam.txt

17 personally, that even drawing a line across a
18 property, even if a pipeline isn't ultimately
19 built or the location is changed, has
09:55:34 20 tremendous impacts on those people affected,
21 speaking personally. It's not -- it's not
22 benign to simply draw a line across somebody's
23 property, as the line for Palomar transects my
24 property. It's a very disturbing situation and
09:55:50 25 has real effects on people.

46

PM2-35

09:55:52 1 MR. FRIEDMAN: Thank you for your
2 comments.
3 You can stand up, state your name for the
4 record, and provide us your comments.
09:55:59 5 MS. BRANDY HUMPHREYS: Brandy Humphreys,
6 H-U-M-P-H-R-E-Y-S. I'm with the Confederated
7 Tribes of Grand Ronde, and I just have a
8 question about analysis, talking about multiple
9 pipelines. Is there a cumulative analysis?
09:56:16 10 MR. FRIEDMAN: Yes, there is a section in
11 the DEIS on cumulative impacts.
12 MS. BRANDY HUMPHREYS: Okay.
13 MR. FRIEDMAN: Are there any more comments
14 or questions from the floor?
09:56:26 15 Yes, Duncan. Please, you have to state
16 your name again.

PM2-36

17 MR. DUNCAN MacKENZIE: Duncan MacKenzie.
18 There is a water usage table presented in
19 the DEIS on page 4-53 as table 4.3.1-1.
09:56:39 20 Submerged combustion vaporizers use a water
Page 40

PM2-35 Cumulative impacts are discussed in section 4.12.

PM2-36 SCVs would be subject to various maintenance checks throughout the life of equipment. Draining of the water bath for maintenance inspections is expected to occur once per year. The unit would likely be refilled with the produced water from the other vaporizers.

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PM2-36
cont'd

PM2 RN-110607-FERCam.txt

21 bath surrounding stainless steel LNG vaporizer
22 tubes as a transfer medium. Noted in this
23 table and as found in the applicant's resource
24 report two, table 2-1, it will take
09:56:52 25 approximately 200,000 gallons of water to
47

09:56:54 1 charge the submerged combustion vaporizing
2 water valves.
3 However, not found in the DEIS or any of
4 the available information for public review is
09:57:03 5 any accounting of the water required to refill
6 the vaporizer unit, approximately 29,000
7 gallons after it has been serviced, nor is the
8 draining of the vaporizer tank taken into
9 account in the noted DEIS table.
09:57:14 10 Reference is made to the following
11 operational narrative text found in the
12 applicant's resource report 13 at Section
13 13.7.3.4 on page 13-32. The vaporizers are
14 arranged in parallel. Under normal operation,
09:57:27 15 only six units are in operation. The remaining
16 unit acts as a spare to enable ongoing
17 maintenance, changeout of water baths, and to
18 cover single unit down time without impacting
19 on the terminal sendout capacity.
09:57:40 20 No schedule or other information as to the
21 frequency of this maintenance procedure and the
22 changeout of water baths was found in the
23 applicant's materials for public review.
24 Furthermore, it is not known if the applicant
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PM2-36
cont'd

PM2 RN-110607-FERCam.txt

09:57:53 25 intends to sequester the water drained from the
48

09:57:55 1 vaporizer tank and then restore it to the tank
2 after maintenance. Therefore, an accurate
3 assessment of the water resource impact this
4 procedure may have over the course of the year
09:58:02 5 or the expected lifetime of the facility cannot
6 be made.
7 The National Marine Fisheries Service has
8 also noted this operational aspect, as found in
9 their request for additional information for
09:58:12 10 Bradwood Landing LNG terminal on page 10, lines
11 22 through 25. The applicant has not responded
12 to this question in any of its four responses
13 to the National Marine Fisheries Service
14 request. It is not known if this response is
09:58:24 15 contained in the nonpublic document for
16 exception number 20071016-0235.
17 It is also noted that the applicant and
18 the National Marine Fisheries Service have a
19 continuing and ongoing dialogue. However, it
09:58:39 20 is recommended that prior to the preparation of
21 the FEIS, the applicant fully identify and
22 quantify all water usage, intake and discharge,
23 to the Commission.
24 MR. FRIEDMAN: Thank you very much for
09:58:48 25 your comments.
49

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09:58:48 1 PM2 RN-110607-FERCam.txt
Are there any more comments from people
2 who have not yet spoken?
3 If not, Mr. Dragich, you would like to
4 speak again?

09:59:01 5 MR. STEVE DRAGICH: Yes, I would.

PM2-37

6 The question was made to compensation to
7 landowners. The original filing for the
8 certificate in June of 2006, on page 88 in the
9 original filing, the proponent listed, just for
09:59:20 10 the pipeline, total compensation of \$186,000.
11 Using the industry standard found in the
12 Pipeline Risk Management book, edition 1992, by
13 Muhlbauer, what's the price of a human life
14 according to the industry's own estimate? In
09:59:42 15 that edition of 1992, you'll see a listing of
16 \$1.5 million per life.

PM2-38

17 My last comment concerns credibility of
18 the proponent. You've heard about the Palomar
19 pipeline, which the proponent didn't have or
10:00:01 20 was stated as not having any connection to. In
21 August of this year, the people in Washington
22 along the pipeline route were contacted by an
23 independent exploratory company called Maverick
24 Petroleum, associated with Venoco.

10:00:24 25 At the time the proponent said they had
50

10:00:27 1 nothing to do with this proposal, Bradwood LNG;
2 yet through Securities and Exchange filings we
3 find out that Venoco owned the platform known
4 as the Clearwater project, which NorthernStar

PM2-37 See our response to comment PM2-4.

PM2-38 This comment is outside the scope of the EIS, as it is not an environmental issue.

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PM2-38
cont'd

10:00:44 5 PM2 RN-110607-FERCam.txt
was backing in California. Yet we were told
6 that they had no connection to Bradwood LNG
7 through NorthernStar. This goes to
8 credibility.
9 MR. FRIEDMAN: Thank you for your
10:00:58 10 comments.
11 All right. Is there anyone else who has
12 not -- yes, sir. State your name for the
13 record, please.
14 MR. WALT MULTANEN: Walt Multanen,
10:01:07 15 M-U-L-T-A-N-E-N, landowner.
PM2-39
16 If there is to be LNG on this river, I
17 stand to enjoy roughly 2,000 feet of the
18 proposed pipeline. I have but one simple
19 question: If there is a loading site in Alaska
10:01:29 20 at the present time and there is to be LNG on
21 this river, would it be within FERC's authority
22 or somebody's authority to insist that only
23 Alaska natural gas come to Bradwood?
24 MR. FRIEDMAN: I don't know the answer to
10:01:47 25 that question.
51
10:01:48 1 MR. WALT MULTANEN: Well, end of comment,
2 but if you're going to have natural gas, it
3 would seem -- well, I hate to use the term
4 "common sense," but I have to -- that just
10:01:59 5 common sense would prevail, and you would keep
6 whatever monies you can within your own
7 economy.
8 MR. FRIEDMAN: I understand your comment,
Page 44

PM2-39 Under section 3 of the NGA, NorthernStar does not have to state the source of its LNG. The Bradwood Landing import terminal could receive LNG shipments from any exporting country, but we expect that the most likely sources would be from the Pacific Basin, including Alaska. However, the FERC would not require a single source of LNG.

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9 PM2 RN-110607-FERCam.txt
and I appreciate it.

10:02:09 10 MR. WALT MULTANEN: There is no such thing
11 as cheap energy on the face of this Earth any
12 longer. That's in days past.

13 MR. FRIEDMAN: When I don't know the
14 answer to a question, that doesn't mean that we
10:02:20 15 won't address it in the EIS; it just means I
16 won't address it now off the top of my head.

17 If there are no more questions from people
18 who have not yet spoken, at this time I'd like
19 to close the meeting. I want to thank you all
10:02:32 20 for being here. And let the record show that
21 this meeting was closed at approximately 10
22 o'clock a.m. Thank you.

23 (MEETING ADJOURNED AT 10:02 A.M.)
24
25

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* * *

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1 CERTIFICATE
2 I, Robin L. Nodland, a Washington
3 Certified Shorthand Reporter, an Oregon
4 Certified Shorthand Reporter, a Registered
5 Diplomat Reporter, and a Certified Realtime
6 Reporter, do hereby certify that I reported in
7 stenotype the proceedings had upon the hearing
8 of this matter, previously captioned herein;
9 that I transcribed my stenotype notes through
10 computer-aided transcription; and that the
11 foregoing transcript constitutes a full, true
12 and accurate record of all proceedings had
13 during the hearing of said matter, and of the
14 whole thereof.
15 Witness my hand at Portland, Oregon, this
16 26th day of November, 2007.

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washington CSR No. 2530

Oregon CSR No. 90-0056

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1

1 U.S. DEPARTMENT OF ENERGY
2 FEDERAL ENERGY REGULATORY COMMISSION

3
4 BRADWOOD LANDING LNG PROJECT
5 FERC DOCKET NUMBERS CP06-365 and 366

6
7
8 PUBLIC MEETING
9 TRANSCRIPT OF PROCEEDINGS

10 * * *

11
12
13 Tuesday, November 6, 2007
14 6:30 p.m.

15
16 J.A. Wendt Elementary School
17 265 South First Street
18 Cathlamet, Washington

19 * * *

20
21 BEFORE: Mr. Paul D. Friedman
22 Federal Energy Regulatory Commission
23 Office of Energy Projects

24 * * *

25 2

1 P R O C E E D I N G S

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Public Meeting Transcript of Proceedings
Tuesday, November 6, 2007, 6:30 p.m.
Cathlamet, Washington

The introductory comments for this public meeting are not included in the FEIS because they are very similar to those of the Monday, November 5, 2007, 6:30 p.m. meeting in Cathlamet, Oregon, which are included. The complete transcript of the Tuesday, November 6, 2007, 6:30 p.m. meeting in Clatskanie, Washington can be obtained at the FERC's internet website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP06-366). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll free at 1-866-208-3676, or for TTY, contact (202) 502-8659.

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18:53:55 1 on the speaker's list, if you've not already
2 done so. After we've given you that
3 opportunity, we'll start taking comments from
4 the floor. Thank you.

18:56:01 5 (Recess.)

6 MR. FRIEDMAN: All right. Now is the time
7 you've been waiting for. It's where you get to
8 give us an earful, what your opinions are about
9 the project. We want to hear what you have to
10 say about the DEIS.

11 I'm going to call people in the order in
12 which they signed up, and I will ask that when
13 you come up to the podium, as you can see --
14 when I used the microphones, it didn't work
15 very well. So you're going to have to speak up
16 in your loud voice in case the microphones
17 don't pick up your soft voice. The court
18 reporter needs to hear you, so you might have
19 to speak slower than I did. I tend to speak
20 too fast. You won't be penalized for your
21 three minutes by speaking slowly and
22 enunciating.

23 Clearly state your name, spell your last
24 name for the court reporter, identify any
19:00:31 25 organization you may represent or yourself, if
18

19:00:35 1 you're an individual. Please tell us if you're
2 a landowner along the pipeline, and if you

Public Meetings

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PM3 RN-110607-FERCpm.txt
3 happen to know the milepost that your land is
4 located on, please tell us that. If you don't
19:00:44 5 know your milepost, there are some NorthernStar
6 people in the back who might be able to locate
7 your land according to milepost, or you can
8 take a look at the DEIS, which has maps with
9 mileposts on it.

19:00:56 10 That said, the last time I was here there
11 was a certain individual who raised her hand
12 all night long, and I kept forgetting to call
13 on her, and tonight she's first on the list.
14 Paula Carlson. You thought I forgot, Paula.

19:01:14 15 MS. PAULA CARLSON: All right. And I
16 didn't want to be first. I signed up as
17 fourth.

18 My name is Paula Carlson. My last name
19 C-A-R-L-S-O-N. I live on Puget Island.

PM3-1 19:01:29 20 The pages that I selected to talk about
21 are page 4-388 and 4-389. NorthernStar has
22 submitted data regarding ambient noise at the
23 west end of Puget Island, which I do not
24 believe is correct. Thus, the conclusions from

19:01:47 25 their data used to project levels of acceptable
19

19:01:50 1 noise from construction and operation of the
2 facility and noise from LNG tankers docking and
3 undocking is based on false premises.

4 I charge that NorthernStar's numbers have
19:02:01 5 been massaged, and I question whether they have
6 factored water into their calculations properly

PM3-1 See our responses to comments PM1-46 and PM1-47.

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PM3-1
cont'd

PM3 RN-110607-FERCpm.txt

7 as a hard site, a condition which will not
8 reduce noise over distance since water, like
9 cement, offers nothing that can absorb the
19:02:17 10 sound energy from their site to the affected
11 residents of Puget Island.
12 It appears that, in order to meet federal
13 guidelines during construction and during
14 operation of the proposed facility, it has
19:02:29 15 fallen upon the company to be selective with
16 the data they have gathered to avoid an
17 accurate interpretation of ambient and
18 background noise and their formulations, and
19 construct their own numbers to fit the grid.
19:02:44 20 Experience living on the island and tuning
21 into the silence or to the breaking of the
22 silence by intermittent ship traffic and
23 occasional dredging of the channel tells me
24 that the majority of the time we, at the west
19:02:57 25 end of the island, are not as high on the noise
20
19:03:00 1 level as NorthernStar states. If I'm right --
2 and I assert that I am -- then NorthernStar
3 cannot meet the guidelines set forth federally
4 through EPA and their application should be
19:03:14 5 denied.
6 Since a portion of the island is so close
7 to the site, to the main shipping channel, and
8 to the berthing maneuvers that NorthernStar has
9 outlined, the data and the analysis of noise
19:03:24 10 and sound must be scrutinized. The hard-site

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PM3-1
cont'd

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11 conditions which exist cannot be ignored. It
12 is a proven fact that noise adversely affects
13 the physiological well-being of the community.
14 Thank you.
19:03:37 15 MR. FRIEDMAN: Thank you for your
16 comments.
17 Next is Steve Fluke.
18 MR. STEVE FLUKE: Steve Fluke, F-L-U-K-E.
19 Better spell it okay.
19:03:51 20 First, I'm here as a citizen, and I
21 live -- I don't live on the river here. I live
22 over by Raymond. My kids go to Willapa Valley.
23 I know there's a lot of Mules here. You know
24 the Vikings, I'm sure. This is a pretty tough
19:04:06 25 group of kids my kids play. All my kids have
21
19:04:09 1 played over here.
2 Anyway, I'm here as a citizen, but I'm
3 also here as a representative of a major union,
4 and that's the machinists' union. I represent
19:04:16 5 here in the state of Washington -- I'm a
6 vice president here on the West Coast, even
7 though I live in the (inaudible) area. I
8 represent the aerospace workers here. I
9 represent the loggers and mill workers on this
19:04:27 10 river here to the tune of about 42,000 members
11 and the families. That's a pretty good group
12 of people that I'm here representing.
13 Obviously -- I know we're not supposed to
14 say whether we support or not. Supposedly you

PM3-2 19:04:39 15 PM3 RN-110607-FERCpm.txt
 16 don't give any weight to that. We do. We're
 PM3-3 17 supportive because obviously there's a lot of
 18 jobs. But one thing that's particularly
 19 important to me that we've looked at, and since
 19:04:51 20 I've worked primarily in the logging and
 21 milling industry here in Washington and Oregon,
 22 is the restoration program that they're
 23 proposing to do. That's a lot of money.
 24 They're proposing \$50 million for restoration
 19:05:08 25 work. I've worked all the way from Queets all
 the way down through Oregon, trying to work on
 22

19:05:10 1 rivers that supposedly were destroyed by -- by
 2 logging, but every time we've got a little bit
 3 of money, we've ran out of it.
 4 I think a company that brings in a
 19:05:19 5 proposal to put that kind of money along this
 6 river to restore some of these wildlife areas
 7 and some of these -- these torn-up riparian
 8 zones is pretty unique, because we brought in a
 9 lot of industry in this -- up and down this
 19:05:34 10 river, and I don't know they brought any money
 11 to help with that restorative process.
 12 So as far as the environment goes, I've
 13 worked -- I've dealt with environmentalists
 14 through the spotted owl crisis, from here in
 19:05:48 15 Washington and Oregon. I've lost a lot of
 16 mills. I know that people are very sensitive
 17 about the environment, but if you take a look
 18 at the background, we've had our machinists --

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PM3-2 Comment noted.

PM3-3 Comment noted.

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PM3-3
cont'd

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19 we have a group back in Washington, D.C. that
19:06:03 20 does a lot of -- a lot of investigation on
21 different companies, and you take a look at
22 this company and they're pretty sound
23 environmentally, both safetywise and
24 environmentally.
19:06:13 25 So we're proposing and we're asking that
23

19:06:15 1 this Commission move on with this process and
2 let this project get going. Thank you.
3 MR. FRIEDMAN: Thank you for your
4 comments.

19:06:24 5 Next on the list is Esther Gregg. By the
6 way, if I mispronounce your name, please
7 correct me.

8 MS. ESTHER GREGG: Thank you. I'm Esther
9 Gregg, G-R-E-G-G. I live in the west end of
19:06:43 10 Wahkiakum County, and I do not own property on
11 the pipeline.

12 I am a Wahkiakum County PUD Commissioner,
13 but I'm here before you this evening
14 representing the Washington State Grange. This
19:06:57 15 year in June at its 108th annual conference, we
16 had 283 voting delegates representing
17 approximately 45,000-plus members within the
18 state of Washington grange. A resolution was
19 brought before the floor, and I'd like to read
19:07:13 20 it into the record, if I might, please.

PM3-4

21 "Whereas, NorthernStar Natural Gas is
22 seeking to develop a liquefied natural gas

Page 20

PM3-4 There is no evidence that the proposed pipeline would adversely impact property values. Please see section 4.8.3.3. Land use is discussed in section 4.7.3.

PM3-4 23 PM3 RN-110607-FERCpm.txt
 cont'd 24 import terminal at Bradwood in a 34-mile
 19:07:30 25 sendout pipe through southwest Washington that
 will adversely impact the land values, 24

19:07:33 1 customary use, and property right of many local
 2 landowners; and

PM3-5 3 "whereas, NorthernStar's project will use
 4 eminent domain against landowners and its

PM3-6 19:07:43 5 pipeline will damage productivity of the
 6 100-foot-wide right-of-way for timber,
 7 agriculture, and wildlife habitat; and

PM3-7 8 "whereas, NorthernStar's project is an
 9 unnecessary supply for Washington state. The
 19:07:56 10 gas from this terminal is for California, who
 11 reject LNG terminals being built in their
 12 state; and

PM3-8 13 "whereas, NorthernStar's terminal and
 14 pipeline are inconsistent with maintaining
 19:08:10 15 adequate public safety and security in the
 16 lower Columbia River area. The 34-mile,
 17 high-pressure, non-odorized gas pipeline and
 18 the LNG terminal presents significant
 19 unresolved safety and emergency response
 19:08:25 20 infrastructure concerns that NorthernStar
 21 refuses to resolve in a timely manner; and

PM3-9 22 "whereas, NorthernStar's terminal and
 23 pipeline undermines state and local economic
 24 interests as landowners, river users, and small
 19:08:39 25 businesses will bear the economic cost of
 25

Public Meetings

3

- PM3-5 The use of eminent domain as it relates to this project is discussed in section 4.7.3.1. See our response to comment PM2-4. There is no evidence that the project would significantly damage productivity of timber, agriculture, and wildlife habitat. After restoration, the right-of-way should be returned to its pre-construction condition and use.
- PM3-6 As discussed in section 4.8.3.3, NorthernStar would compensate the landowner for use of the land. The easement agreement between NorthernStar and the landowner would specify compensation for damage to property during construction, loss of use during construction, and loss of renewable and nonrenewable or other resources. Congress has authorized the use of eminent domain by natural gas pipelines certificated by the FERC under section 7h of the NGA.
- PM3-7 Section 1.1 has been revised to include information indicating that the majority of natural gas supplied by the proposed project would go to consumers in Oregon and Washington.
- PM3-8 The project will be constructed and operated in accordance with applicable federal, state, and local regulations including safety and security standards. A discussion of reliability and safety is provided in section 4.11.
- PM3-9 There is no evidence that the project would have negative impacts on the local and state economy, and it may in fact have economic benefits. Delays for commercial ship traffic would be minor, and should not result in an increase for shipping costs. See section 4.8. The costs for security would mainly be borne by NorthernStar through the cost-sharing agreement spelled out in its ERP, as discussed in section 4.11.6.

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PM3-9 19:08:42 1 increased security and delays in river traffic,
cont'd 2 creating increased shipping costs for any
3 agriculture or other products being shipped on
4 the Columbia River; and

PM3-10 19:08:53 5 "whereas, the LNG terminal will exacerbate
6 pollution and damage critical salmon habitat in
7 the Columbia River estuary, a vital nursery for
8 salmon; and

PM3-11 9 "whereas, the Washington State Grange
19:09:07 10 recognizes the need in the Pacific Northwest
11 for clean, safe, affordable energy but finds
12 NorthernStar's project to be destructive,
13 unnecessarily risky, and a cause for extra
14 expense to agriculture and other products using
19:09:22 15 Columbia River ports for shipping.

PM3-12 16 "Therefore, be it resolved that the
17 Washington State Grange urges the Federal
18 Energy Regulatory Commission and all relevant
19 Washington and Oregon agencies to deny site
19:09:36 20 approval and all permits for the Bradwood
21 Landing LNG terminal and pipeline."

22 This resolution was passed unanimously at
23 the Washington State Grange this summer, as I
24 say, and in response to the -- to the nature of
19:09:51 25 the historic nature of Washington State Grange,

26

19:09:54 1 in passing a resolution, we believe in "say
2 one, say all." So it's safe to say that the
3 Washington State Grange's 45,000-plus members
Page 22

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PM3-10 As section 4.10 of the EIS explains, the proposed project would not be a major source of pollution, and would not have significant impacts on regional air quality. Impacts on salmon and the lower Columbia River estuary, and mitigation for those impacts, are discussed in sections 4.3.2, 4.5, and 4.6.

PM3-11 There is no evidence that the proposed project would cause extra expenses to the shipping of agricultural products. See response to comment PM3-9.

PM3-12 See our response to comment PM2-3.

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PM3-12 | cont'd

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4 would support, in whole, this resolution to not
 19:10:09 5 site the Bradwood Landing plant.
 6 Thank you.
 7 MR. FRIEDMAN: Thank you. Next on the
 8 list is --
 9 MS. CAROL KRIESEL: -- is Carol Kriesel.
 19:10:27 10 MR. FRIEDMAN: All right. Thank you,
 11 Carol.
 12 SPEAKER: Hi, I'm Carol Kriesel,
 13 K-R-I-E-S-E-L, resident of Puget Island.
 PM3-13 | 14 I will point out inconsistencies contained
 19:10:44 15 in the DEIS regarding distance between Puget
 16 Island and the proposed site in Bradwood,
 17 Oregon. On page 28, it is stated that the
 18 nearest residents are about .6 miles. On page
 19 469 it says no residences are present within
 19:11:03 20 .05 -- .5 miles. And on page 574, in table
 21 4.10.2-5, the distance from the proposed site
 22 to Puget Island is listed as 1,000 feet.
 23 I want NorthernStar to demonstrate how
 24 they arrive at those different figures and what
 19:11:24 25 coordinates they used. Just stating the
 27
 19:11:27 1 information without a basis for the
 2 determination makes it invalid, and to concede
 3 there are two main areas that need to be
 4 corrected by NorthernStar: The inconsistencies
 19:11:39 5 and the information used to gather the data.
 PM3-14 | 6 My second point, the project proposed by
 7 NorthernStar to be sited in Bradwood, Oregon,
 Page 23

PM3-13 The Executive Summary has been revised to state that the nearest residence is 0.5 mile from the LNG terminal site. The distance referenced in table 4.10.2-5 is from the nearest NSA located on Puget Island (referred to as N2, a group of riverfront homes) to the NorthernStar property line as shown on figure 4.10.2-1.

PM3-14 The operational size of the Bradwood Landing LNG terminal is smaller than many other currently operating or proposed LNG terminals.

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PM3-14
cont'd

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8 is not small to medium-sized. The following
9 quotes with page numbers from the DEIS
19:11:55 10 demonstrate that this is a large project.
11 Page 162, quote: A type of low-profile
12 LNG storage tank referred to as an LNG smart
13 horizontal tank storage has been developed by
14 Mustang Engineering but has not been used on a
19:12:13 15 scale as large as the proposed project.
16 Page 165: Because a service area of the
17 heat exchangers needs to be large for efficient
18 heat transfer, the structures would be large
19 and require significant space for construction
19:12:30 20 and operation.
21 Page 266: Potential impacts on water
22 quality resulting from boring operations would
23 be due to the relatively large work areas.
24 Page 328: Due to the very dynamic nature
19:12:47 25 of large-scale construction, NorthernStar has
28

19:12:51 1 not defined specific lighting plans for
2 construction.
3 Page 562: Most large energy facilities in
4 Oregon are under the jurisdiction of the Oregon
19:13:03 5 Energy Facility Siting Council.
6 Page 565: Motor vehicles are a primary
7 source of air pollution, with large industrial
8 facilities accounting for less than 15 percent
9 of those types of criteria pollutants.
19:13:20 10 Finally, there are four pages with the
11 same phrase, page 276, page 283, page 329, and
Page 24

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PM3-14 | cont'd

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12 page 350. They say: For any large
 13 construction project, there is a potential for
 14 spills or leaks.

19:13:35 15 As you can see, FERC refers to this as
 16 large. It is not small- to medium-size. Thank
 17 you.

18 MR. FRIEDMAN: Thank you for your
 19 comments.

19:13:56 20 All right. Hopefully we get this right.
 21 Mieke Eykel.

22 MS. MIEKE EYKEL: That's Mieke.
 23 MR. FRIEDMAN: Mieke. I'm sorry, Mieke.
 24 UNIDENTIFIED SPEAKER: Please use a mike.

19:14:18 25 MS. MIEKE EYKEL: My name is Mieke Eykel.
 29

19:14:20 1 Last name is E-Y-K-E-L. And I'm here in
 2 opposition. I am strongly opposed.

PM3-15 | 3 The DEIS states no residences within a
 4 half a mile of the proposed LNG facility. But
 19:14:36 5 my concern, as a residence within half a mile
 6 of the closest LNG source, this would be LNG
 7 carrier unloading at dockside. This closest
 8 LNG source is 2500 feet from my house and may
 9 be even closer to some of our neighbor's
 19:14:57 10 places.

11 Why is the half-mile criteria so important
 12 to NorthernStar? Are these issues -- are there
 13 issues within half a mile or less distance to
 14 an LNG terminal source? And other issues are

PM3-16 | 19:15:13 15 side pollution. The submersed vaporizers in
 Page 25

PM3-15 There is no special criterion of residences within one-half mile of the site. We are sensitive to residences overlapped by the Zones of Concern. As the LNG carriers move into the Bradwood dock from the waterway, the distances to houses change during the transit. The EIS discloses the number of houses overlapped by Zone 1 along the waterway and at the berth. The project would meet all applicable air quality standards and the requirements of its air quality permit.

PM3-16 The figures we show in this EIS include the exhaust stacks that would be constructed at the proposed LNG terminal.

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PM3-16
cont'd 16 NorthernStar's handouts do not show the large
17 exhaust stacks, six or ten of them. Why are
18 these not shown?

PM3-17 19 And then existing -- existing residences.
19:15:28 20 Your FERC statement of construction and
21 operational impact on the dense communities is
22 short-term and not significant. I disagree
23 with the statement as the facility is to
24 operate for the next 30 to 40 years. As a
19:15:41 25 matter of fact, it reflects -- to the effects
30

19:15:44 1 on how quiet this area is, one can hear
2 people's conversation on the other side of the
3 river, or any other activity.

PM3-18 4 And the potential erosion to Puget Island
19:15:58 5 shoreline would be very significant due to
6 berthing in the LNG areas, especially as
7 berthing is accomplished at high tide. Why is
8 this issue not mitigated with the property
9 owners in Wahkiakum County?

19:16:11 10 Thank you.
11 MR. FRIEDMAN: Thank you for your
12 comments, Mieke.
13 Robert Larson.
14 MR. ROBERT LARSON: Robert Larson. I live
19:16:24 15 20 miles at --
16 (Reporter requests clarification.)

PM3-19 17 MR. ROBERT LARSON: L-A-R-S-O-N. And my
18 question is part of the process. I was
19 wondering how deep will the navigation channel
Page 26

PM3-17 The EIS states that potential impacts from the Bradwood Landing LNG terminal could be caused by short-term increases in noise during construction and increases in noise due to operation of the project in the long term. Noise from the LNG terminal may be perceptible during relatively quiet periods. However, NorthernStar would be required to meet the FERC's 55 dBA L_{dn} restriction at NSAs.

PM3-18 Shoreline erosion along Puget Island is addressed in section 4.1.3.3. We have added a recommendation that NorthernStar prepare a Shoreline Monitoring Plan for the west end of Puget Island.

PM3-19 The horizontal directional drill would be at least 50 feet below the Columbia River bed. Exact depth would be determined during engineering design of the drill.

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PM3-19 | 19:16:46 20 of the Columbia River, the pipeline, will be
cont'd | 21 put in if the process goes ahead?
22 MR. FRIEDMAN: Thank you.
23 Does anyone from NorthernStar know the
24 answer to that? How deep is the horizontal
19:17:02 25 directional drill under the Columbia River?
31

19:17:04 1 SPEAKER: We couldn't hear the question
2 back here, Paul.
3 MR. FRIEDMAN: The question was: How deep
4 is the horizontal directional drill below the
19:17:12 5 Columbia River? Do you know the answer?
6 MR. GARY COPPEDGE: It's at least 50 feet.
7 (Reporter requests clarification.)
8 MR. FRIEDMAN: Gary C-O-P-P-E-D-G-E. His
9 comments was at least 50 -- you said at least
19:17:31 10 50 feet?
11 MR. GARY COPPEDGE: Yeah. It varies.
12 That's a difficult question to answer in one --
13 MR. FRIEDMAN: All right. At the FEIS,
14 we'll do some more research, and we'll provide
19:17:42 15 a more detailed answer.
16 Franz, your turn.
17 MR. FRANS EYKEL: Good evening. Thank you
18 for commenting on the FEIS.
19 MR. FRIEDMAN: State your name first.
19:18:20 20 MR. FRANS EYKEL: Excuse me?
21 MR. FRIEDMAN: State your name and spell
22 your last name.
23 MR. FRANS EYKEL: Franz Eykel, E-Y-K-E-L,
Page 27

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24 Puget Island resident.

PM3-20 19:18:29 25 My reference is to 4.7.2.3, existing
32

19:18:33 1 residences. It's about risk perception. Risk
2 perception amplifies the impact of a
3 disability. Public perception of risk and
4 nuisance effects have a measurable economic

19:18:49 5 consequence. One direct impact associated with
6 risk likely to be experienced by landowners and
7 residents in the area, real estate values may
8 decline. And should propose LNG terminals be
9 approved, is an increase in insurance premiums
10 of available insurance coverage available?

11 Accidents that threatens the value of the
12 land in the community impacts the long-term
13 fiscal -- fiscal health of the community,
14 industrial development, including electrical
15 power plants, oil refineries, and LNG
16 facilities are found to be -- to be associated
17 with a decrease in property values, of
18 properties within approximately a two-mile
19 radius.

PM3-21 19:19:42 20 The fact is it creates is a disamenity,
21 including spacial effects, noise, lights,
22 traffic, air pollution, shoreline erosion, and
23 odors. Tourists -- tourists can be very
24 sensitive to amenities of an area and to the
19:20:02 25 perceived reputation and character of a
33

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PM3-20 We discuss the potential impact of the LNG terminal on property values in section 4.8.2, and safety in section 4.11.

PM3-21 As discussed in section 4.8.1.8, we believe the proposed project would not have a significant impact on tourism in the project area. Lighting and visual impacts are addressed in section 4.7.2.7. Shoreline erosion is discussed in section 4.2. Noise and air pollution are addressed in section 4.10.

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19:20:05 1 community. LNG or like facilities are a
2 disamenity to this area.

PM3-22

3 Militarizing the river due to LNG carrier
4 escorts will have a serious scheduling effect
19:20:19 5 on the upriver cruise ship business and other
6 perceived risks and a disamenity. NorthernStar
7 Natural Gas writes off the dollar values of
8 jobs and tax revenues, but they fail to enter
9 the dollar values of the disamenities.

PM3-23

19:20:41 10 Mitigation. The citizens of Puget Island
11 and their properties are negatively affected by
12 the proposed Bradwood Landing facility by the
13 above-mentioned factors, but no attempt has
14 been made to mitigate or compensate for the
19:20:58 15 anticipated decreases in property values.

16 As far as representation, our county
17 commissioners have intervenor status with the
18 FERC, but due to the lack of representation we,
19 the people, have to speak out on these issues
19:21:16 20 and represent our interests and of the others
21 in our the community. Thank you.

22 MR. FRIEDMAN: Thank you for your
23 comments.

24 Next is Mike Rees.

19:21:36 25 MR. MIKE REES: Good evening. My name is
34

19:21:39 1 Mike Rees. R-E-E-S, no E on the end.

2 MR. FRIEDMAN: Mike, speak up, if you can.

3 MR. MIKE REES: Shall I pick one of these

Page 29

PM3-22 See our response to comment PM2-18.

PM3-23 As discussed in section 4.8.2.3, we believe the potential impacts on property values as a result of the proposed project would be minimal.

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		PM3 RN-110607-FERCpm.txt
	4	up?
	19:21:50 5	MR. FRIEDMAN: Yes. I don't think it
	6	works. Okay.
PM3-24	7	MR. MIKE REES: I'm a retired engineer
	8	from the Boeing Company and currently working
	9	as an independent engineering consultant. I
	19:21:58 10	did submit scoping comments to you on October
	11	the 15th, 2005. My understanding is that it is
	12	incumbent on the lead agency to address all the
	13	submitted scoping comments as part of the DEIS.
	14	This DEIS does not address many of my comments;
	19:22:18 15	therefore, I find it inadequate. I would ask
	16	that the lead agency review all the scoping
	17	comments that were submitted and make certain
	18	that those which have not been addressed in the
	19	DEIS be included in the FEIS.
PM3-25	19:22:35 20	I have three preliminary technical
	21	comments to add now. According to scientific
	22	reports, it is typical for an LNG system in the
	23	U.S. to have a 1.5 percent leakage rate. This
	24	leakage occurs primarily from valves, pumps,
	19:22:55 25	and mechanical systems used either to convert
		35
	19:22:57 1	the liquid to gas, to transport the gas along
	2	pipelines, or from spills and accidents.
	3	Further, natural gas is essentially
	4	methane, which is 24 times more potent
	19:23:10 5	greenhouse gas than carbon dioxide. The peak
	6	output from Bradwood Landing is 1.3 billion
	7	cubic feet per day. That would amount to
		Page 30

PM3-24 The draft EIS did address the general issues raised during scoping (see section 1.4, and table 1.4-2 in the draft EIS).

PM3-25 Section 4.10.1 has been updated to include the estimated GHG emissions resulting from the construction and operation of the project.

PM3-25 8 PM3 RN-110607-FERCpm.txt
 cont'd 9 approximately 20 million cubic feet of methane
 10 gas vented to the atmosphere per day somewhere
 11 in the system. That's equal to 31,000 tons of
 12 carbon dioxide a day.
 13 The environmental impact of expected
 14 leakage is not addressed in this DEIS. The
 15 FEIS should include the maximum expected
 16 leakage rate of the total system and the
 17 effects of the leakage on global warming.

PM3-26 17 Same comment is on vaporizing
 18 technologies. The DEIS indicates that no water
 19 would be taken from the Columbia River by
 19:23:58 20 vaporizing technologies. However, water
 21 condensate would be discharged into the river,
 22 which would be treated for PH neutralization
 23 and be at 68 degrees Fahrenheit. The amount of
 24 water that will be discharged is stated in the
 19:24:15 25 DEIS as 160 gallons per minute. That equates
 36

19:24:20 1 to a quarter of a million gallons a day.
 2 That amount of water would be
 3 discharged -- excuse me. The amount of water
 4 that would be discharged has not been addressed
 19:24:34 5 in the -- in the DEIS, and I would ask that the
 6 appropriate fish and wildlife agency address
 7 the effect of this discharge on local aquatic
 PM3-27 8 habitat. Also, I would like to ask that the PH
 9 neutralization system desired be explained to
 19:24:54 10 show how it is to prevent accidental discharge
 11 of non-neutralized water.

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PM3-26 As part of the section 7 consultation, which is described in detail in section 4.6.1, FERC has been involved in numerous conversations with the NMFS regarding the potential impacts of discharges on federally listed aquatic species. As part of these discussions, the NMFS provided comments related to the discharge of SCV water. Potential impacts on water quality and aquatic resources as a result of this discharge are discussed in sections 4.3.2.3 and 4.5.2.1, respectively, and will be described in detail in the revised BA and EFH Assessment.

The effectiveness of the pH neutralization tank, including sampling and analysis of the SCV discharge, would be addressed through the requirements of the NPDES permit. The ODEQ began the NPDES permit process on October 18, 2007.

PM3-27 The SCV discharge would be monitored in accordance with the NPDES permit to ensure that the treatment system is working properly. In addition, NorthernStar has indicated that the SCV discharge water would be monitored for temperature and pH in the control room through the DCS.

PM3-28

PM3 RN-110607-FERCpm.txt
My last comment is about the noise levels.

The noise analysis in the DEIS I believe is insufficient. As indicated in my scoping comments, it is not reasonable to identify noise levels only in the day/night level metric, the DNL metric. DNL is misleading. It does not address the impact of short duration noise amplitudes that are significantly higher than the average levels.

For example, if a large cannon were located at the Bradwood site and fired every 15 minutes, the effect of -- on the residents of Puget Island would be extremely annoying.

However, because the DNL metric averages the noise levels over 24 hours, the noise from the cannon would make an insignificant difference to the DNL average, and the DEIS only deals in DNL.

Therefore, the FEIS should also address the noise metric called time above. Time above is in which the total time above a certain noise level -- say, 60 dBA -- in a 24-hour period is reported in the number of minutes.

With a construction period of 36 months and the pile-driving program of four months, expressing the noise levels in DNL is totally inadequate. Communities would need realistic noise assessments.

MR. FRIEDMAN: Mike, can you wrap it up?

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PM3-28

Short-term noise would be associated with construction activities at the site. Section 4.10.2.2 describes construction noise and estimates the noise associated with the short-term construction activity. The construction noise estimates are not provided in a day/night (L_{dn}) format but reflect the estimated noise associated with the operation of the equipment averaged over a short period. We are recommending a noise mitigation plan to minimize dredging noise impacts during construction of the facility. Operation of the facility would generally result in a fairly steady noise source and representation of the noise in a L_{dn} format is industry standard due the conservative 10 decibel addition of noise at night to compensate for the receptors additional sensitivity at night. As indicated in section 4.10.2.2, we recommend that NorthernStar make all reasonable efforts to ensure its predicted noise levels from the LNG terminal are not exceeded at the NSAs and file noise surveys with the Secretary no later than 60 days after placing the LNG terminal in service. We do not agree that permanent noise monitoring stations are necessary.

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PM3-28 16 PM3 RN-110607-FERCpm.txt
cont'd 17 MR. MIKE REES: I'll just wrap it up. Two
18 sentences.
19 Similarly, for the operational aspect of
20 it. If NorthernStar were truly interested in
19:26:41 21 measuring and minimizing the impact of the
22 adjacent communities, they would include at
23 least two noise monitors -- one at the Bradwood
24 site and one on Puget Island -- to evaluate
noise complaints that would surely occur.

19:26:55 25 Thank you for the opportunity for making
38

19:26:56 1 these comments.
2 MR. FRIEDMAN: Thank you.
3 Next is Mike Lewis. Mike, make sure you
4 speak loudly.
19:27:10 5 MR. MIKE LEWIS: Is this loud enough?
6 MR. FRIEDMAN: Yes.
7 MR. MIKE LEWIS: Okay. My name is Mike
8 Lewis, L-E-W-I-S. I'm a resident of Puget
9 Island. I represent myself and my family.

PM3-29 10 I have about 30 years of commercial risk
11 and insurance experience, and I'm going to
12 suggest to this audience that no matter what
13 you write down in any of these books and
14 studies, you're inviting yourself into a 9/11
19:27:34 15 incident. We saw a major city in the last ten
16 years attacked by terrorists using our
17 airplanes and attacking a well-built building
18 in a city that had lots of resources and lots
19 of political influence. And we have people

Page 33

PM3-29 Safety and security issues, including those related to terrorist attacks, are discussed in section 4.11. It is possible that a release from the LNG storage tanks could be caused by an intentional act, such as a terrorist attack. Although an intentional breach scenario could result in greater thermal radiation in the immediate vicinity of the release, such scenarios are typically associated with the desire to inflict damage to major infrastructure and population and commercial centers.

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PM3-29
cont'd

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19:27:51 20 dying today from that incident, and they will
21 continue to die from the asbestos exposure that
22 they endured.
23 This is just another example of how our
24 engineers in this country seem to be able to
19:28:06 25 put together just about anything. All you got
39

19:28:08 1 to do is look up the river and look at Hanford.
2 I worked with contractors at Hanford. They
3 approved everything as safe. What's leaking
4 potentially into the Columbia River?
19:28:19 5 Contaminated groundwater. Do we have a nuclear
6 storage facility yet in the United States? No.
7 So we've got this stuff stored all over the
8 place in defunct power plants.
9 So now we're going to do -- we're going to
19:28:35 10 invite a bomb into our community, a bomb that
11 is not necessary because it's all going to be
12 sold to California anyway. If California wants
13 it so bad, let them put it in. Their
14 lieutenant governor bragged about the fact that
19:28:48 15 we would get the site and they would get the
16 gas. That hardly seems to be a payoff. What
17 are we going to get off of this? Short-term
18 jobs? I doubt it. We won't even get that.
19 But we are inviting terrorists to put a
19:29:04 20 bull's eye on us. We're supplying the bomb in
21 the form of the gas tanks, and we're supplying
22 the foreign crews that cannot be vetted. We
23 can't even vet driver's licenses in this state;

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PM3-29 19:29:19 25 PM3 RN-110607-FERCpm.txt
cont'd 19:29:19 25 And you talk about fires? Someone here
40

19:29:23 1 got a hundred-thousand-dollar grant to supply
2 firefighting gear for our firefighters on
3 Cathlamet Island -- or Puget Island. It's a
4 waste of time. Whenever there's a refinery
19:29:37 5 fire, they just stand back and contain it. You
6 don't fight fires in those kinds of things, and
7 you don't fight fires in ships like that. So
8 this is an unmitigated disaster being invited
9 into a community that does not deserve it.

19:29:50 10 Thank you.
11 (Applause.)
12 MR. FRIEDMAN: Thank you.
13 Next is Beverly Beal.
14 MS. BEVERLY BEAL: I'm Beverly Beal,
19:30:12 15 B-E-A-L. I'm a resident of Cathlamet. Thank
16 you for the opportunity to publicly express my
17 concerns with information contained within the
18 DEIS. A more detailed copy of my remarks will
19 be submitted in writing.

PM3-30 19:30:32 20 On page ES-2 under the heading "project
21 impacts and mitigation," your agency wrote the
22 final engineering design for the LNG terminal
23 would incorporate detailed seismic
24 specifications and other measures to mitigate
19:30:47 25 the impact of seismic hazards and may be
41

PM3-30 As discussed in section 4.1.4.3, welded steel pipelines are not prone to failure due to earthquakes unless they cross active faults or other areas subject to significant permanent ground displacement. Also see our responses to comments SA1-4 and LA7-25.

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PM3-30
cont'd

PM3 RN-110607-FERCpm.txt

19:30:51 1 subject to final review and approval by the OEP
2 prior to construction.
3 Further references to seismic hazards
4 occurred on page ES-8, I-13, table 1.4-2, table
19:31:07 5 2.8.1-1, and so on. The point being, seismic
6 activity is a concern when siting LNG
7 terminals. In western Washington and Oregon,
8 seismic activity is well-known and not taken
9 lightly. Seismic-related hazards, beginning on
19:31:29 10 page 4-9 and going through page 4-13, includes
11 a list of recommendations that indicate a
12 heightened level of concern regarding the
13 location of the terminal. However, under
14 section 4.1.4.3, geological hazards, and on
19:31:48 15 page 4-22, seismic-related hazards, the same
16 regard is not given to the proposed pipeline.
17 I quote: "Given that the proposed
18 pipeline route does not cross any known active
19 faults, earthquakes and associated seismic
19:32:05 20 risks are not anticipated to have significant
21 impact on the proposed pipeline."
PM3-31 22 The Nesqually earthquake occurred February
23 28, 2001, is conspicuously missing from this
24 report. That particular earthquake caused
19:32:22 25 widespread damage from south of Portland to
42
19:32:25 1 Tacoma, Washington. Bridges and buildings were
2 damaged, including the dome of the Washington
3 state capitol building in Olympia, the area of
4 the greatest damage as well as near the
Page 36

PM3-31 The Nisqually earthquake has been added to section 4.1.3.3.

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PM3-31
cont'd

PM3 RN-110607-FERCpm.txt

19:32:36 5 epicenter, which registered 6.8 on the Richter
6 scale.
7 I was living in the Mill Creek area near
8 where the pipeline is proposed to come to
9 Cowlitz County. When the Nisqually earthquake
19:32:49 10 occurred, pictures were knocked off of walls,
11 books shaken out of cases, and dishes knocked
12 out of cabinets. My motor home shook like it
13 was sitting on a wave machine.
14 Yes, Mill Creek is a long way from
19:33:00 15 Olympia, but the Nisqually quake information
16 should have been taken into consideration and
17 included in the DEIS because it is a strong
18 piece of evidence to the vulnerability of this
19 area to seismic activity, including activity a
19:33:18 20 distance away. It is well reported that a
21 strong quake in the near future is predicted
22 for the area -- local vicinity.
23 The fact that while living in the Spokane,
24 Washington, area we joked about the big one
19:33:31 25 coming and eastern Washington becoming 43

19:33:33 1 shoreline property along the Pacific ocean is
2 no longer a joke, according to the
3 seismologists at the University of Washington.
4 It is rather shortsighted of NorthernStar and
19:33:45 5 the Federal Energy Regulatory Commission to not
6 have included this information and the
7 University of Washington studies.
8 Thank you.

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PM3 RN-110607-FERCpm.txt

9 MR. FRIEDMAN: Thank you for your
19:33:54 10 comments.

11 Richard Erickson.

12 MR. RICHARD ERICKSON: Good evening.

13 Thank you. I'm Richard Erickson.

14 E-R-I-C-K-S-O-N. I'm the executive director
19:34:09 15 for the Lower Columbia Economic Development
16 Council. I'm here to duress -- address the
17 economic development impact.

PM3-32 18 Our county is suffering from the loss of
19 timber revenues, fishing revenues, and we're
19:34:24 20 losing a lot of family-wage jobs. Our largest
21 employer, Jerry DeBriac Logging, has gone from
22 130 jobs to a hundred in the last two years.
23 Our county has gone from 80 employees to a
24 hundred because they've had to assume our
19:34:39 25 clinic, which is struggling at best. Our
44

19:34:43 1 county commissioners are in the throes of
2 having to deal with tight budgets at the time.

PM3-33 3 My board of directors of 13 has taken a
4 wait-and-see attitude about Bradwood Landing
19:34:54 5 over the last two and a half years. In
6 discussing with the Bradwood officials and
7 looking at the safety record, my board of
8 directors has determined that we want to
9 support the Bradwood Landing project for
19:35:05 10 several reasons, jobs being number one. The
11 Bradwood officials have committed to place
12 three tug boats on our waterfront, which would
Page 38

PM3-32 Comment noted.

PM3-33 Comment noted.

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PM3-33
cont'd

PM3 RN-110607-FERCpm.txt

13 amount to 35 union-paid, high-wage, family-wage
14 jobs. In addition, there could be possibly ten
19:35:21 15 to 15 jobs in our county working at the plant.
16 With that possibility would make Bradwood
17 Landing our fourth-largest employer.
18 If you've never worked in the county where
19 you had to deal with your fourth-largest
19:35:36 20 employer, it is huge when you're dealing with
21 the type of jobs that we are looking for here
22 in our county.

PM3-34

23 The other thing that Bradwood Landing
24 brings to our county is an opportunity for our
19:35:46 25 high school kids to go to work during the
45

19:35:49 1 construction project and to be able to be
2 trained and come out three years later as a
3 journeyman. We have -- one of our largest
4 exports is our youth. They leave, go off to
19:35:59 5 college, and never return. We have an
6 opportunity for our high school kids, through
7 the work force program, through Lower Columbia
8 College and the work force in Clatsop County,
9 to be able to be employed and then come out
19:36:10 10 with an education.

PM3-35

11 In addition, the Bradwood Landing
12 officials have made several commitments to
13 Wahkiakum County. Because we are not going to
14 receive the tax revenue that Clatsop County has
19:36:25 15 of possibly \$8 million, they have made a
16 commitment to us of \$100,000 a year until the
Page 39

PM3-34 Comment noted.

PM3-35 Comment noted.

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PM3-35 |
cont'd |

PM3 RN-110607-FERCpm.txt

17 plant is sited and then \$500,000 a year as long
18 as the plant is operating. They have come
19 through on the first two checks. They have
19:36:40 20 made several commitments to our county, and
21 they have fulfilled those commitments.
22 Consequently, we feel that the officials
23 of Bradwood Landing and NorthernStar have
24 fulfilled their commitments to us, and we feel
19:36:53 25 that the jobs are necessary and the education
46

19:36:56 1 to our children would be important to our
2 operations. So the board of directors of the
3 Lower Columbia Economic Development Council
4 supports the siting of Bradwood Landing for the
19:37:06 5 economic development opportunities. Thank you.
6 MR. FRIEDMAN: Thank you.
7 (Applause.)
8 MR. FRIEDMAN: Next is Kathleen
9 Gilbertsen.
19:37:23 10 MS. KAYRENE GILBERTSEN: Good evening.
11 Kayrene Gilbertsen. K-A-Y-R-E-N-E,
12 G-I-L-B-E-R-T-S-E-N.
13 MR. FRIEDMAN: Thank you for correcting
14 me. Speak a little louder.
19:37:35 15 MS. KAYRENE GILBERTSEN: I will. I live
16 on Puget Island. I am a native of Puget
17 Island. I own property within view of Bradwood
18 Landing.
PM3-36 | 19 I would like to say that I have followed
19:37:45 20 what NorthernStar has done and has said they
Page 40

PM3-36 Comment noted.

Public Meetings

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K-117

PM3-36
cont'd

PM3 RN-110607-FERCpm.txt

21 would do. They have come up -- they have
22 followed through with their promises to our
23 community. I have followed the information
24 that we've received in the newspapers regarding
19:38:00 25 other plants. I have read what firemen have
47

19:38:04 1 said who have gone to Savannah, come back, and
2 said we can -- we can deal with this.
3 As far as fear, nobody wants something in
4 your own backyard. You'd always like it to be
19:38:16 5 in someone else's. So that tells me that
6 perhaps we're not so opposed to liquid natural
7 gas; we're just opposed to having it in our
8 neighborhood. Let's send it to California.
9 The fact that there is a plant in Boston,
19:38:34 10 in Savannah, and an LNG plant docking every 18
11 hours in Tokyo makes me feel pretty safe about
12 the future of Bradwood Landing, and I think we
13 have more to fear by riding the ocean of fear.
14 Thank you very much.
19:38:54 15 MR. FRIEDMAN: Thank you.
16 (Applause.)
17 MR. FRIEDMAN: You know, let's not applaud
18 or cheer. Let's be neutral. Thanks. Show
19 everyone the same respect. I appreciate that.
19:39:02 20 Gary Gilbertsen.
21 MR. GARY GILBERTSEN: Gary Gilbertsen from
22 Puget Island. I'm a retired commercial
PM3-37 23 fisherman and school teacher. The LNG
24 terminals in this country and worldwide have an
Page 41

PM3-37 Comment noted.

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PM3 RN-110607-FERCpm.txt

PM3-37 19:39:24 25 excellent safety record. The pipeline comes
cont'd 48

19:39:29 1 from Canada going south, goes through Cowlitz
2 County with lines that go under city streets,
3 providing gas for homes and businesses. There
4 is a line that goes from port westward to PG &
19:39:46 5 E's gas-fired plant, and all of these have had
6 good safety records. There's been no accidents
7 within my memory.

PM3-38 8 As far as the environment, this river has
9 been industrialized since the 19th century, and
19:40:09 10 although the fish runs are down from their
11 previous past numbers, they have been stable
12 for a number of years. There is wildlife that
13 doesn't seem to be affected by places like the
14 pulp mill like the old Wauna mill site or other
19:40:29 15 industries. We have ospreys that we didn't
16 have when I was a child, bald eagles, and
17 numerous other birds and wildlife, white-tailed
18 deer, variety.

19 So seems to me that -- that there isn't a
19:40:53 20 problem with building a plant at Bradwood
21 Landing, a former mill site. Thank you.
22 MR. FRIEDMAN: Thank you for your
23 comments.
24 Richard Beck.

19:41:11 25 MR. RICHARD BECK: I've got some
49

PM3-38 Comment noted.

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K-119

19:41:12 1 PM3 RN-110607-FERCpm.txt
supporting documents and stuff.
2 MR. FRIEDMAN: You can give them to me,
3 and I'll put it in the record.
4 MR. RICHARD BECK: Okay.
19:41:21 5 MR. FRIEDMAN: Thank you.
6 MR. RICHARD BECK: My name is Richard
7 Beck, and I live on Puget Island with my
8 family.
9 MR. FRIEDMAN: Richard, spell your last
19:41:36 10 name for the court reporter.

PM3-39

11 MR. RICHARD BECK: B-E-C-K.
12 On Saturday, January 30th, 1965, at 1:20
13 in the morning, after weeks of heavy rain, the
14 cliff near Bugby Hole gave way and crashed into
19:41:47 15 the Columbia River. A huge wave was generated,
16 which surged across and washed over a section
17 of the Puget Island dike, killing Haakon
18 Gabrielsen, age 59, as it destroyed his house.
19 Other homes were damaged, including those of
19:42:01 20 Fred Aegerter and Tom Irving. Extensive damage
21 was done to the dikes, sloughs, and crops
22 planted nearby.
23 Representatives from the Army Corps of
24 Engineers, Representative Jody Butler Hansen,
19:42:10 25 and other state and county agencies met to
50

19:42:13 1 assess the area's needs. All of this, along
2 with pictures showing the slides and damages,
3 were reported on the front page of Wakiakum
4 Eagle on February 4th, 1965.

PM3-39 Information regarding the 1965 landslide has been added to section 4.1.3.3.

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PM3-39 19:42:23 5 PM3 RN-110607-FERCpm.txt
cont'd 6 Many concerned local residents, myself
7 included, have previously testified regarding
8 this event, which happened only a few hundred
9 yards from the Bradwood Landing liquified
10 natural gas terminal. It appears, although I
11 cannot find a clear diagram of the proposal,
12 that the plan is to drill horizontally and run
13 their pipeline right through the base of that
14 very cliff.
15 What was FERC's response to our testimony?
16 Quoting from page 4-9 of the DEIS: We received
17 comments about a landslide that reportedly
18 occurred in 1965 upriver of and adjacent to the
19 Bradwood Landing site. We were unable to find
20 information regarding such a landslide
21 occurring in 1965. In addition, a review of
22 aerial photographs from various intervals
23 dating back to 1948 did not reveal any
24 indications of landslides occurring within a
25 one-mile radius of the site.
19:43:07 25 So what was their problem? All someone
51

19:43:09 1 had to do was walk into the local paper of
2 record and ask publisher Eric Nelson, whose
3 father probably wrote the original story and
4 took those pictures, if he had anything on a
5 slide in 1965 and they would have got what I
6 got in five minutes. Furthermore, the exposed
7 cliff is still visible, and anyone with an
8 elementary knowledge of geology can see that a

Public Meetings

3

K-121

PM3-39
cont'd

9 PM3 RN-110607-FERCpm.txt
slide has occurred there fairly recently.

19:43:29 10 If you've lived here for more than two
11 years, you know a basalt rockslide ends up
12 blocking SR4 every couple of years, taking
13 days, months, and sometimes even years to
14 clear, and it is impossible to prevent them
19:43:42 15 from happening.
16 Maybe that's it. No one from NorthernStar
17 or FERC is shown much interest in what it's
18 like to live around here -- the fishing, the
19 weather, the wildlife. Does this result in an
19:43:51 20 inability to really care what this terminal and
21 pipeline and all these tankers might really do
22 to us? Or is there maybe an agenda which is so
23 focused on seeing a permit awarded to knowingly
24 suppress any inconvenient evidence? Why has
19:44:04 25 Puget Island been left out of the background in
52

19:44:06 1 so many renderings of the facility? Just
2 ignore the potential problems until you get
3 your deal done?
4 My opinion has been all along that if a
19:44:13 5 regulatory agency really cared about the damage
6 from a magnitude-nine earthquake, huge floods
7 washing out the 500-foot-high ridge separating
8 Bradwood from the mighty Columbia, basalt
9 cliffs crashing into the river generating huge
19:44:24 10 waves, maybe even all this happening at once,
11 they wouldn't allow a terminal and a pipeline
12 to be sited there in the first place.

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PM3 RN-110607-FERCpm.txt
13 The Greeks had a concept called hubris,
14 which is just a cockiness which makes you
19:44:36 15 believe you can handle anything which might
16 come along. It was forever causing guys to end
17 up poking out their own eyes, or the gods
18 punishing them by having their liver eaten by
19 vultures for all eternity. The point was that
19:44:45 20 when you're playing with powerful forces, you
21 should have a little humility. Nobody really
22 knows how to prepare an LNG terminal for a
23 Cascadia Subduction Zone earthquake because
24 there hasn't been one in 300 years. But we're
19:44:56 25 due for one now. Don't you do something the
53

19:45:00 1 rest of us will all regret. Thank you.
2 MR. FRIEDMAN: Thank you for your
3 comments.
4 Craig Brown.
19:45:11 5 MR. CRAIG BROWN: I'm not going to bother
6 with this because I don't believe it's working
7 anyway. My name is Craig, C-R-A-I-G, Brown,
8 just like the color. I do not own property
9 along the pipeline. I'm speaking as an
19:45:22 10 individual. I'm glad Mr. Lewis made the
11 remarks that he made. It's a good opening for
12 me.

PM3-40 13 I can't imagine what jobs would be
14 worth -- would trump public safety. Public
19:45:34 15 safety seems to be the most critical issue of
16 all concerning this site and those ships coming

Page 46

PM3-40 To make the Columbia River suitable for the type and frequency of LNG marine traffic associated with the Bradwood Landing Project, additional measures as described in the WSR will be necessary to responsibly manage the navigation, safety, and security risks.

PM3-40 17 PM3 RN-110607-FERCpm.txt
 cont'd 18 up the river. This is not like Boston Harbor
 19 out here. That's a narrow a channel out there.
 19:45:48 20 It is so narrow in many places that you, with a
 21 good arm, could throw a rock and hit a ship as
 22 it passes by. This is very different from
 Boston Harbor.

PM3-41 23 There are issues in the draft EIS that
 24 concern mitigation of fire hazards because we
 19:45:59 25 have to consider the possibility of a rupture
 54

19:46:02 1 or a leak. It can happen. Whether
 2 intentionally or accidentally, it can happen.
 3 The draft EIS suggests that it can be mitigated
 4 with tugboats with firefighting equipment on
 19:46:15 5 them.

6 I retired from the San Francisco Fire
 7 Department. I've had extensive training with
 8 the state fire marshal's office, but I was
 9 never allowed to serve on the fire boats
 19:46:25 10 because the specialized training that goes into
 11 the officers and firefighting crews on those
 12 ships is so specialized that if you haven't got
 13 the qualifications, you don't get to be
 14 assigned there. Fighting marine fires is
 19:46:38 15 highly specialized.

16 Crews on tugboats, regardless of the
 17 equipment that they may have around them, are
 18 not going to be able to deal with this kind of
 19 a situation. And besides that, the ships
 19:46:49 20 cannot get into -- the tugboats cannot get into

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PM3-41 In-transit firefighting has been identified as a resource gap in the WSR. A plan for managing firefighting, including response procedures, resources, and requirements must be developed and approved.

Public Meetings

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PM3-41
cont'd

PM3 RN-110607-FERCpm.txt

21 position in order to mitigate -- that is, to

22 put up a fire screen -- if they cannot position

23 around the ships. When you have a narrow

24 channel, the tugboat is either going to precede

19:47:01 25 or follow the big ships in those narrow areas.

55

PM3-42

19:47:04 1 And then there's that problem with the

2 marine layer. We have a marine layer that

3 comes down this river quite a bit. In fact, we

4 had it this morning, if you remember. When

19:47:14 5 that vapor cloud from a leak comes across that

6 cold river, with all the experience and all the

7 equipment in the world, you will not be able to

8 see the vapor cloud; not until it gets over

9 land, not until it begins to warm and return to

19:47:28 10 methane its ambient natural state will you

11 finally find it getting through an ignition

12 source. Then you'll see the vapor cloud

13 because then the flammability will read right

14 back to the source.

19:47:40 15 We have to be realistic about what can be

16 mitigated. The draft EIS does not deal

17 realistically with how we can mitigate fire

18 hazards from that facility or a rupture of a

19 tank along the passage of the river.

19:47:53 20 Thank you.

21 MR. FRIEDMAN: Thank you.

22 Karen Berteach.

23 MS. KAREN BERTROCH: My name is Karen --

24 is this one working? Or is this one working?

Page 48

PM3-42 An analysis of the hazards to spills from an LNG carrier is discussed in section 4.11.5.3.

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K-125

19:48:10 25 PM3 RN-110607-FERCpm.txt
MR. FRIEDMAN: Yes, the first one was.
56

19:48:11 1 MS. KAREN BERTROCH: Hello. My name is
2 Karen Bertroch, B-E-R-T-R-O-C-H.
3 MR. FRIEDMAN: Thank you for correcting.

4 MS. KAREN BERTROCH: That's fine. I come
19:48:19 5 representing myself, no entity other than being

PM3-43

6 a landowner in Grays River. Grays River is a
7 highly terroir fish with the Lower Columbia
8 Fish Recovery Board because we carry several
9 species of endangered fish. We have a huge
19:48:32 10 flooding issue out there, and we have a very
11 hard time finding funding.

12 I am excited that if the permit goes
13 through, there is additional money available
14 for fish habitat restoration that is not
19:48:43 15 required by mitigation. There is an additional
16 big fund that has been given to the Fish
17 Recovery Board that will be used strictly for
18 fish habitat restoration and monitored, given
19 out, and taken care of by the Fish Recovery

19:48:56 20 Board. The Fish Recovery Board is highly
21 respected, assigned by the State, and we're
22 excited to have that funding available.

PM3-44

23 I am also pleased that the
24 NorthernStar/Bradwood Landing folks have
19:49:08 25 already given significant funding to the area.
57

19:49:12 1 30,000 went to Puget Island last year, 30,000
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PM3-43 Comment noted.

PM3-44 Comment noted.

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PM3-44
cont'd

PM3 RN-110607-FERCpm.txt

2 to the Cathlamet fire department, and this year
3 they have authorized already \$37,000 for a much
4 needed radio study for the Sheriff's Department
19:49:24 5 that the County absolutely does not have the
6 funding to meet. Many of our areas do not have
7 radio coverage for our volunteer firemen. This
8 is an exceptionally important study.

PM3-45

9 In my experience, I have seen here in this
19:49:36 10 county a great deal of fear, a great deal of
11 raising of red flags, but I come from a place
12 where, in Alaska, we fought the pipeline tooth
13 and nail. And I'll tell you, it didn't hurt a
14 thing really. The caribou understood it, and
19:49:55 15 the decision is going to have to be made to
16 rebuild it or not, but we fought that pipeline.
17 And I learned a hard lesson: That if we
18 compromise with nature, we can all win.
19 Thank you.
19:50:04 20 MR. FRIEDMAN: Thank you for your
21 comments. Paul Vik.
22 MR. PAUL VIK: I'm going to pass.
23 MR. FRIEDMAN: All right. Before we go on
24 -- Robert Kiser, are you here? Robert, did you
19:50:17 25 speak at any of the earlier meetings?
58

19:50:19 1 MR. ROBERT KISER: No, I did not.
2 MR. FRIEDMAN: All right. Please come up.
3 It's your turn.
4 MR. ROBERT KISER: I hope you didn't get
19:50:31 5 me mixed up with my wife.
Page 50

PM3-45 Comment noted.

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PM3 RN-110607-FERCpm.txt

6 Robert Kiser, K-I-S-E-R; landowner on the
7 pipeline, supposedly. I don't know for sure
8 where the pipeline's going to be, but it
9 potentially can impact me about seven and a
19:50:49 10 half acres of temporary right-of-way and close
11 to three and a half acres of primary
12 right-of-way if it's located where I think it's
13 going to be.

14 I will be providing you with written
19:51:05 15 testimony by December 24th. You'll have to
16 shut me off at probably three minutes because
17 I'm going down through page and paragraph in
18 the DEIS where I have found problems.

PM3-46

19 Page ES-5, you state that the technical
19:51:27 20 review identified several areas of concern with
21 respect to the proposed facility, and we
22 identified specific recommendations be
23 addressed by NorthernStar prior to site
24 preparation. I cannot understand why that is
19:51:46 25 not a requirement in the DEIS. If we are going
59

19:51:50 1 to provide input related to this DEIS and the
2 decisions that are being made, then we need to
3 have that opportunity up front, not before
4 construction, not before some other EIS or
19:52:06 5 whatever. We will not have that opportunity
6 after this presentation.

7 Page ES-4, first paragraph, you state
8 National Marine Fishery Service and Fish and
9 Wildlife Service has some questions --
Page 51

PM3-46

See our response to comment PM1-2. We have recommended that no construction be allowed until after we have revised our BA, formally consulted with the FWS and NMFS, and completed compliance with the ESA.

PM3 RN-110607-FERCpm.txt

PM3-46 19:52:21 10 additional information that means you will be
cont'd 11 revising your EHA assessment and BA. Your
12 revision needs to be part of the DEIS so that
13 the public can respond intelligently to the
14 impacts of the T and E species.

PM3-47 19:52:38 15 Page ES-7, you state that the U.S. Coast
16 Guard will issue an LOR finding including
17 recommendations that may, may, include
18 conditions. Here again it leaves it up to the
19 NorthernStar discretion to implement all the
19:52:53 20 U.S. Coast Guard identified safety conditions.
21 It should be a requirement of the DEIS. How
22 can you adequately evaluate -- evaluate
23 navigational and community safety without it?

PM3-48 24 Page ES-8, how can you conclude that the
19:53:11 25 construction and operation of Bradwood Landing
60
19:53:13 1 project has a potential for limited significant
2 environmental impacts when the National Marine
3 Fishery Service and Fish and Wildlife Service
4 are still requesting additional information and
19:53:26 5 haven't identified the impact on federally
6 listed species?

PM3-49 7 Page 1-25, I specifically mentioned at a
8 scoping meeting, along with others, the
9 unstable sales along the proposed pipeline
19:53:41 10 route. Nothing is mentioned here.

PM3-50 11 Page 1-3, purpose and need. How can you
12 deliver natural gas to Williams Northwest
13 interstate pipeline system when it is fully
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PM3-47 Conditions of the Coast Guard LOR and the FERC certificate would not be discretionary – they would be requirements.

PM3-48 We believe that implementation of the FERC staff's Plan and Procedures, our recommendations, and NorthernStar's ESC Plans and SWPPP would result in the project having limited significant environmental impacts. As stated in section 4.6.3, the FERC would not allow construction to begin if either the FWS's or NMFS's BO finds that the project would result in the destruction or adverse modification of designated critical habitat.

PM3-49 Information regarding the landslide that occurred in 1965 approximately one-half mile from the proposed LNG terminal site has been added to section 4.1.3.3. The geologic conditions at this location are not the same as at the LNG terminal location.

PM3-50 See our response to comment PM1-10.

PM3 RN-110607-FERCpm.txt

14 subscribed?
 PM3-51 19:53:56 15 Page 1-6, permits approval and regulatory
 16 requirements. FERC is also required to follow
 17 the NEPA process. NEPA is excluded from
 18 statements regarding regulatory requirements
 19 for you.

PM3-52 19:54:12 20 Page 2-122.1.215, the discussions
 21 concerning 1500 recreational fishing boats used
 22 in the Columbia River in a year. It is a very
 23 poor way of determining use. Besides the
 24 number being low, the use needs to be expressed
 19:54:32 25 in user base to determine accurate description
 61

19:54:36 1 of total use. Charter boats, for example, can
 2 be on the Columbia for eight hours a day. It
 3 is not uncommon for recreational fishing boats
 4 to spend five hours a day on the river. In
 19:54:46 5 addition, a person who fishes the Columbia
 6 usually takes more than one trip per year. For
 7 example, I took 17.

8 MR. FRIEDMAN: Okay. Can I ask you to
 9 wrap it up?

19:54:57 10 MR. ROBERT KISER: Wrap up?

11 MR. FRIEDMAN: Yep.

12 MR. ROBERT KISER: Going to hear the rest
 13 of it tomorrow night.

14 MR. FRIEDMAN: That's fine. And you're
 19:55:03 15 going to send in detailed written comments.

16 MR. ROBERT KISER: Which one do I pick? I
 17 might as well keep going.
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PM3-51 The FERC is meeting its NEPA obligations through this EIS process.

PM3-52 Section 4.8.1.7 has been revised to correct the number of recreational fishing boats.

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PM3 RN-110607-FERCpm.txt

PM3-53 18 Survey and staking. It is unclear if
19 survey and staking occurs before clearing
19:55:16 20 operation begins or before construction of
21 trench. Property surveys and wood (inaudible)
22 need to be marked and protected throughout all
23 phases of construction. All phases of
24 construction must operate within the
19:55:27 25 right-of-way or with approval of landowner.
62

19:55:30 1 This should include all equipment, including
2 egress and ingress, over approved access road.
3 Thank you.
4 MR. FRIEDMAN: Thank you for your
19:55:38 5 comments. We'll address those comments in the
6 FEIS.
7 Now we've reached the part where the only
8 people who have signed up are people who have
9 already spoken. So I want to ask, is there
19:55:51 10 anyone in the room who has not spoken yet, who
11 did not speak at a previous meeting, who wants
12 to speak?
13 I didn't see any hands go up, so I'm going
14 to call Gayle Kiser up.
19:56:09 15 Gayle, did you ask me for a hard copy of
16 the DEIS?
17 MS. GAYLE KISER: No. I have a hard copy
18 of the DEIS.
19 I'll try to speak specifically -- oh,
19:56:20 20 excuse me. Gayle Kiser. That's K-I-S-E-R.
21 Pipeline landowner. I'll speak specifically
Page 54

PM3-53 Our discussion of general pipeline construction techniques is included in section 2.4.2.1. In addition, we have recommended in section 5.2 that NorthernStar employ at least one EI per spread during construction of the proposed project to ensure equipment remains inside the approved construction work area, including access roads.

		PM3 RN-110607-FERCpm.txt	
PM3-54	22	tonight. Last night I spoke generally.	
	23	Addressing Section 3.1, FERC alternatives,	
	24	nowhere in the evaluation criteria is the	
	19:56:38 25	effect on human population taken into	63
PM3-55	19:56:41 1	consideration. The question: Can we do it?	
	2	Yes. Should we do it? No.	
	3	Section 3.1.1, the no-action alternative.	
	4	Where is the data to support claims of expanded	
	19:56:54 5	need for natural gas? The sources cited are	
	6	not independent but industry-related. How can	
	7	a claim be made that LNG will lower prices?	
	8	Where is the economic study to support this	
	9	assertion?	
PM3-56	19:57:06 10	Section 3.1.1.2, increased efficiency in	
	11	conservation. Energy conservation should be	
	12	encouraged. A study by the Natural Resources	
	13	Defense Council recently showed that we could	
	14	reduce our use of natural gas by 12 percent	
	19:57:22 15	merely by using today's technology. Why state	
	16	that the United States' production is declining	
	17	when there are plans under way to build a new	
	18	pipeline from the Rockies to the Northwest?	
PM3-57	19	Section 3.1.8.1, major pipeline route	
	19:57:37 20	alternatives. Too much weight is being given	
	21	to the project objective, getting gas from	
	22	Bradwood Landing to potential markets. Without	
	23	an independent needs assessment, this is a	
	24	subjective opinion. The Palomar pipeline must	
	19:57:50 25	be included in this assessment. Where is the	

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- PM3-54 The alternatives analysis did address impacts on the human population by considering such factors as population density and visual impacts. A more detail discussion of the project's potential impacts on regional population may be found in sections 4.7 and 4.8 of the final EIS.
- PM3-55 Section 3.1.1 of the final EIS has been modified to briefly address the need for natural gas. A more detailed discussion of project need can be found in section 1.1. There are multiple independent studies cited in this EIS that suggest that bringing in additional new supplies of natural gas to the region in the future will help to stabilize prices.
- PM3-56 Section 3.1.1.2 describes why we believe increased conservation does not provide an alternative to the proposed project, but rather a complementary component of the overall energy demand and supply mix. As explained in section 1.1, estimates from the EIA indicate that domestic natural gas production from conventional onshore sources will decline in the future, while there would be increased production from unconventional sources, such as coalbed methane produced in the Rocky Mountains. Section 3.1.2.2 discusses newly proposed jurisdictional interstate pipelines that could transport Rocky Mountain gas to the West Coast as system alternatives to the Bradwood Landing Project.
- PM3-57 As explained in the beginning of section 3.1, the project objective is key to the alternatives assessment because an alternative must be able to meet the project's objective. The Palomar pipeline is discussed as a system alternative in section 3.1.2.2 (see our response to comment PM1-24). There is a brief summary of the need for this project in section 1.1 of the EIS. However, the Commission will make its independent assessment of need in the project Order.

PM3-58 19:57:53 1 data to support the assertion that an HDD bore
2 of the Columbia River at Bradwood is
3 unconstructable?

PM3-59 4 Table 3.1.8-2 discusses the alternative
19:58:05 5 route from entry pit of the HDD bore hole that
6 would cross the Cowlitz River. I am intimately
7 acquainted with this property, and I can tell
8 you there are no oak trees that would be
9 disturbed. The alternative will take out our
19:58:19 10 pear trees. The power line right-of-way that
11 is mentioned is now abandoned, and access is
12 under control of the landowner.

PM3-60 13 Section 4.1.4.1, stratigraphy. Landslide
14 areas have not been adequately identified. The
19:58:33 15 pipeline is proposed to cross an ancient debris
16 area on our property that was deemed too

PM3-61 17 unstable for housing construction. The Cowlitz
18 River crossing will involve the Ostrander
19 protection zone that the Burlington Northern
19:58:46 20 had to drive pilings more than 100 feet deep to
21 reach solid rock.

PM3-62 22 The nearby K8 pipeline crosses the north
23 end of our property. Neighbors had to move
24 their house because of a land movement caused
19:58:58 25 by the installation of that pipeline, and it is
65

19:59:00 1 under monitor now and was last moved in April

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3

PM3-58 NorthernStar did not consider an HDD directly from its proposed Bradwood Landing LNG terminal to Wahkiakum County, Washington because of the width of the Columbia River at that location. A crossing at the terminal would place the pipeline at the town of Cathlamet, and a pipeline route east from there to an interconnection with the existing Williams Northwest system near Kello would have to traverse extremely rough, hilly terrain.

PM3-59 The FERC prefers a route for a new pipeline that follows an existing right-of-way, such as the abandoned power line corridor to be utilized by Route Variation NS-8 in the vicinity of MP 33.9. NorthernStar has committed to working with landowners to preserve mature trees (see section 4.7.1.15). The specifics of adjusting the pipeline alignment to avoid mature trees would be negotiated through easement agreements. The text in the EIS has been revised to indicate that the power line right-of-way is now abandoned.

PM3-60 We have recommended in section 4.1.4.3 that NorthernStar conduct additional field mapping and subsurface investigations as needed to develop a Final Pipeline Design Geotechnical Report. Unstable areas that have not yet been identified would be identified at that time and design measures would be required to mitigate potential damage due to unstable slopes.

PM3-61 Due to the ductile nature and buoyancy of pipelines, pilings are not required for structural support as they are with other structures such as railroads and buildings.

PM3-62 See our response to comment PM3-60.

PM3-63 2 PM3 RN-110607-FERCpm.txt
and May of this year.

3 Page 4.22 -- excuse me -- 4-22. seismic
4 related hazards, quote: "The proposed pipeline
19:59:14 5 would cross a seismic hazard area between
6 milepost 34 and 35." Again, I'm intimately
7 acquainted with that area. This area is likely
8 delineated as a seismic hazard area based on
9 the potential for liquefaction of the soils
19:59:28 10 within the flood plain. It changes every year.
11 The high water comes and goes, and that section
12 of the river changes every year.

PM3-64 13 quote: "In recent history, no accounts of
14 damage to any existing pipelines have been
19:59:44 15 documented in the project area." And we just
16 heard previous testimony about how safe these
17 lines are.
18 Someone is not taking into account the two
19 explosions at the Williams pipeline within the
19:59:57 20 last 12 years, one in Castle Rock, one in
21 Kalama, both due to land movement. I know
22 about them. I watched both of them from my
23 house. Last winter the Williams pipeline fell
24 into the Toutle River. No accounts of damage?
20:00:12 25 I beg to differ.

66

20:00:15 1 MR. FRIEDMAN: Thank you for your
2 comments.
3 Next is Daniel Serres.
4 MR. DANIEL SERRES: Last name is spelled
20:00:40 5 S-E-R-R-E-S.

Public Meetings

3

PM3-63 Changes in the river level between MPs 35 and 35 would not affect the pipeline.

PM3-64 See our response to comment PM2-16.

PM3-65 6 PM3 RN-110607-FERCpm.txt
 7 I want to begin by saying that you pointed
 8 out at both meetings, Mr. Friedman, that FERC
 9 is not a sponsor of the project. While that
 10 may be true, we have to wonder about Natural
 20:00:51 11 Resource Group a little bit because they are
 12 also doing review for the Palomar pipeline.
 13 They're not working for FERC; they're working
 14 for Palomar pipeline. Because these two
 15 pipelines being so closely related, you have to
 20:01:05 16 question if there is not a conflict of interest
 17 from Natural Resource Group in participating in
 18 both projects, one as the agency-regulated
 19 project and the other as agency -- or as a
 20:01:17 20 proponent of the project itself. I just wanted
 to point out that problem.

PM3-66 21 I want to echo everything that's been said
 22 about public safety, the limited response
 23 capabilities. Sections 4.8.2.6 and 4.8.3.6,
 24 the findings regarding public safety.
 20:01:33 25 Basically the resources available to safeguard
 67

20:01:37 1 the public along the pipeline and along the
 2 terminal are totally inadequate. The problem
 3 is you failed to disclose the potential and
 4 reasonable and foreseeable incidence that
 20:01:47 5 happen along the pipeline, like Gayle talked
 6 about having seen two of them from her house.

PM3-67 7 And in doing that, you also failed to
 8 assess what can be responded. There's sort of
 9 a laundry list in there, fire department here,

Public Meetings

3

PM3-65 The FERC has determined that Natural Resource Group, LLC (NRG) does not have an Organizational Conflict of Interest (OCI) by working on both the Bradwood Landing Project and the Palomar Project. When the issue of an appearance of OCI was raised, the FERC required that NRG separate staff and offices between the projects. The letters to and from the FERC and NRG on this subject are a matter of record, and have been placed in the public file for this proceeding.

PM3-66 See our responses to comments PM2-16 and PM3-8.

PM3-67 See our response to comment PM1-1.

Public Meetings

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K-135

PM3-67
cont'd

PM3 RN-110607-FERCpm.txt

20:02:00 10 fire department there, and there's nowhere that
11 provides a reasonable narrative that describes
12 how the public is supposed to be protected, how
13 the public will respond, and again, mitigation
14 of public safety impacts, mitigation required,
20:02:12 15 to be likely to meet the community standard for
16 mitigation, for being included in the DEIS.
17 The Coast Guard has identified -- and I
18 quote from 4.8.2.6 -- significant gaps exist in
19 firefighting capability for both shore and
20:02:26 20 waterside firefighting response. The same is
21 true on the pipeline. So FERC is not
22 disclosing the real impacts both in costs and
23 increased risks in this NEPA document. That's
24 a failure to comply with NEPA.

PM3-68

20:02:40 25 I'd also point out that the salmon 68

20:02:43 1 enhancement initiative -- I want to switch to
2 fish issues now. The SEI is too vague to be
3 measured with a guaranteed real value to salmon
4 at this point. What we do know is that
20:02:56 5 NorthernStar is essentially proposing to create
6 essentially a blender in the middle of the
7 Columbia River, both in construction and in
8 continued operation, to have tugs operating in
9 the Columbia River with their powerful
20:03:06 10 thrusters, having a vessel turning in that
11 area, ongoing maintenance dredging.
12 The compensatory mitigation measures are
13 not adequately described in section 4.6.2.2.

PM3-68 The SEI is discussed in the response to comment FA4-12.

While every effort would be made to avoid or minimize aquatic resource impacts resulting from construction and operation of the proposed LNG terminal, some unavoidable impacts would occur (see section 4.5.2.1). These unavoidable impacts would be compensated for through implementation of NorthernStar's Compensatory Mitigation Plan. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. The revised plan will be submitted to the NMFS and FWS as part of the FERC's BA and EFH Assessment. The FERC would not allow construction to begin until after we have concluded formal consultation with the FWS and NMFS.

Public Meetings

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PM3-68
cont'd

PM3 RN-110607-FERCpm.txt

14 The table that goes through the impacts to
20:03:19 15 salmon repeatedly states, unavoidable impacts
16 will be mitigated to implementation of
17 NorthernStar's mitigation plan.
18 While that sounds fine, but that fails to
19 lay out again a narrative of how impacts that
20:03:34 20 are very serious and very likely to disturb
21 salmon habitat used for rearing and migration
22 through both -- basically at the head of the
23 channel, how those impacts would be mitigated
24 in place, in kind, and in time. And it's very
20:03:50 25 important that we realize the extreme

69

20:03:53 1 significance of this area of the river, with 13
2 listed fish species passing through this very
3 point in the river. It's an incredibly
4 important chill point. An estuary that is now
20:04:05 5 widely recognized to be --
6 MR. FRIEDMAN: Let's wrap it up.
7 MR. DANIEL SERRES: -- the linchpin to
8 recovery in the estuary.
9 So to conclude, I will say the DEIS fails
20:04:14 10 to comply with NEPA in disclosing impacts to
11 both safety, public service, to threatened
12 salmon species. Impacts to public safety and
13 fisheries are both more significant than their
14 characterization in the DEIS and to the impacts
20:04:24 15 like the 50 acres in the middle of salmon
16 habitat are unmitigable. Thank you.
17 MR. FRIEDMAN: Thank you for your

Public Meetings

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PM3 RN-110607-FERCpm.txt
 18 comments. We're going to address most of what
 19 you had to say in the FEIS. There is one
 20:04:34 20 comment you said at the beginning that I want
 21 to address right now. You can sit down,
 22 Daniel.
 23 Daniel raised the issue that we just found
 24 out about that NRG is working for the FERC as
 20:04:45 25 our third-party environmental contractor on the
 70

20:04:49 1 Bradwood Landing project. They've served this
 2 role for almost three years. Over two years.
 3 Palomar is a brand-new project, just was
 4 authorized for the initial prefilling process
 20:05:09 5 only recently, and so we've only recently
 6 discovered that NRG is working for Palomar as
 7 its private consultant. We wrote -- "we,"
 8 meaning the FERC -- has written a letter to NRG
 9 questioning this apparent conflict of interest
 20:05:26 10 and asking NRG to file new conflict-of-interest
 11 forms for our attorneys to review.
 12 NRG has only recently responded to that
 13 letter with new forms, and our attorneys are
 14 reviewing those forms to make certain that
 20:05:40 15 there is no legal conflict of interest.
 16 MR. DANIEL SERRES: Are those documents
 17 public?
 18 MR. FRIEDMAN: I believe the letter to NRG
 19 is public, yes.
 20:05:52 20 Everyone who signed the sign-up list has
 21 had an opportunity to speak. Is there anyone

Public Meetings

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K-138

PM3 RN-110607-FERCpm.txt
22 who has not spoken who wishes to?
23 That being the case, on behalf of the
24 FERC, I would like to thank all of you for
20:06:08 25 being here tonight, providing us with your
71
20:06:10 1 comments on our draft Environmental Impact
2 Statement for the Bradwood Landing LNG project.
3 Let the record show that this meeting concluded
4 at approximately 8:05 p.m. Thank you.
10:02:47 5 (MEETING ADJOURNED AT 8:05 P.M.)
6 (NOTE: Untranscribed steno notes archived ten
7 years on computer; transcribed English files
8 archived five years on computer.)
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22	* * *	
23		
24		
25		73

1 CERTIFICATE
2 I, Robin L. Nodland, a Washington
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PM3 RN-110607-FERCpm.txt

3 Certified Shorthand Reporter, an Oregon
4 Certified Shorthand Reporter, a Registered
5 Diplomat Reporter, and a Certified Realtime
6 Reporter, do hereby certify that I reported in
7 stenotype the proceedings had upon the hearing
8 of this matter, previously captioned herein;
9 that I transcribed my stenotype notes through
10 computer-aided transcription; and that the
11 foregoing transcript constitutes a full, true
12 and accurate record of all proceedings had
13 during the hearing of said matter, and of the
14 whole thereof.

15 Witness my hand at Portland, Oregon, this
16 26th day of November, 2007.

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Washington CSR No. 2530
Oregon CSR No. 90-0056

□

PM4 RN-110707-FERCam.txt

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1 U.S. DEPARTMENT OF ENERGY
 2 FEDERAL ENERGY REGULATORY COMMISSION
 3
 4 BRADWOOD LANDING LNG PROJECT
 5 FERC DOCKET NUMBERS CP06-365 and 366
 6
 7

8 PUBLIC MEETING
 9 TRANSCRIPT OF PROCEEDINGS
 10 * * *
 11
 12

13 Wednesday, November 7, 2007
 14 9:00 a.m.
 15

16 Cowlitz County Expo and Conference Center
 17 1900 7th Avenue
 18 Longview, Washington
 19 * * *
 20

21 BEFORE: Mr. Paul D. Friedman
 22 Federal Energy Regulatory Commission
 23 Office of Energy Projects
 24 * * *
 25

□

2

1 P R O C E E D I N G S
 2

3 MR. FRIEDMAN: All right. We have a sound
 Page 1

Public Meetings

Public Meeting Transcript of Proceedings
Wednesday, November 7, 2007, 9:00 a.m.
Longview, Washington

The introductory comments for this public meeting are not included in the FEIS because they are very similar to those of the Monday, November 5, 2007, 6:30 p.m. meeting in Cathlamet, Oregon, which are included. The complete transcript of the Tuesday, November 6, 2007, 6:30 p.m. meeting in Clatskanie, Washington can be obtained at the FERC's internet website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP06-366). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll free at 1-866-208-3676, or for TTY, contact (202) 502-8659.

Public Meetings

Public Meetings

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PM4 RN-110707-FERCam.txt
 6 comments that cannot be summarized in those
 7 three minutes, we urge you to send in detailed
 8 written comments to the Commission.
 9 This is a meeting for you, the public, to
 09:23:51 10 comment on the DEIS. It is not a question-and-
 11 answer forum. Because many of our concerns are
 12 complex, the FERC staff would need to do
 13 additional research before addressing those
 14 issues in the FEIS. Therefore, I probably will
 09:24:04 15 not be able to give accurate and complete
 16 responses tonight to many of your questions. I
 17 will answer those questions if I know the
 18 answer to them, and I will address any
 19 questions having to do with administrative or
 09:24:15 20 process issues.
 21 Before we start hearing from speakers, I
 22 suggest we take a short, one-minute break in
 23 case any of you have not signed up with the
 24 speakers' list and wish to do so. Please go
 09:24:27 25 see Janelle, and we'll start again in about a
 □
 09:24:30 1 minute with you giving your comments. Thanks.
 2 (Recess at 9:24 a.m.)
 3 MR. FRIEDMAN: All right. Thanks for
 4 indulging me. We have a few that want to
 09:30:27 5 speak. Now I'm going to open the floor to
 6 individual comments. I ask that each speaker
 7 come up to the microphone that's right there.
 8 Hopefully it's working. We haven't tested it
 9 yet, but mine's working, so I assume that's
 09:30:40 10 going to work as well.

Public Meetings

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PM4 RN-110707-FERCam.txt
 11 I'd like you to state your name and spell
 12 your last name for the court reporter, identify
 13 any organization you may be representing. If
 14 you are a landowner along the pipeline route,
 09:30:51 15 please indicate where your property is
 16 according to mile marks. If you don't know
 17 what your mile marks -- where your property is
 18 by mile mark, there are some NorthernStar staff
 19 people in the back. You can ask them, and I'm
 09:31:03 20 certain that they know the location of your
 21 property.
 22 The first speaker we have signed up is
 23 John Philbrook.
 24 MR. JOHN PHILBROOK: Hi. John Philbrook.
 09:31:16 25 Last name is spelled P-H-I-L-B-R-O-O-K.

17

PM4-1 09:31:22 1 I represent the ILWU, International
 2 Longshore and Warehouse Union. I am the
 3 president here locally, Local 21, and also the
 4 area chairman of the Columbia River area. So I
 09:31:34 5 represent those longshoremen that work in the
 6 Columbia River. Roughly, a little bit less
 7 than a thousand people, longshoremen I should
 8 say. And our comments today are basically
 9 along these lines.
 09:31:45 10 After reviewing the EIS amongst ourselves,
 11 after observing the two things that are most
 12 important for us, for our livelihood, which are
 13 the commerce of the river, specifically, and
 14 navigation and also the safety of the river,
 09:31:59 15 after reviewing these things we don't see a

PM4-1 Comment noted.

PM4-1 cont'd

PM4 RN-110707-FERCam.txt

reason why FERC should not grant NorthernStar the opportunity for the LNG.

Those things alone are enough for us to make sure that, as long as these things aren't compromised, then to us, we don't have an issue with that, and we would recommend that FERC grant the project, to be able to go ahead and move forward. Thank you.

MR. FRIEDMAN: Thank you for your comments.

09:32:27

Also, if I mispronounce your name, please correct me.

Next is Kevin Smith.

MR. KEVIN SMITH: Good morning. I live by milepost 38 there. I'm right next to a pump station before it goes up to the Williams. I am a union laborer. I worked on -- worked for Rockford putting in the last one. I do have one question before I do any comments. Is that gas line going on the north side of the Beaver line or the south side?

MR. FRIEDMAN: NorthernStar, is there someone back there who knows the answer to that?

UNIDENTIFIED SPEAKER: I don't know the answer, but I'll get that information to you.

PM4-2

PM4-3

MR. KEVIN SMITH: Well, I was pleased with their last job. At the end I was laid off before they hit my property because I have all the water rights there. I have a 70-year-old

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18

Public Meetings

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PM4-2 Refer to Appendix B for pipeline location information.

PM4-3 We have recommended that on-site, third-party compliance monitors representing the FERC be present full-time during all pipeline construction phases (including restoration), and periodically during LNG terminal construction, to ascertain that the project is being built as outlined in this EIS, and in accordance with the environmental conditions of the FERC Order. Stumps or other debris would not be suitable backfill material and would not be used to fill in excavations created during pipeline construction.

PM4-3
cont'd

21 PM4 RN-110707-FERCam.txt
22 system that the company shrugged me off, and it
23 took me eight years to get everything back to
24 order myself. Last summer was the last thing
was done. I finally got my gates put in and my
road back.

09:33:46 25
□ 19

09:33:46 1 But the only comment and the only issue I
2 have is my water system, and they dug a 25-foot
3 hole and filled it up with stumps above it. Is
4 this going to be happening again, or are they
09:33:59 5 going to do a total cleanup like they're
6 supposed to, instead of the tail-end and just
7 get out of there? That's --

8 MR. FRIEDMAN: The answer is, they're
9 supposed to do a proper job of restoration, and
09:34:12 10 we'll have a third-party monitor checking on
11 them.

12 MR. KEVIN SMITH: This time, because as
13 soon as they got it in there, before the pump
14 station, they evacuated.

09:34:21 15 MR. FRIEDMAN: You're talking about -- for
16 those who don't know, I believe you're talking
17 about the KB pipeline.

18 MR. KEVIN SMITH: Beaver pipeline, yeah.

19 MR. FRIEDMAN: Yes. He's talking about a
09:34:29 20 different company. It's jurisdictional, but a
21 different company. We're going to have a
22 third-party monitor on site 24/7 to make
23 certain those kind of problems don't happen.

24 MR. KEVIN SMITH: All right. It was a
09:34:42 25 good job until the very last. That's the

□ 20
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Public Meetings

PM4 RN-110707-FERCam.txt

09:34:44 1 comments I have. Thank you.
 2 MR. FRIEDMAN: Thank you for your
 3 comments.
 4 Next is Rob Quoidbach. Please correct me
 09:35:00 5 if I got that wrong.
 6 MR. ROB QUOIDBACH: My name is Rob
 7 Quoidbach. It's Q-U-O-I-D-B-A-C-H.
 8 (Reporter requests clarification.)
 9 MR. ROB QUOIDBACH: Q-U-O-I-D as in dog, B
 09:35:39 10 as in Boston, A-C-H. Quoidbach, one word. I'm
 11 a property owner on mile 27 of the proposed
 12 pipeline.
 13 I have prepared a letter to send to the
 14 County regarding the EIS, and I -- if you don't
 09:35:53 15 mind, it's a very short letter, I will read it
 16 for my comments.
 17 MR. FRIEDMAN: Okay.
 18 MR. ROB QUOIDBACH: As a property owner
 19 with the KB pipeline running through
 09:36:01 20 three-quarters of a mile of my forest land,
 21 plus my experiences with a BS in civil
 22 engineering, 45 years as an industrial
 23 contractor, ten years as a docking district
 24 supervisor, and ten years on the Washington
 09:36:16 25 State Forest Practices Appeals Board, I feel
 □

21

09:36:19 1 well-qualified to criticize the pipeline
 2 portion of the DEIS.
 3 My tree farm at 230 -- 230 Grasset Poston
 4 Road will be adjacent to the proposed pipeline
 Page 17

PM4-4

Public Meetings

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PM4-4

If the proposed project is authorized by the FERC, NorthernStar would be required to implement an environmental complaint resolution procedure which would provide a method for landowners to identify environmental mitigation problems/concerns during construction of the project and restoration of the right-of-way. See our response to comment PM2-4.

PM4 RN-110707-FERCam.txt		
PM4-4 cont'd	09:36:36	5 for one-half mile and then impacted by it for
		6 one quarter of a mile. Maybe if we listen,
		7 history wouldn't have to repeat itself. I have
		8 experienced the false promises of the KB group
		9 to replant trees, to plant for wildlife, to
	09:36:51	10 maintain property screen, to clear only ten
		11 feet on top of the pipe, none of which happened
		12 because permits are granted and nobody follows
		13 up.
		14 The draft DEIS contains pipeline gray
	09:37:05	15 areas that need attention. 4.8, 3.5, that's a
		16 reference, tax revenues, page 4-351 states:
		17 Property taxes on the pipeline would be
PM4-5		18 assessed by and paid to Cowlitz County in
		19 Washington.
	09:37:26	20 Property taxes should be clearly specified
		21 as to real estate and personal property taxes.
		22 Current county policy unfairly charges the
		23 landowner for real estate taxes and the
		24 pipeline companies only for personal property
	09:37:41	25 taxes. In my case, three acres of forest land
		□
	09:37:45	1 have been converted to an industrial land with
		2 no back taxes regard, and the KB rides free
		3 with me paying their land tax. NorthernStar
		4 should be required to pay for all current
	09:37:57	5 real -- personal property and conversion back
		6 taxes.
PM4-6		7 Section 4.4.2.3, existing upland
		8 vegetation, page 4-115 states, quote: In areas
		9 where timber would be harvested, the trees
Page 18		

Public Meetings

4

PM4-5 The EIS discusses taxes that may be paid by NorthernStar to local jurisdictions in section 4.8.

PM4-6 Landowners would be allowed to include provisions in the easements that are negotiated with NorthernStar for the sale of merchantable timber. As discussed in section 4.7.3.1, easement negotiations are a private legal matter between NorthernStar and the landowner.

PM4 RN-110707-FERCam.txt		
PM4-6 cont'd	09:38:17	10 would be cut and stacked for commercial sale.
		11 The logs would be hauled to the market and the
		12 proceeds of the sale collected by the property
		13 owner.
		14 This is not the way it is done.
	09:38:27	15 NorthernStar should conduct a timber cruise,
		16 pay for the timber rights, take out DNR forest
		17 practices permits, and pay for the value of any
		18 reproduction trees that are not yet ready for
		19 market.
PM4-7	09:38:41	20 Section 2.3.3, pipeline and associated
		21 facilities, page 2-35 states: Where the
		22 Bradwood pipeline would -- where the Bradwood
		23 pipeline would be adjacent to the existing KB
		24 pipeline, the temporary construction
	09:38:58	25 right-of-way would overlap onto the existing
		23
	09:39:01	1 permit right-of-way. The overlap would be up
		2 to ten feet but no closer than 15 feet from the
		3 existing pipeline.
PM4-8		4 Will the property owner be paid for this
	09:39:15	5 encroachment? In other words, they are
		6 encroaching on our existing pipeline with no
		7 mention about who's paying for it or why, why
		8 they get the right to do that.
		9 On a large portion of my land, the KB pipe
	09:39:30	10 is 20 feet from the property line. That's only
		11 five feet of spoil could be deposited if 15
		12 feet takes precedent. Finally, there should be
		13 a standard easement with site-specific clauses
		14 plus a liability hold-harmless clause stating
		Page 19

Public Meetings

4

PM4-7 See our response to comment PM2-4.

PM4-8 See section 2.3.3 of the EIS. NorthernStar proposes to use a typical 100-foot-wide construction right-of-way, and maintain a 50-foot-wide permanent easement. In cases where the Bradwood Landing pipeline would be adjacent to the KB pipeline, the temporary construction right-of-way for the proposed Bradwood Landing pipeline would overlap about 10 feet of the existing KB easement. As discussed in section 4.7.3.1, easement negotiations are a private legal matter between NorthernStar and the landowner and are, therefore, beyond the scope of this EIS.

Public Meetings

4

PM4 RN-110707-FERCam.txt

PM4-8
cont'd

09:39:48 15 that NorthernStar pays all current real estate
16 and personal property taxes, plus any
17 conversion back taxes; and upon the 50-year
18 life, page 2-63, abandonment of the pipeline,
19 there shall be a recorded reconveyance and
09:40:04 20 release of the right-of-way easement.

21 Thank you.

22 MR. FRIEDMAN: Thank you for your
23 comments.

24 Next is Phil Dines.

09:40:14 25 MR. PHIL DINES: Good morning. My name's
□

24

09:40:15 1 Phil Dines, D-I-N-E-S. I'm here to speak in
2 favor of this project, according to the DEIS.
3 I represent the Longview Kelso Building
4 Construction Trades Council.

PM4-9

09:40:28 5 Bradwood Landing, energy or -- excuse
6 me -- NorthernStar has provided the necessary
7 safety precautions that we've been requiring
8 all along. With the commerce along the river
9 that's currently taking place, with the

09:40:44 10 location of the proposed project being on an
11 existing mill site, we feel that these
12 precautionary measures have been met
13 satisfactorily. So we are, therefore,
14 endorsing the support for this project at this
09:40:58 15 time.

PM4-10

16 Also, on an economical standpoint, what --
17 the advantages of having natural gas coming to
18 the region. Recently we've seen the proposed
19 layoffs from Longview Fibre, and a lot of that
Page 20

PM4-9 Comment noted.

PM4-10 Comment noted.

PM4 RN-110707-FERCam.txt

PM4-10
cont'd

09:41:13 20 is just cost of doing business. Natural gas is
 21 one of the primary sources that the
 22 manufacturing and industrial plants here
 23 locally use. If we can keep these costs down,
 24 hopefully we can keep more of these industries
 09:41:26 25 or entice other manufacturing jobs to come to a

25

09:41:30 1 region instead of just slipping away and
 2 becoming retail industry here locally.

3 Thank you.
 4 MR. FRIEDMAN: Thank you for your
 09:41:38 5 comments.

6 At this time we're going to go back to
 7 people who have already spoken at other
 8 meetings, unless there's someone from the floor
 9 who wishes to speak who was not signed up, who
 09:41:47 10 has not previously spoken. Is there anyone who
 11 has not previously spoken who would like to
 12 talk at this time?

13 If not, then I'm going to ask Mr. Dragich
 14 to speak again.

09:41:58 15 MR. STEVE DRAGICH: Mr. Dragich,

PM4-11

16 D-R-A-G-I-C-H. I'll speak specifically about
 17 two items, one in the appendices of the DEIS,
 18 the open-trench method for laying the pipe
 19 through streambeds. I refer to Washington
 09:42:21 20 State Revised Code 76, forest practices,
 21 specifically riparian zones.

22 At present, citizens of the state of
 23 Washington who have forest land, which this
 24 pipeline will cross in this county, are
 Page 21

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PM4-11 The specific crossing method to be used on a particular stream is established as part of the COE and WDE permitting processes. In those instances where open cut is determined by the agencies to be acceptable, appropriate BMPs are mandated as part of the crossing to protect the associated resources.

PM4 RN-110707-FERCam.txt

PM4-11
cont'd

09:42:40 25 prohibited from this riparian zone, any and all
□ 26

09:42:46 1 practices or any disturbance whatsoever, yet
2 NorthernStar and FERC in their DEIS proposes
3 for certain streams on the Washington side for
4 an open-trench method, yet us citizens are
09:43:02 5 prohibited from this very method.

PM4-12

6 Second one concerns critical areas, mainly
7 unstable geologic areas. As you know, on the
8 Washington side there are 21 unstable noted
9 areas. Cowlitz County has an ordinance known
09:43:21 10 as the critical areas ordinance, currently
11 under review by their contractor, Parametrix
12 from Portland, Oregon. When asked in an open
13 meeting of this review of the critical areas
14 ordinance, will this ordinance apply to any
09:43:39 15 federally sanctioned project, i.e.,
16 NorthernStar's proposed pipeline, the answer
17 from the county's -- Cowlitz County's
18 contractor, Parametrix, was no, yet the
19 citizens of this county are subject to that
09:43:57 20 critical areas ordinance.

PM4-13

21 In your DEIS you state that they have to
22 apply the local land-use ordinances. Obviously
23 statements that I've just mentioned contradict
24 this.

09:44:13 25 MR. FRIEDMAN: Thank you for your
□ 27

09:44:13 1 comments.
2 Next is Robert Kiser.

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PM4-12 The EIS addresses geological hazards along the pipeline route in section 4.1.4. The EIS discusses the Cowlitz County Critical Area Ordinance under local permits in section 1.3.11, and local land use zoning in section 4.7.3.2. Cowlitz County is the lead SEPA agency, and we hope that it will adopt our EIS. NorthernStar may voluntarily seek permits from Cowlitz County. The FERC encourages cooperation between applicants and local governments, but this does not mean that local agencies, using state or local laws, may prohibit or unreasonably delay projects approved by the FERC. Local permits must be consistent with the conditions of a FERC Certificate.

PM4-13 See our response to comment PM4-12.

PM4-14	09:44:31	3	PM4 RN-110707-FERCam.txt MR. ROBERT KISER: Kiser, K-I-S-E-R,
		4	Robert.
PM4-14	09:44:31	5	The impact statement is supposed to be
		6	driven by the process of scoping. The scoping
		7	process is part -- in part includes public
		8	comments as well as agencies determine issues,
		9	concerns, and opportunities. Although you
		10	mention 1-24 and 25, prefiling public scoping
		11	process and meetings, you have excluded
		12	comments from the public meetings that dealt
		13	with unsuitable soils and socioeconomic effects
		14	of landowners. All issues and concerns and
PM4-15	09:45:00	15	opportunities identified by the public need to
		16	be addressed in the DEIS.
		17	Criteria through the evaluated
		18	alternatives are not adequately addressed.
		19	There is no such advantaged way for the reader
		20	to evaluate alternatives against each other.
		21	This applies to alternative fees for various
		22	planned projects and activities but is
		23	especially important to determine all site and
		24	pipeline locations.
PM4-15	09:45:25	25	The criteria, again, should reflect the
		28	
		1	data developed from the scoping process. How
		2	can you select an alternative if you haven't
		3	evaluated all the alternatives in a systematic
		4	manner against issues, concerns, and
		5	opportunities, identify a preferred, and
		6	documented such?
		7	The DEIS only tells you the agency looked
			Page 23

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PM4-14 See our response to comment PM3-24. The EIS addresses potential project-related impacts on soils in section 4.2, and socioeconomic issues are addressed in section 4.8.

PM4-15 The EIS summarizes the results of the alternatives analysis and we looked at more details than may be apparent from the summary. We also considered whether alternatives were economically feasible. However, it was not feasible to do a detailed comparison of costs as part of the analysis.

PM4-15 | 8 PM4 RN-110707-FERCam.txt
 cont'd | 9 at other alternatives and discarded them. You
 09:45:50 | 10 can't even tell if you considered a broad range
 | 11 of alternatives, as required by NEPA. The
 | 12 criteria is subjective, not objective. You
 | cannot measure it.

PM4-16 | 13 The cover letter indicates a draft EIS
 | 14 addresses potential environmental effects
 09:46:06 | 15 associated with the construction and operation
 | 16 of the following facilities, looked at the
 | 17 proposed Bradwood Landing terminal. The letter
 | 18 also states that the DEIS also evaluates
 | 19 alternatives to the proposal. If the
 09:46:18 | 20 alternatives are equally evaluated, including
 | 21 no action against each other, why weren't other
 | 22 alternatives addressed with equal weight as the
 | 23 preferred Bradwood Landing and the pipeline
 | 24 alternative?

PM4-17 | 09:46:31 25 The DEIS is a draft decision document. 29
 | 09:46:35 1 This should not -- there should not be any
 | 2 questions left unanswered, especially ones
 | 3 involving environmental consequences. Several
 | 4 places it leaves it up to NorthernStar to do
 09:46:46 | 5 what they want rather than telling them what
 | 6 they must do. The document should leave --
 | 7 should leave -- should not leave any
 | 8 subjectivity to NorthernStar, FERC, COE, U.S.
 | 9 Coast Guard, or DOT, or the Commission,
 09:47:01 | 10 especially to the discretion of NorthernStar.

PM4-18 | 11 The mitigation plan for T and E species
 | 12 did not adequately compensate for loss of

Page 24

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PM4-16 The alternatives were evaluated at a detail necessary to determine that none had significant environmental advantages over the proposed project and could meet all of the project objectives. If an alternative had been able to meet all of the project objectives and been clearly environmentally superior, we would have evaluated it in greater detail.

PM4-17 See our responses to comments PM1-2 and PM3-47. Section 5 contains our recommendations, which would become requirements if adopted by the Commission as part of its Order authorizing the project.

PM4-18 As the lead federal agency, the FERC will develop determinations of effect for federally listed species and designated critical habitat. These determinations of effect will be included in the revised BA and EFH Assessment. However, quantification of take and the associated Incidental Take Statement would be developed and issued by the NMFS and/or FWS for the proposed project as part of the formal consultation process under section 7 of the ESA and the MSA. Additional information on the formal consultation process is included in section 4.6 of the EIS.

PM4-18
cont'd

PM4-19a

PM4-19b

PM4-20

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habitat and taking of species. No reference
has been found to requiring a take permit of a
T and E species. There is no question that the
dredging and subsequent valve water intake will
take T and E fish species. The recovery plan
for T and E species aggressively enhances
these.

An enhancement plan specifies marine
fishery service is needed prior to approval of
EIS. There is no mention of approval of an
enhancement plan. The trenching across many of
the streams reviewed on the maps provided is
not compatible with requirements of the

Washington Park and Natural Resources.
MR. FRIEDMAN: Mr. Kiser, can you wrap it
up?

MR. ROBERT KISER: Okay. The product that
you have here is, in my estimation, very poorly
written. The document will not pass muster.
It's got to be rewritten, reissued, and a
pellet could hit it with a slingshot; he
wouldn't have to hit a shotgun. It's got to
pass muster and get to the final in the form
that it will survive. This won't do it.

MR. FRIEDMAN: Thank you for your
comments.

I do have one point of clarification on
whether or not the EIS is a decision document.
It is not a decision document. It is a
staff-written document, and therefore uses the

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PM4-19a See our response to comment FA2-10.

PM4-19b See our response to comment PM4-11.

PM4-20 We disagree. We believe the EIS has been properly prepared to comply with the NEPA.

PM4-21	18	PM4 RN-110707-FERCam.txt term "recommendation." The Commissioners, the	
	19	five Commissioners who make decisions, their	
	09:48:51 20	decision document is called a project order,	
	21	and the conditions of that order will use words	
	22	such as "shall."	
	23	UNIDENTIFIED SPEAKER: If I may, please,	
	24	the NEPA process requires a decision. Is that	
	09:49:07 25	going to be the Commission's decision? If so,	31
	09:49:10 1	they have to abide by NEPA. Right?	
	2	MR. FRIEDMAN: The Commission order will	
	3	adopt the EIS.	
	4	UNIDENTIFIED SPEAKER: Okay. And the	
	09:49:18 5	decision of the Commission is appealable?	
	6	MR. FRIEDMAN: That is correct, by	
	7	intervenors who will have standing in the	
	8	proceeding.	
	9	UNIDENTIFIED SPEAKER: Right.	
	09:49:29 10	MR. FRIEDMAN: Are there any other	
	11	questions from the floor?	
	12	Yes, sir. Would you please -- you have to	
	13	come up here, state your name, spell your last	
	14	name for the court reporter, and provide us	
	09:49:39 15	your comments.	
PM4-22	16	MR. ROBERT KEENUM: Yes. My name is	
	17	Robert Keenum, K-E-E-N-U-M.	
	18	The only question I have -- I represent no	
	19	one except the community and the people that	
	09:49:50 20	enjoy the river here. I was a little surprised	
	21	to see this terminal being established so far	
	22	upriver. I know no one wants LNG-type	
Page 26			

Public Meetings

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PM4-21 See our responses to comments PM3-51. The EIS is not a decision document, the Commission Order is.

PM4-22 Several LNG terminals are located inland along rivers including: the Cove Point LNG terminal is located approximately 100 miles from the mouth of Chesapeake Bay; the Distrigas terminal in Everett, Massachusetts is located approximately 5 miles inland from Boston Harbor; Elba Island is located approximately 9 miles up the Savannah River; the Trunkline LNG terminal is located approximately 48 miles up the Calcasieu River/Ship Channel; the Sabine Pass LNG terminal is located 3.7 miles up the Sabine Pass River; and the LNG terminal at Freeport/Quintana Island is located 6 miles up the Freeport ship channel.

PM4-22 23 PM4 RN-110707-FERCam.txt
 cont'd 24 terminals near them, but we all need them
 09:50:05 25 somewhere, but I was surprised to see it so far
 upriver. 32
 09:50:05 1 My question is: Are there other LNG
 2 terminals in the United States that are 38
 3 miles up a river?
 4 MR. FRIEDMAN: I don't know, but we'll --
 09:50:21 5 we'll do some looking. I will say there are
 6 LNG terminals located on rivers. I believe
 7 Elba in Georgia is located on a river. Cove
 8 Point in Maryland is located on the Chesapeake
 9 Bay. And the District Gas LNG terminal in
 09:50:37 10 Boston is located up a river in Boston Harbor.
 11 So there are -- there are LNG terminals located
 12 on rivers inland from the ocean.
 13 MR. ROBERT KEENUM: Right. And security
 14 reasons and environmental reasons, 38 miles, I
 09:50:49 15 recognize -- the farthest one I found upriver
 16 was five miles. I'm not an expert by any
 17 means. 38 miles to me is something that should
 18 be seriously considered.
 19 MR. FRIEDMAN: For people who don't
 09:51:02 20 understand how siting occurs, it is the project
 21 proponent, NorthernStar, who picks a location,
 22 and then the FERC analyzes the environmental
 23 impacts of that proposal.
 24 MR. ROBERT KEENUM: Thank you.
 09:51:12 25 MR. FRIEDMAN: Thank you. 33
 09:51:15 1 Are there any other questions or comments
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2 from the floor?

3 If not, then that brings to conclusion

4 this morning's public meeting. I would like to

09:51:27 5 thank you all here on behalf of the FERC for

6 coming and providing us your comments on the

7 DEIS for the Bradwood Landing LNG terminal.

8 And let the record show that this morning's

9 meeting was concluded, after all comments were

09:51:41 10 taken from the floor, at approximately 9:50

11 a.m. Thank you very much.

12 (Recess at 9:51 a.m.)

13 MR. ARTHUR JOHNSON: Well, thank you. My

14 name is Arthur Johnson. I live at 167 Jackson

10:02:59 15 Road, Longview, Washington. It's a yew fallow

16 heights district (phonetic).

17 As a landowner, I'm going to be directly

18 affected by this pipeline construction. I'm a

19 third-generation owner of an 80-acre tree farm,

10:03:13 20 and I've been very active in it for quite

21 some -- quite a long time. The pipeline will

22 be constructed about a quarter of a mile across

23 my property and leave, of course, about a

24 50-foot-wide scar that will in turn over the

10:03:26 25 period of years never be used for much of

□

34

10:03:29 1 anything, since it's going to be part of a tree

2 farm. Trees will not be able to be planted on

3 it. It will be more or less a grassy strip,

4 I'm afraid.

10:03:37 5 The trees on my property that are where

6 the pipeline is running right now are almost

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PM4-23 See our response to comment PM2-4.

Public Meetings

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PM4-23
cont'd

7 near maturity, but they could go for another
8 several more years to reach full maturity and
9 full value, so I feel I will be cheated if the
10:03:52 10 pipeline is built because I will not receive
11 full value for my trees.
12 Now, in the EIS statement, the Bradwood
13 EIS statement, it makes some comments in there
14 that they're about to harvest the timber. I
10:04:02 15 feel some of those -- statements are quite
16 vague. They're quite brief. They're quite
17 short. They're not right to the point.
18 There's a lot of leeway there for the
19 construction company to deal with me. I don't
10:04:15 20 have -- I have serious questions about who will
21 harvest the timber, how they will do it, and
22 what means they go by, and of course I have
23 some very serious question about will I receive
24 full payment for my trees in the aftermath.

PM4-24

10:04:30 25 I have great concerns about the
□
10:04:32 1 construction of the pipeline itself, even
2 though in the EIS brochure they talk about all
3 the procedures and the things that they are
4 going to do, but it's been my experience in the
10:04:45 5 past, when the adjacent KB pipeline that was
6 built about a decade ago, that the construction
7 company there was quite careless. They left
8 the land in quite a disturbed state.
9 The land there actually is relatively
10:04:59 10 flat, and it was quite smooth, but the
11 aftermath was that the land was left in rather
Page 29

35

PM4-24 See our response to comment PM4-4.

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PM4-24
cont'd

12 rough form. There are a lot of dips. There
13 are minor ridges and little hills, little
14 gullies. They're small, but they're
10:05:15 15 significant enough that when you run equipment
16 across it, like I do on occasion, it's quite
17 rough -- difficult to operate equipment on.
18 One of the most harmful things done in the
19 construction of the KB pipeline was that they
10:05:28 20 buried a lot of wood in the pipeline, stumps,
21 all kinds of chunks of wood. That wood now is
22 rotting, and when it rots, the potholes and the
23 surface of the pipeline, and actually some of
24 the wood surfaces when you run equipment across
10:05:40 25 it, it becomes quite difficult to do so. 36
□

10:05:43 1 Even though in the EIS brochure, the
2 statement, they're saying that they're going to
3 be careful about those things, I have some
4 severe doubts because I have doubts that there
10:05:55 5 is good enough government oversight of the
6 construction practices. I have this fear that
7 I will have to rent and operate some equipment
8 to rectify the situation just to make the
9 surface into a more suitable form.

10:06:12 10 This gentleman right here, Ralph
11 Quoidbach, an adjacent landowner, has become
12 quite a good friend of mine, and he was at --
13 the KB pipeline was constructed on his
14 property. He has gone into explicit detail
10:06:25 15 over the years explaining to me his
16 negotiations with the lease agreement, which he
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PM4-24
cont'd

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17 said were quite unsatisfactory and unsavory.
18 He has discussed actually in quite detail the
19 construction of the pipeline, the promises made
10:06:41 20 by the construction company, and all the
21 promises that were broken, all the mishaps, all
22 the bad things that have happened.
23 And, in turn, he has been left in, shall
24 we say, a shallow bitterness about the whole
10:06:57 25 thing. No matter where discussions are, at
□ 37

10:06:59 1 some point in time the discussion always comes
2 back to the construction of the KB pipeline.
3 He has been left a bitter man.
4 If the Bradwood pipeline would be
10:07:11 5 constructed on my land, I will feel that the --
6 my land will be violated and, in turn, I will
7 be violated too because I am part of that land.
8 If you drive west of Longview here, there
9 is a cemetery there, Bunker Hill Cemetery. I
10:07:26 10 have a tombstone out there already, and on that
11 tombstone it says -- there's a Finnish phrase
12 inscribed on the tombstone called maa poika.
13 Maa poika in English means son of the soil.
14 And I have always be the son of the soil
10:07:45 15 because I have been so attached to my land
16 because it's been in the family for now a third
17 generation. And if the pipeline is built, I
18 will feel that I will have been violated too.
19 Thank you for your time.
10:08:00 20 MR. FRIEDMAN: Thank you for your
21 comments. The one thing -- because you came a
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22 little late, you didn't hear my response
 23 earlier, about how FERC is going to monitor
 24 construction and restoration. We're going to
 10:08:16 25 require that NorthernStar hire a third-party
 □ 38

10:08:20 1 monitor, environmental monitor, to monitor all
 2 construction and restoration activities. So
 3 there will be somebody around to watch
 4 construction activities all the time.

10:08:30 5 There are three other people who have come
 6 in after I reopened this meeting, and we're
 7 going to give them an opportunity to speak.

8 Jared Ross.
 9 MR. JARED ROSS: Did you want my address
 10:08:45 10 too?

11 MR. FRIEDMAN: Yes. Spell your name for
 12 the court reporter.

13 MR. JARED ROSS: My name is Jared Ross,
 14 J-A-R-E-D, Ross, R-O-S-S. My address is P.O.
 10:08:53 15 Box 278, Adna, Washington.

16 MR. FRIEDMAN: If you're a landowner on
 17 the pipeline, provide us a milepost.

18 MR. JARED ROSS: A what?

19 MR. FRIEDMAN: A milepost, if you know
 10:09:02 20 where it is.

21 MR. JARED ROSS: No, I don't.

PM4-25 22 95822. I'm here just to support the
 23 Bradwood Landing/NorthernStar natural gas --
 24 NorthernStar pipeline. That's all I have to
 10:09:13 25 say. Thank you.
 □ 39

PM4-25 Comment noted.

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10:09:17 1 MR. FRIEDMAN: All right.
 2 Also, Sherry Barry.
 PM4-26 3 MS. SHERRY BARRY: Hi, my name is Sherry
 4 Barry, and you spell that S-H-E-R-R-Y,
 10:09:29 5 B-A-R-R-Y. And I also -- my address is 811
 6 Bluff Avenue in Hoquiam, Washington. And I
 7 just am here today to also let you know that I
 8 support the Bradwood Landing project and the
 9 pipeline that will go in following it. Thank
 10:09:46 10 you.
 11 MR. FRIEDMAN: Thank you for your
 12 comments.
 13 Next is Glenn Willman.
 14 MR. GLENN WILLMAN: Hi. I'm Glenn
 10:09:55 15 Willman, G-L-E-N-N, W-I-L-L-M-A-N. My address
 16 is 1914 Olympia Way, Longview, Washington,
 17 space 13.
 PM4-27 18 I'm business manager of the laborers'
 19 local union here in town, and I support the
 10:10:08 20 Bradwood Landing and the NorthernStar pipeline.
 21 It will provide quite a few jobs for my
 22 members, family wages, benefits, and keep it
 23 here locally.
 24 MR. FRIEDMAN: Thank you for your
 10:10:18 25 comments.

40

10:10:19 1 Is there anyone else who did not earlier
 2 have an opportunity to speak who would like to
 3 speak? If not, then I'm once again going to
 4 close the meeting with the understanding that,

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4

PM4-26 Comment noted.

PM4-27 Comment noted.

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4

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 10:10:30 5 should people come in later who wish to speak,
 6 I will reopen it. The time is now 10:10 a.m.
 7 Thank you.

8 (Recess at 10:10 a.m.)

9 MR. FRIEDMAN: I'm going to open up the
 10:33:52 10 meeting again at approximately 10:30 a.m., and
 11 we're going to take another public comment.

12 So please state your name and spell your
 13 name for the record.

14 MR. JIM PROULX: My name, Jim Proulx,
 10:34:06 15 P-R-O-U-L-X. Actually, I'd like to speak on
 16 both myself and perhaps a little bit about our
 17 company's support for this project. Okay?

18 I've lived here for about 30-plus years.
 19 I hunt, fish. I do a lot of activities,
 10:34:24 20 exactly where this project is being considered
 21 to be built. So I've enjoyed the environmental
 22 fruits of the area, and I don't have any issues
 23 as a hunter, as a fisherman. I don't have any
 24 issues, and neither do the friends that I hunt
 10:34:43 25 and fish with. So, I understand the tankers

41

PM4-28

10:34:46 1 coming in and the construction along the river
 2 and all those types of things. It is not going
 3 to impact me personally any more than any of
 4 the typical river traffic that's going on now.

10:35:00 5 As a matter of fact, on a personal note,
 6 okay, I've been disappointed to see this region
 7 lose so many of the big industries that have
 8 been supporting a lot of families with
 9 good-paying jobs. I know that there's been

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PM4-28 Comment noted.

PM4-28 10:35:14 10 PM4 RN-110707-FERCam.txt
 cont'd 11 one, two, three -- four big aluminum plants
 12 along the Columbia River that have -- in the
 13 last few years they've closed and they've gone
 14 away, and those businesses close, those jobs
 15 have gone away. And I see pulp and paper, I
 10:35:27 16 see other industries that take advantage of the
 17 same locations. They're going. They're going
 18 to different countries, but they're leaving
 19 this area.
 20 So on a personal note, I'd certainly like
 10:35:40 21 to see this project come to fruition for -- for
 22 more jobs, more industry moving into this area,
 23 and it's kind of a domino effect.
 24 As a business, I work for a company called
 10:35:59 25 Harder Mechanical Contractors. We're a big
 □ construction company. 2008 is our -- will be 42
 10:36:01 1 our 75th year of doing business. We actually
 2 started our company in Astoria, Oregon, in
 3 1934. So -- and our headquarters are here in
 4 Portland. We're one of the largest
 10:36:13 5 contractors, actually in the United States, but
 6 certainly the largest in this area.
 7 We've got a lot of people that live and
 8 work all around this area, okay, up and down --
 9 from Astoria to Portland, Oregon, Washington.
 10:36:32 10 I can't speak for all of them, but I've spoken
 11 to a lot of them, and it's pretty unanimous.
 12 There's a lot of support within our company.
 13 We are a construction company, so we'd
 14 like to see this thing happen, of course, but

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PM4-28
cont'd

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10:36:45 15 for those same reasons: It's going to bring
16 good jobs. It's going to -- it's not going to
17 be harmful to their way of life, whatever
18 issues. There's a lot of skill in this area.
19 This is -- this is a high-tech area. Intel
10:37:02 20 builds their world-class wafer-manufacturing
21 facilities here.
22 There's some really skilled labor that has
23 been enjoying this big, industrial region for a
24 long time. They're very, very safe. I think
10:37:17 25 we set records for the safe work performance of
□ 43

10:37:22 1 not only our company but of this area as well.
2 So, you know, we've got a big company.
3 This area has been supporting large complex
4 industries like this for many, many years. The
10:37:38 5 quality of the construction, if this facility
6 was to be built, would be the highest. Nobody
7 here, but I'd like to comment on that. I don't
8 think there would ever be any issues with the
9 construction, the safe work performance on a
10:37:56 10 project like this.
11 It is a large project. We build -- this
12 region has built many, many large projects,
13 larger projects than this. Okay. So from a
14 construction standpoint, we see it as a very
10:38:10 15 successful opportunity. As a personal
16 standpoint, we don't see any issues with this,
17 and we're in -- personally, I'm in support of
18 it, and as a company I'd like to go on record
19 that we very much support this project. And I

10:38:27 20 PM4 RN-110707-FERCam.txt
believe that's all I got to say.
21 MR. FRIEDMAN: Thank you very much for
22 your comments.
23 MR. JIM PROULX: Okay.
24 (MEETING ADJOURNED AT 10:38 A.M.)

10:02:50 25 * * * 44
□

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1

CERTIFICATE

2

I, Robin L. Nodland, a Washington

3

Certified Shorthand Reporter, an Oregon

4

Certified Shorthand Reporter, a Registered

5

Diplomate Reporter, and a Certified Realtime

6

Reporter, do hereby certify that I reported in

7

stenotype the proceedings had upon the hearing

8

of this matter, previously captioned herein;

9

that I transcribed my stenotype notes through

10

computer-aided transcription; and that the

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foregoing transcript constitutes a full, true

12

and accurate record of all proceedings had

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during the hearing of said matter, and of the

14

whole thereof.

15

Witness my hand at Portland, Oregon, this

16

27thday of November, 2007.

17

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19

20

Washington CSR No. 2530

21

Oregon CSR No. 90-0056

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Public Meetings

PMS RN-110707-FERCpm.txt

1

1 U.S. DEPARTMENT OF ENERGY
2 FEDERAL ENERGY REGULATORY COMMISSION
3
4 BRADWOOD LANDING LNG PROJECT
5 FERC DOCKET NUMBERS CP06-365 and 366
6
7

8 PUBLIC MEETING
9 TRANSCRIPT OF PROCEEDINGS
10 * * *
11
12

13 Wednesday, November 7, 2007
14 6:30 p.m.
15

16 Cowlitz County Expo and Conference Center
17 1900 7th Avenue
18 Longview, Washington
19 * * *
20

21 BEFORE: Mr. Paul D. Friedman
22 Federal Energy Regulatory Commission
23 Office of Energy Projects
24 * * *
25

□

2

1 P R O C E E D I N G S
2

3 MR. FRIEDMAN: My name is Paul Friedman.

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Public Meetings

5

Public Meeting Transcript of Proceedings
Wednesday, November 7, 2007, 6:30 p.m.
Longview, Washington

The introductory comments for this public meeting are not included in the FEIS because they are very similar to those of the Monday, November 5, 2007, 6:30 p.m. meeting in Cathlamet, Oregon, which are included. The complete transcript of the Tuesday, November 6, 2007, 6:30 p.m. meeting in Clatskanie, Washington can be obtained at the FERC's internet website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP06-366). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll free at 1-866-208-3676, or for TTY, contact (202) 502-8659.

Public Meetings

Public Meetings

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11 PMS RN-110707-FERCpm.txt
 have comments that take more than three minutes
 12 to express, please summarize your main points
 13 tonight and write detailed letters to the FERC.
 14 This is a meeting for you, the public, to
 18:54:52 15 comment on the DEIS. It is not a question-and-
 16 answer forum. Because many of your concerns
 17 are complex, the FERC staff would need to do
 18 some additional research before addressing
 19 those issues in the FEIS. Therefore, I
 18:55:05 20 probably would not be able to give accurate or
 21 complete responses tonight. For those
 22 questions where I do know an answer, I'll
 23 provide it, and I may be able to answer some
 24 questions having to do with administrative or
 18:55:15 25 process issues.

17

18:55:17 1 Before we start hearing from speakers
 2 tonight, I suggest we take a very short break
 3 of a couple of minutes. This will give anyone
 4 an opportunity who has not signed up to speak
 18:55:25 5 an opportunity to go back to Janelle and sign
 6 our speakers' list. So let's do that right
 7 now, and I'll reconvene in about three minutes.
 8 (Recess.)

9 MR. FRIEDMAN: Mr. Castle? Is Bill Castle
 18:58:12 10 here? Did you speak at an earlier meeting?

11 MR. BILL CASTLE: I spoke at the first one
 12 in Clatskanie, yes.

13 MR. FRIEDMAN: Thank you.

14 Because this is not an overwhelming list,
 18:58:29 15 we're going to just call up one person at a

Public Meetings

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16 PMS RN-110707-FERCpm.txt
 time. It's a small enough room and a small
 17 enough audience, and I think we can do that and
 18 still move the meeting along.
 19 So the first person on here -- oh, by the
 18:58:40 20 way, if I -- I often mess up people's names and
 21 pronunciations. So please correct me when I
 22 mispronounce your name.
 23 We're now going to open the floor to
 24 individual comments. I ask that each person
 18:58:54 25 come up to the microphone here. These are
 □ 18
 18:58:57 1 working much better than some of our other
 2 microphones at other venues. You all can hear
 3 me clearly. Correct? And I believe if you
 4 speak up in this microphone, that you will also
 18:59:09 5 be heard clearly by everyone in the back of the
 6 room.
 7 I want to you state your name for the
 8 record and spell your last name for the court
 9 reporter, identify any organization you may
 18:59:19 10 represent. If you are a landowner along the
 11 pipeline route and you know where your property
 12 is located according to mile marks, please tell
 13 us. If you don't know where your property is
 14 located according to mile marks, there are some
 18:59:30 15 representatives of NorthernStar here, and they
 16 might be able to help you figure out what
 17 milepost your property is located at.
 18 The first speaker I have on the list
 19 tonight is Charlotte Piersons.
 18:59:48 20 MS. CHARLOTTE PERSONS: Hi. I'm actually

PM5-1		21	PM5 RN-110707-FERCpm.txt Charlotte Persons, P-E-R-S-O-N-S. I live in	
		22	Kelso. I do not live anywhere near a pipeline.	
		23	I am here to represent Willapa Hills Audubon	
		24	Society, and we are mostly concerned with	
	19:00:00	25	environmental issues. One of them is carbon	19
	19:00:06	1	dioxide emissions.	
		2	Page 4-382 states, to date, NorthernStar	
		3	has not indicated whether they intend to	
		4	voluntarily comply with the ODET requirements	
	19:00:16	5	for control of gases contributing to global	
		6	warming. FERC, as the U.S. entity with the	
		7	most direct effect on government policy	
PM5-2		8	regarding global warming impacts of new energy	
		9	facilities, should take responsibility for	
	19:00:31	10	requiring new facilities to comply with limits	
		11	on carbon dioxide and other greenhouse gases.	
		12	We ask that FERC use its ability -- its	
		13	authority to do so in this case.	
		14	Furthermore, carbon dioxide emissions are	
	19:00:48	15	a part of this kind of facility, partly because	
		16	of transportation of the LNG from far	
		17	distances -- other countries, Alaska -- partly	
		18	from the burning of natural gas by customers	
		19	who are end customers. We ask that FERC	
PM5-3	19:01:06	20	encourage other forms of energy -- solar, wind,	
		21	tidal, and the like -- rather than going ahead	
		22	and approving LNG facilities.	
		23	There are also some other specific things	
		24	that we have problems with in terms of	
	19:01:26	25	mitigation. One is eagle habitat. While no	20
			Page 16	

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PM5-1 Section 4.10.1.2 of the final EIS has been updated to indicate that NorthernStar has agreed to voluntarily comply with the Oregon Department of Energy's siting requirements for non-generating energy facilities, including the CO₂ emission standards, for the proposed LNG import terminal.

PM5-2 We address CO₂ emissions in section 4.10. The FERC does not promote one form of energy over another, but we discuss energy alternatives in section 3.

PM5-3 The bald eagle's life history and occurrence within the project area as well as potential impacts due to construction and operation of the Bradwood Landing Project are described in sections 4.6.1.2, 4.6.2.1, 4.6.2.2, and 4.6.2.3. The FWS's National Bald Eagle Management Guidelines (2007) recommend a buffer of at least 660 feet between construction activities and bald eagle nests during the breeding season. The nearest bald eagle nest is located 0.4 mile (over 2,000 feet) from the proposed project area. In addition, section 4.6.2.2 describes measures that NorthernStar would implement to minimize impacts on bald eagles in the vicinity of the project and the FERC staff's recommendation that NorthernStar conduct additional surveys for bald eagles, where necessary, prior to construction of LNG terminal and pipeline facilities. Therefore, adverse impacts on bald eagles as a result of the proposed project are not anticipated and the implementation of additional mitigation measures is not warranted.

PM5 RN-110707-FERCpm.txt

PM5-3
cont'd

19:01:29 1 longer listed as an endangered species, eagles
2 are still protected under a variety of acts. A
3 failure of the DEIS is that the impact study
4 makes no mention of the specific needs of
19:01:40 5 individual eagles that currently use the area
6 in and near the Bradwood site.
7 The Peterson Point area proposed to
8 mitigate for 30 acres of forested land
9 destruction on the site, page 4-156, is already
19:01:54 10 being preserved by Duck Hunters Unlimited.
11 There is no plan mentioned to identify the
12 current population of eagles and then to
13 monitor from Peterson Point to see if those
14 eagles currently using this area actually --
19:02:11 15 actually move to the new area.
16 In fact, they may not do so as there are
17 already eagles nesting in that area, and eagles
18 do not share nesting territory. There should
19 also be a backup plan for other forested
19:02:26 20 mitigation areas to be created if the current
21 plan is not successful.

PM5-4

22 Another habitat mitigation problem that we
23 notice is the Hunt Creek/Clifton Channel
24 mitigation site. Section 4.5.2.1, page 4-152,
19:02:43 25 states: There is no plan to monitor the
□
19:02:45 1 success of the site as the only upkeep will be
2 the removal of noxious weeds. We ask that this
3 site be monitored to see if it is indeed acting
4 as a mitigation site, especially for federally
Page 17

21

Public Meetings

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PM5-4 See our response to FA2-10.

PM5 RN-110707-FERCpm.txt

19:02:57 5 listed salmon and starry flounder habitat use.

6 Thank you.

7 MR. FRIEDMAN: Thank you for your

8 comments.

9 Next on the list is Laurie Caplan.

19:03:17 10 MS. LAURIE CAPLAN: My name is Laurie

11 Caplan. I'm from Astoria. I'm speaking for

12 myself, but I'm also a member of RiverVision

13 and Columbia Riverkeeper.

14 People in Clatsop County frequently ask me

19:03:34 15 why -- why oppose this project, and I tell them

16 there are hundreds of economic, safety, and

17 quality-of-life reasons to oppose this, but of

18 course tonight we're talking about

19 environmental reasons. So I would like to

19:03:48 20 raise three environmental questions and one

21 process one.

22 First, I'm all for international

23 cooperation. I'm very concerned, however, that

24 cooperation in this field means that we are

19:04:07 25 relying or would be relying on importing LNG

□

22

19:04:12 1 from countries that are not only authoritarian,

2 but are openly hostile to the United States,

3 including Iran, Russia, and Qatar. Also, just

4 the pollution and environmental degradation

19:04:33 5 that comes from extracting, processing, and

6 shipping this material from all over the globe

7 creates its own separate set of problems

8 related to pollution and further environmental

9 degradation.

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Public Meetings

5

PM5-5 See our response to comment PM2-39.

PM5 RN-110707-FERCpm.txt

PM5-5
cont'd

19:04:48 10 So what I'm wondering is: why would the
11 federal government support a project that makes
12 this country more dependent on a fossil fuel,
13 especially a fossil fuel that comes from
14 hostile countries, since that seems to be the
19:05:05 15 source of a good many of our problems right
16 now?

PM5-6

17 Secondly, all of us on the north coast are
18 grateful that we don't have hurricanes and
19 tornados, but we know that we face earthquakes
19:05:17 20 and slides, and in Astoria it's a tourist
21 attraction to drive around and show people
22 where the slides are. Even in areas that have
23 been built up for decades, we still get slides.
24 And as I understand it, the Bradwood site
19:05:34 25 and the pipeline route are going in earthquake

23

19:05:41 1 areas and slide areas, and it's kind of unreal
2 for me that we're even having a discussion
3 about this because it is such a ridiculous site
4 to do any of this kind of project, especially
19:05:55 5 one that poses its own set of problems if
6 anything goes wrong.

PM5-7

7 I would like to suggest that you update
8 your geologic and seismic information in the
9 DEIS. It's seriously out of date. There is
19:06:12 10 much more current, technologically accurate
11 information than the DEIS presents.

PM5-8

12 So my second question is: why would the
13 federal government even consider siting such a
14 massive project on such a fragile ecosystem and
Page 19

Public Meetings

5

PM5-6 Earthquake and landslide hazards and associated mitigation are discussed in sections 4.1.3.3 and 4.1.4.3.

PM5-7 Additional information and clarifications have been added to section 4.1.

PM5-8 See our response to comment PM2-29. The lower Columbia River has already seen industrial, commercial, and residential development, and the Bradwood Landing terminal property was once the site of a saw mill and town. Also see our response to comment PM5-33.

PM5 RN-110707-FERCpm.txt

PM5-9

19:06:31 15 on such unstable land?

16 A third point is that -- my question is:

17 How can the federal government say that there

18 will be few, if any, toxic fumes from LNG

19 tankers when the tankers and their escort

19:06:50 20 boats, which the DEIS forgot to mention would

21 be running all the time, all of those engines

22 will be running not only during transit up and

23 down the river, but when the LNG tankers are

24 offloading, which takes approximately 24

19:07:06 25 hours -- so three shipments a week up, down,

□

19:07:12 1 and offloading means --

2 MR. FRIEDMAN: Laurie, can you wrap up?

3 MS. LAURIE CAPLAN: Sorry. -- means that

4 almost every day there will be toxic fumes

19:07:20 5 spewing out.

6 The last thing that I want to say is we

7 have been sadly disappointed in the Clatsop

8 County Commissioners because they've been

9 acting like the Clatsop County board of county

19:07:35 10 contortionists. It's been very disappointing.

11 And, unfortunately, despite what you said

12 before about FERC's role, many people have come

13 to believe that "FERC" means Friends to Energy

14 Resource Companies.

19:07:49 15 So I would encourage FERC to take back its

16 role as a regulatory agency and protect all of

17 us from this horrific project. Thank you.

18 MR. FRIEDMAN: Thank you for your

19 comments.

Page 20

Public Meetings

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PM5-9

Emissions from marine engines powering the escort boats and tugs associated with the project will be regulated by Title II of the Clean Air Act Amendments of 1990, specifically 40 CFR Part 91 and 94 (Control of Emissions From Marine Spark Ignited and Compression Ignition Engines). The EPA, supported by the World Shipping Council, recently proposed to the International Maritime Organization (IMO) more stringent emission limits for ocean going ships, such as LNG carriers. If adopted, the amendments to Annex VI of MARPOL would reduce air pollution from ships by establishing a new tier of performance based standards for marine diesel engines on all vessels. The marine vessels associated with the proposed project would be required to comply with all applicable air quality regulations.

PM5 RN-110707-FERCpm.txt

19:08:00 20 Next, Mike Smith.
 21 MR. MIKE SMITH: My name is Mike Smith,
 22 S-M-I-T-H. I am on the pipeline, and I believe
 23 my mile mark is 21 through 21.058.

PM5-10 24 I am a realtor and a member of Cowlitz

19:08:27 25 County Association -- Cowlitz County

25

19:08:29 1 Association of Realtors. Cowlitz County
 2 Association of Realtors has taken a stand,
 3 along with landowners and Citizens for a Safe
 4 Community, in opposing the pipeline; among
 19:08:40 5 other reasons, the quality of life it affects
 6 on the area.

7 I am here to speak on behalf of myself,
 8 Cowlitz County Association of Realtors, and the
 9 many landowners in the way of the pipeline.

19:08:54 10 After fumbling my way through the DEIS, I found
 11 plenty of places where it refers to property
 12 values and studies -- and the studies seem to
 13 be made by NorthernStar or some associated with
 14 the business, or they say it can't be

19:09:16 15 determined until after the plant is completed.
 16 This is not acceptable.

17 A lot of people have purchased their land
 18 or inherited in the hopes of a good retirement
 19 or to subdivide for our children. With the
 19:09:30 20 pipeline bisecting our land, we have little
 21 chance of that. As a realtor, I have seen
 22 firsthand how hard it is to sell land or
 23 housing with a pipeline in close proximity, and
 24 to subdivide for our children is an impossible

Page 21

Public Meetings

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PM5-10 Our discussion of potential impacts of the proposed pipeline on property values is included in section 4.8.3.3. The studies we cite on impacts of a pipeline on property values were conducted by Whatcom County, Washington and the INGAA Foundation, not by NorthernStar. Subdividing the land would not be precluded after construction of the pipeline.

Public Meetings

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PM5 RN-110707-FERCpm.txt

PM5-10
cont'd

19:09:46 25 task, depending on where they put the pipeline. 26
□

19:09:48 1 I have read the DEIS, and this pipeline is
2 going within 50 feet of several homes where
3 people live. Who do you think is going to buy
4 this home if the need to sell occurs? Would
19:10:02 5 you? If the price was right. Huh?

6 In a lot of cases, we are not well-to-do
7 and are depending on our land as a -- as a part
8 of our retirement, whether it is to sell or
9 downsize for our senior years or to subsidize
19:10:23 10 our income -- income. I was told that
11 NorthernStar had planned approximately \$158,000
12 to purchase easements through Cowlitz County.
13 This wouldn't cover the losses of one of the
14 many landowners that are affected.

PM5-11

19:10:37 15 For the promise of a few jobs, we are
16 jeopardizing the lives of many people. The
17 Cowlitz County Association of Realtors will
18 usually support any project that brought new
19 jobs to the area, but with all the negative
19:10:50 20 issues associated with NorthernStar, it is our
21 opinion this is not a place for the pipeline or
22 the regasification plant planned for our area.

23 As you have heard from many others before
24 me, this is not a good thing. And, if
19:11:05 25 anything, it should be close -- put closer to 27
□

19:11:07 1 the end users, Southern California. We are not
2 an LNG acceptable risk. Thank you.

PM5-11 A discussion of jobs is provided in sections 4.8.1.4, 4.8.2.4, and 4.8.3.4. The project would be constructed and operated in accordance with applicable DOT regulations and, therefore, we believe the likelihood of a significant safety event is minimal. A discussion of reliability and safety is provided in section 4.11. Regarding the end users being in Southern California, see our response to comment PM1-23.

Public Meetings

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PM5-12

3 PMS RN-110707-FERCpm.txt
MR. FRIEDMAN: Thank you for your

4 comments.

19:11:17 5 Next is Jim Townley.

6 MR. JIM TOWNLEY: Mr. Friedman, thank you

7 for the ability to comment this evening. I'm

8 Jim Townley, the executive director of the

9 Columbia River Steamship Operators Association,

19:11:37 10 an 85-year-old, not-for-profit association that

11 was created to represent the interests of

12 deep-sea shipping, the owners, agents that

13 bring the ships to call at ports, including

14 Kalama, Longview, Vancouver; also the deep-sea

19:11:50 15 barges that come to various Oregon coastal

16 ports; and to the inland river system that goes

17 all the way up to Lewiston, Idaho, and operates

18 between Lewiston and Astoria.

19 Our reason for being is to try and keep

19:12:01 20 the ports and the entire river system cost-

21 effective and cost-competitive with other

22 regions around the country, and to do it in a

23 manner that's safe, secure, and environmentally

24 sound. If any new entity comes into the river

19:12:17 25 system, it's looked at by our association

□ 28

19:12:18 1 because our endorsement is sought, and we were

2 quite skeptical about LNG, the initial proposal

3 made about a year and a half ago.

4 Since that time we've worked with the

19:12:30 5 Coast Guard, other state and federal agencies,

6 other partners, stakeholders in the river, the

7 pilots and other people like that that make

PM5-12 Comment noted.

PM5-12 8 PM5 RN-110707-FERCpm.txt
 cont'd 9 their living on the river, and have come to the
 10 conclusion, having participated in the waterway
 11 suitability assessment and the resulting
 12 waterway suitability report, that the
 13 particular project is a positive in all
 14 categories; meaning economically, on balance,
 15 will benefit not just the local region but the
 16 entire river system. The safety and security
 17 of the river system will actually be improved.

PM5-13 17 And the other condition we are looking for
 18 is an improvement and increase in environmental
 19 integrity for the systems that we operate to
 19:13:11 20 prevent, respond, or restore or remediate
 21 should there be an environmental incident,
 22 whether natural or accidental or intentional.
 23 So we didn't come to this conclusion lightly.
 24 We thank you for the opportunity make a
 19:13:23 25 position and to encourage the FERC to go ahead 29

19:13:26 1 and approve the issuance of the required
 2 documents.
 3 Thank you.
 4 MR. FRIEDMAN: Thank you for your
 19:13:32 5 comments.
 6 Paul Amos.
 7 MR. PAUL AMOS: Good evening.
 8 MR. FRIEDMAN: Please make sure to spell
 9 your name for the court reporter.

PM5-14 19:13:55 10 MR. PAUL AMOS: Paul Amos, A-M-O-S. I'm
 11 the President of the Columbia River Pilots. We
 12 board the vessels in Astoria for the bar pilot

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PM5-13 Comment noted.

PM5-14 Comment noted.

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K-182

PM5-14
cont'd

13 PM5 RN-110707-FERCpm.txt
to bring them across the bar, bringing the
14 ships into to Astoria. We take them the
19:14:06 15 remainder of their voyage to Portland,
16 Vancouver, points east. We will be responsible
17 for navigating the vessels from Astoria to the
18 Bradwood Landing, about 20 miles.
19 My purpose for speaking is to assure FERC
19:14:19 20 that we handle ships of this size routinely.
21 It's not something we're unaccustomed to. We
22 train for regularly, and these ships call on
23 ports on a very regular basis, with a similar
24 draft or deeper drafts as the LNG ships we're
19:14:35 25 talking about.

30

PM5-15

19:14:36 1 We have developed vessel traffic
2 information system the last few years that is
3 considered state of the art and allows us to
4 manage the traffic flow of these ships so they
19:14:43 5 fit nicely in the patterns that exist in the
6 river now. So we don't feel there is going to
7 be any conflict or any problems occurring with
8 ships calling here. Should fit nicely into the
9 process.
19:14:56 10 About, oh, several years ago, our traffic
11 volumes peaked at a little over 2100 arrivals.
12 Last year, 2006, our arrivals were down to
13 1,644. So there's quite a bit of difference
14 there. So you can see that the addition of
19:15:12 15 these ships calling on the river won't begin to
16 fill the gap from our peak period. So the
17 traffic load can be well handled, and the river

Page 25

PM5-15 Comment noted.

PM5-15 18 PM5 RN-110707-FERCpm.txt
 cont'd 19 has historically been handled with no problem.
 19:15:25 20 But we now have the advantage of the more
 21 modern technology of the vessel traffic
 22 information system. This allows us to predict
 23 where we're going to meet vessels along the
 24 route, and as part of the Coast Guard
 requirement for this project, we can only meet
 19:15:36 25 in certain areas. With this technology we can 31
 19:15:39 1 determine exactly where we will meet and make
 2 sure to be in those areas only.
 3 It's a safe -- safe river for this type of
 4 operation, once the improvements have been put
 19:15:49 5 in place the Coast Guard recommended, and if
 6 you have any questions, feel free to contact my
 7 office.
 8 MR. FRIEDMAN: Thank you for your
 9 comments. Next is Marvin King.
 19:16:07 10 MR. MARVIN KING: My name's Marvin King,
 11 K-I-N-G. And I'm speaking against this for
 12 myself and probably a lot of people that don't
 13 even come to these meetings and can't make it
 14 here.
 PM5-16 19:16:17 15 One of my biggest concerns with the LNG
 16 plant is the amount of CO2 that it will put
 17 into the atmosphere every day. In the
 18 processing of the LNG alone, the plant will be
 19 responsible for the release of 192 tons of CO2
 19:16:30 20 daily. CO2 has been identified as the main
 21 cause of global warming, which is melting the
 22 world's glaciers at a record pace. It's ironic

Public Meetings

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PM5-16 Section 4.10.1 has been updated to include the estimated greenhouse gas emissions resulting from the construction and operation of the project.

PM5-16 23 PM5 RN-110707-FERCpm.txt
 that the CO2 caused from the release of this
 cont'd 24 will some day put this plant under water.
 PM5-17 19:16:46 25 Another big concern is the amount of 32
 □
 19:16:47 1 electricity it takes to make LNG. 24
 2 megawatts, or 20,000 homes' worth of
 3 electricity daily, will definitely make
 4 electricity prices rise as the demand will
 19:16:58 5 increase. In this aspect alone, I do not see
 6 how NorthernStar can condemn many private
 7 citizens' property and run a pipe through it
 8 when ultimately it will be responsible for
 9 making the utility bills of all Northwest homes
 19:17:13 10 higher.
 PM5-18 11 If I'm not mistaken, in the eminent domain
 12 process, NorthernStar must prove that they are
 13 improving life for the public. And they are
 14 definitely not proving that here.
 PM5-19 19:17:26 15 Another huge concern is the climate in the
 16 Northwest. The Northwest has an extremely wet
 17 climate, which is the direct cause of the land
 18 instability and pipe deterioration. There have
 19 been numerous ruptures and explosions already
 19:17:39 20 in the Northwest. It happens even in dry
 21 climates, such as the 30-inch pipe explosion in
 22 Carlsbad, New Mexico, on August 19th, 2000.
 23 This happened to be a very dry climate, but
 24 still the pipe had corrosion which led to a
 19:17:54 25 rupture and the deaths of 12 innocent people. 33
 □
 19:17:57 1 One good question I have: If there is a
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- PM5-17 It does not take a lot of electricity to unload, store, or vaporize LNG. In fact, as stated in section 2.1.3.5, the SCVs would operate on natural gas. Actually, the natural gas from the LNG imported by NorthernStar could be used to produce electricity, and may result in lowering of individual utility costs as explained in section 1.1. See our response to comment PM3-6.
- PM5-18 In order to use eminent domain, NorthernStar must have a Certificate issued by the FERC, and be unable to reach an easement agreement with a landowner. The FERC Order issuing a Certificate would include a determination of public convenience and necessity.
- PM5-19 As discussed in section 4.11.9.1, the pipeline must be designed, constructed, operated, and maintained in accordance with the DOT Minimum Federal Safety Standards in 49 CFR Part 192, which include protection from internal, external, and atmospheric corrosion. The unfortunate accident on the El Paso system occurred on an older pipeline that was not "pig-able." NorthernStar's proposed pipeline would be new pipe, welded with modern methods, that could be inspected with a pig.

		PMS RN-110707-FERCpm.txt	
PM5-20	2	rupture and an explosion that causes deaths,	
	3	can the people that voted "yes" be held	
	4	accountable for the deaths since they knew of	
	19:18:08 5	this possibility?	
PM5-21	6	We have so many renewable resources in	
	7	Oregon and Washington that are still untapped.	
	8	FERC should definitely say "no" to this project	
	9	and seek greener, renewable alternatives	
	19:18:23 10	instead of harming the planet for all future	
	11	generations.	
	12	Thank you.	
	13	MR. FRIEDMAN: Thank you for your	
	14	comments.	
	19:18:29 15	Next is Jeff Lovingfoss.	
PM5-22	16	MR. JEFF LOVINGFOSS: My name is Jeff	
	17	Lovingfoss, L-O-V-I-N-G-F-O-S-S. I'm here to	
	18	speak on behalf of Bradwood Landing and	
	19	NorthernStar. Their project will provide over	
	19:19:02 20	\$700,000 in construction costs. 110 million of	
	21	that will be wage and benefits for union	
	22	construction workers, over 2 million hours for	
	23	journeyman level and apprentice construction	
	24	workers in our community.	
PM5-23	19:19:18 25	As our economy grows, Canada's economy	34
	□		
	19:19:22 1	grows, and their need for natural gas increases	
	2	so the amount they will be able to provide us	
	3	with over the years will be reduced. If that	
	4	supply is reduced, costs will increase in this	
	19:19:33 5	area, which will make it hard for our	
	6	industries to compete.	
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- PM5-20 The FERC will approve or deny the project based on an evaluation of the project's merits, including environmental impacts and safety considerations. We address protection of public safety in section 4.11.
- PM5-21 The EIS discusses renewable energy resources as alternatives in section 3.1.1.3.
- PM5-22 Comment noted.
- PM5-23 Comment noted.

PM5 RN-110707-FERCpm.txt

7 Thank you.

8 MR. FRIEDMAN: Thank you for your

9 comments.

19:19:45 10 Next is Darrel Whipple.

11 MR. DARREL WHIPPLE: I'm Darrel Whipple.

12 D-A-R-R-E-L, W-H-I-P-P-L-E. I'm speaking on

13 behalf of Willapa Hills Audubon Society, a

14 public benefit organization of about 225

19:20:10 15 members in Cowlitz and Wahkiakum counties of

16 Washington, and Columbia County, Oregon. The

17 mission of our organization is to support

18 ecologically responsible ways of life, to help

19 maintain biologically diverse habitats, and to

19:20:29 20 promote environmental understanding and

21 enjoyment of nature.

22 My comments are on the turning basin

23 that's proposed. As I understand it, the

24 proposed turning basin section of 2.3.1 is to

19:20:46 25 be excavated in an aquatic conservation unit of

35

19:20:50 1 the estuary, which was so designated by Clatsop

2 County pursuant to the Coastal Zone Management

3 Act and Oregon Land Use Goal 16, estuary and

4 resources. That turning basin is appropriate

19:21:05 5 to development unit, not to a conservation

6 unit, where only minor navigational

7 improvements are sanctioned. It is an

8 unacceptable stretch to characterize this

9 proposed turning basin as a minor navigational

19:21:23 10 improvement.

11 Moreover, the applicant has not

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PM5-24 On March 20, 2008, the Clatsop County Board of Supervisors made its final decision giving approval to NorthernStar's consolidated application for permits, and changing the land use designation for the proposed maneuvering basin.

PM5 RN-110707-FERCpm.txt

PM5-25

12 demonstrated that the turning basin is
 13 necessary to the operation of the LNG terminal.
 14 If it is true, as I have heard, that there is
 19:21:36 15 sufficient space for an LNG tanker to be turned
 16 around, adjacent to the dock at Bradwood, then
 17 the only reason to excavate nearby in the
 18 conservation unit would be to lay claim to a
 19 bounteous supply of cheap sand for building up
 19:21:52 20 of the plant site to design specifications.

21 Then what a few years hence? Abandon the
 22 turning basin and avoid the nuisance and
 23 expense of maintaining it? What sort of
 24 guarantee does the applicant make that the
 19:22:07 25 turning basin is so essential to the operation

36

19:22:09 1 of the terminal that the company will be using
 2 it throughout the life of the plant? If the
 3 turning basin is just an excuse to tap a nearby
 4 source of sand at the expense of the structure
 19:22:22 5 and biology of a protected portion of the
 6 estuary, then the applicant has perpetrated a
 7 deception and should be granted no permits for
 8 this project.

PM5-26

9 My final comment generally about the DEIS,
 19:22:40 10 we have noticed several sections where there
 11 are incomplete portions. They may need to be
 12 submitted or actually written, and if there are
 13 such added portions to the DEIS, we believe
 14 that public comments on those portions should
 19:23:06 15 be allowed.

16 Thank you.

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PM5-25 Only about half of the 700,000 cubic yards of sand is needed to raise the grade at the LNG terminal site to the design specifications. The remaining sand must be removed to construct the maneuvering basin for the LNG carriers.

PM5-26 See our response to comment PM1-26.

PMS RN-110707-FERCpm.txt

17 MR. FRIEDMAN: Thank you for your
18 comments.

19 Next, if I mispronounce your last name,
19:23:19 20 please correct me. Brett VandenHeuvel.

21 MR. BRETT VANDENHEUVEL: That's Brett
22 VandenHeuvel. I'm the staff attorney for
23 Columbia Riverkeeper.

24 MR. FRIEDMAN: Brett, would you spell your
19:23:33 25 last name.

37

19:23:33 1 MR. BRETT VANDENHEUVEL: Sorry.
2 V-A-N-D-E-N-H-E-U-V-E-L.

PM5-27

3 Columbia Riverkeeper is an conservation
4 organization with over 1500 members. We're
19:23:46 5 also a part of the Lower Columbia Clean Energy
6 Coalition, which is a coalition of groups
7 including business groups, property rights
8 organizations, environmental groups that have
9 all joined together in an unprecedented joining
19:24:02 10 of groups of these types to oppose Bradwood as
11 an LNG terminal.

12 And a lot of us in this area have got a
13 big education analogy in the last three or four
14 years looking at Bradwood and looking at some
19:24:16 15 of the other sites, and there's a lot of
16 pessimism about FERC. People think FERC has
17 failed us on this. They've looked at the EIS,
18 which I have read, and I know a lot of people
19 in this room have read in detail. They think
19:24:29 20 it has been a failure, has a lot of holes in
21 it, includes a lot of misstatements,
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PM5-27 The Commission did not authorize the KeySpan LNG Project in Rhode Island (CP04-223 et al.). Impacts on salmon habitat from dredging the turning basin at the Bradwood Landing Project, and mitigation of those impacts are discussed in sections 4.3.2, 4.5, and 4.6.

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PM5-27
cont'd

PMS RN-110707-FERCpm.txt

22 misinformation that has been fed by
23 NorthernStar.
24 At this stage I still see some hope for
19:24:42 25 FERC in this process, some hope that FERC is 38
□

19:24:44 1 going to make the right decision right here.
2 I've been laughed at when I've said that; that
3 FERC has never rejected an LNG terminal, no
4 matter how bad it is, and that's true as far as
19:24:54 5 I understand.
6 MR. FRIEDMAN: No, it's not true.
7 MR. BRETT VANDENHEUVEL: Okay. What's
8 the --
9 MR. FRIEDMAN: There was a project in
19:25:00 10 Providence. Right? Yeah, there was an
11 application rejected in the Northeast.
12 MR. BRETT VANDENHEUVEL: The (inaudible)
13 in Providence?
14 MR. FRIEDMAN: No. I'm not sure exactly
19:25:10 15 where it was. It was the --
16 UNIDENTIFIED SPEAKER: KeySpan.
17 MR. FRIEDMAN: Yes, the KeySpan proposal.
18 MR. BRETT VANDENHEUVEL: I stand
19 corrected. Thank you.
19:25:21 20 UNIDENTIFIED SPEAKER: It was not a new
21 one.
22 MR. BRETT VANDENHEUVEL: So, other than
23 one out of many -- but I still have hope
24 because this one is an absolute no-brainer.
19:25:32 25 From all the other terminals that we've looked 39
□

PM5 RN-110707-FERCpm.txt

PM5-27 cont'd 19:25:34 1 at, there is nothing nearly as egregious as
2 approving this. People have talked about

PM5-28 3 ecologically the problems. Here it would be
4 dredging 58 acres of prime salmon habitat.
19:25:47 5 The United States, private individuals,
6 our organization have all spent hundreds and
7 hundreds of hours of time, millions of dollars
8 trying to restore this economically vital
9 salmon run, only to be degraded for the profit
19:26:02 10 of a private corporation. They hide from us
11 how it's going to be destroying salmon habitat;
PM5-29 12 filling 14 acres of wetland; a pipeline
13 crossing over -- the Palomar pipeline would
14 cross over over 70 water bodies in Oregon and
PM5-30 19:26:19 15 Washington. The proposed NorthernStar pipeline
16 would cross all the way across Cowlitz County,
17 ruining many water bodies, even if it's
18 horizontally directionally drilled.

PM5-31 19 Economically, there's great potential to
19:26:30 20 disrupt river traffic. The Cowlitz County
21 Association of Realtors, I find that very
22 interesting that they're opposing this project
23 because usually anything that brings jobs they
PM5-32 24 approve. Global warming was mentioned earlier.
19:26:43 25 LNG is not the same as domestic natural gas. 40
□

19:26:47 1 Two different studies have shown that it's
2 either 30 or 40 percent -- emits 30 or 40
3 percent more greenhouse gases than domestic
4 natural gas.

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- PM5-28 Past and current efforts to restore the Columbia River estuary are summarized in section 4.12.3. In addition, these efforts along with a detailed analysis of the project's effect on salmon habitat will be described in the revised BA and EFH Assessment.
- PM5-29 The Palomar pipeline is being evaluated under a separate EIS.
- PM5-30 As described in section 4.3, with the mitigation measures proposed and the use of HDD, impacts on waterbodies would be minor and temporary during pipeline construction.
- PM5-31 We do not believe that the project has great potential to disrupt other river traffic. See the discussion in sections 4.8.1.7 and 4.8.1.8
- PM5-32 Section 4.10.1 has been updated to include the estimated CO₂ emissions resulting from the construction and operation of the project. The end use of the natural gas that would be brought in through the proposed Bradwood Landing Project is outside the scope of the project and, consequently, is outside the scope of the EIS.

PM5-33 19:26:57 5 PM5 RN-110707-FERCpm.txt
And eminent domain was mentioned earlier.

6 It seems to be FERC's policy and the policy of
7 the United States government that whoever gets
8 their application in first is going to be
9 approved first. Everyone agrees that there's
19:27:12 10 not going to be very many of these LNG
11 terminals approved, so it's a race to get that
12 done first. That's very unwise energy policy.
13 FERC should look closely at the wisdom of the
14 location and the need for the gas and not just
19:27:27 15 approve whoever comes in the door first.

PM5-34 16 Lastly, on this -- lastly, safety.
17 NorthernStar is an energy speculator, funded by
18 investors out of New York. They're not a
19 reputable company. They've never built
19:27:40 20 anything. They've never built a gas station.
21 Dr. Jerry Havens, who's going to -- this is for
22 folks in the audience, too. Dr. Jerry Havens,
23 who is an expert on LNG safety, is in Oregon
24 this week, and he's going to present testimony
19:27:56 25 to you tomorrow night in Knappa. So I

19:27:58 1 encourage everyone to go out and see him.
2 I had the good fortune of meeting with him
3 today and some representatives of Oregon and
4 the federal government, and he wrote the model
19:28:08 5 that's used in 49 CFR 123 that FERC applies,
6 and in the EIS he flew all the way to Oregon to
7 tell you -- and I'm going to give you a little
PM5-35 8 precursor to tonight -- that NorthernStar and
9 FERC applied his model incorrectly and that

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PM5-33 The Commission's policy is to ensure that all proposed projects are environmentally sound and consistent with public safety, and then leave it to the market to determine which projects are constructed. To protect the environment and ensure safety, each individual project must be evaluated on the basis of its site-specific impacts. We therefore review applications for gas projects as they are filed, based on their individual merits.

PM5-34 NorthernStar would be required to construct and operate its project in accordance with applicable DOT regulations regardless of its corporate structure and, therefore, we believe the likelihood of a significant safety event is minimal. A discussion of reliability and safety is provided in section 4.11.

PM5-35 See our responses to Dr. Jerry Havens' comments, IND73-1 through IND73-5.

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PM5-35
cont'd

19:28:22 10 PMS RN-110707-FERCpm.txt
they vastly underestimated the safety
11 consequences of the vapor cloud dispersion
12 model.
13 In simple English, they say that a vapor
14 cloud fire is going to be much smaller than it
19:28:34 15 actually would be. So this is a very high-
16 consequence event. Granted, everyone agrees
17 it's low risk, but the consequence of this must
18 be analyzed, not only for the terminal itself,
19 but for the city of Astoria and the other
19:28:48 20 organizations --
21 MR. FRIEDMAN: Wrap it up.
22 MR. BRETT VANDENHEUVEL: -- and the other
23 population centers that it passes along the
24 route, including right across the river the
19:28:55 25 population center on Puget Island.

□ 42

19:28:58 1 So those are what quickly what we consider
2 to be the very negative aspects of this
3 proposal. As I said, I think it's a
4 no-brainer. I have hope that FERC can stand
19:29:11 5 strong and reject this application.
6 Thank you.
7 MR. FRIEDMAN: Thank you for your
8 comments.
9 We're going to guess on this. It's hard
19:29:42 10 reading the writing. Marcie Denison? Your
11 turn to speak. And if you could spell your
12 last name for the court reporter.
13 MS. MARCIA DENISON: I'm Marcia Denison.
14 MR. FRIEDMAN: If you can push the

Page 35

PM5 RN-110707-FERCpm.txt
 19:30:01 15 microphone down a bit. He was really tall.
 16 MS. MARCIA DENISON: Marcia Denison,
 17 Pacific Rainforest Guardians. Just a second.
 18 MR. FRIEDMAN: Can you spell your last
 19 name for the court reporter, please.
 19:30:20 20 MS. MARCIA DENISON: D-E-N-I-S-O-N.
 21 MR. FRIEDMAN: Thank you.
 PM5-36 22 MS. MARCIA DENISON: I can't get past the
 23 part where a branch of our military would be
 24 commandeered and they would -- could possibly
 19:30:35 25 kill anybody that's in their way. I mean, that
 □ 43
 19:30:37 1 part -- you know, I kind of stumble over that
 2 one from the beginning, you know. But also
 3 their lack of concern for anybody else with
 4 something that dangerous. They shouldn't even
 19:30:52 5 have a license to operate. When you got
 6 something really dangerous, you got to be
 7 really concerned about people around you. They
 8 won't even set the gas to prevent a disaster
 9 from happening. They don't care.
 19:31:09 10 My handwriting is terrible, isn't it?
 11 Okay.
 12 LNG ships are not allowed in California,
 13 and they must not be allowed in Oregon because
 14 they are too dangerous. I mean, you know, this
 19:31:23 15 is just plain as the nose on your face, isn't
 16 it?
 17 NorthStar must not be allowed to risk
 18 burning our forests and killing our wildlife in
 19 case of an accident. If they don't care enough

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PM5-36 Safety and security issues are addressed in section 4.11.

PM5-36 19:31:42 20 PM5 RN-110707-FERCpm.txt
 to set the gas, you know there's a good
 cont'd 21 likelihood of an accident happening.
 PM5-37 22 Okay. They don't care if they suck up all
 23 the young salmon into their bilge water. They
 24 don't even bother to put a screen on the intake
 19:32:01 25 of the bilge pump. They take the salmon and
 □ 44

19:32:07 1 dump them off in Indonesia. What's that for
 2 the environment? Is that good for the
 3 environment? No. They get a big "F" for EIS.
 4 Okay?

19:32:18 5 I'm struggling on this. Okay.

PM5-38 6 The air is so bad already. In Longview
 7 and Rainier area, all that crap drifts across
 8 the river. I can't even see the hill four
 9 blocks away when -- there's too many
 19:32:34 10 smokestacks now. The lower Columbia industrial
 11 area is ignored by the EPA. They don't monitor
 12 all this horrible pollution that we have from
 13 all these smokestacks. They just turn their
 14 back on it because it's not up around Seattle
 19:32:50 15 someplace.

16 And there's a very, very high rate of lung
 17 cancer and other lung diseases here, and we
 18 don't need any more smokestacks. All that is
 19 is going to fuel a whole bunch more smokestacks
 19:33:01 20 and kill people, and we don't want it. It's
 21 bad. It's frustrating not being able to get
 22 the government authorities to do something
 23 about it, too.

24 Okay. Oh, man. Okay. We need the air

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PM5-37 See our response to comment FA1-28.

PM5-38 As documented in section 4.10.1 of the EIS, the Bradwood Landing project would comply with applicable air quality regulations that have been established by federal and state agencies to be protective of the public and the environment, in order to minimize impacts of air pollution generated from the project.

PM5-38 19:33:21 25 PM5 RN-110707-FERCpm.txt
 cleaned up in the lower Columbia industrial 45
 cont'd

19:33:24 1 area. We don't need more plants, and don't
 2 make it worse, please. And I think that's all
 3 I had to say. Let's see.
 4 Oh, yeah. We want wind and wave power.

19:33:36 5 We don't want any more smog and carbon dioxide.
 6 The global warming is -- is shocking now. I
 7 mean, it's time to slam on the brakes. A good
 8 place to start. Thank you.

9 MR. FRIEDMAN: Thank you for your
 19:33:50 10 comments.
 11 Again, correct me if I mispronounce your
 12 name, John Koehler. And, John, please make
 13 sure you spell your last name for the court
 14 reporter.

19:34:12 15 MR. JOHN KOEHLER: You got the
 16 pronunciation correct. K-O-E-H-L-E-R. I am,
 17 as far as I know, not on the pipeline. At
 18 least I hope I'm not.

PM5-39 19 A few things I'd like to mention right
 19:34:27 20 now. They're really in the form of questions
 21 for your final draft, to address, not comments
 22 as your preliminaries said. The question
 23 that's already been brought up about the
 24 question of safety I think is one that's very,
 19:34:43 25 very important. Yes, the chances are very low. 46
 19:34:49 1 At least we most certainly all hope they're
 2 low. However, the chance was very low for
 3 Three Mile Island, for Chernobyl.
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PM5-39 The FERC does not choose the locations for proposed LNG terminals. The location is chosen by the applicant and the FERC determines if the location meets the applicable safety standards. See section 4.11.

		PM5 RN-110707-FERCpm.txt	
PM5-39	4	You locate things that are very, very	
cont'd	19:34:59 5	dangerous in places that make sense. You don't	
	6	locate a nuclear power plant at the head of a	
	7	waterway that will pollute all the waterways if	
	8	something happens. You don't plant places at	
	9	the top of a windy mountain so that if you have	
	19:35:15 10	a meltdown, you have that wind spreading things	
	11	all over the place. You don't put it in the	
	12	middle of a large population base.	
	13	I hope that when you're doing your safety	
	14	consideration, you're not only looking at the	
	19:35:29 15	possibility of danger, of an accident and the	
	16	impact, but the location. Is this really a	
	17	safe place to put it? Is it really an	
	18	appropriate place to put it? You're talking	
	19	about the largest river in the United States,	
	19:35:45 20	one that has tremendous tidal flow and current	
	21	flow through there.	
	22	Any kind of an act that's going to carry	
	23	that liquid natural gas a long distance very,	
	24	very quickly, is not going to be a	
	19:35:59 25	lackadaisical situation, where you have plenty	
	□	47	
	19:36:02 1	of time to respond. It's going to spread	
	2	itself very rapidly to a very wide area. So I	
	3	hope those are issues that you're looking at	
	4	very carefully.	
PM5-40	19:36:12 5	Secondly, the reason that I don't believe	
	6	that I'm on the gas line is because they were	
	7	intending to come up in the middle of my	
	8	property, and they discovered when they did	
		Page 39	

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PM5-50 See our response to comment PM3-60.

		PMS RN-110707-FERCpm.txt	
PM5-40	9	some studies -- this is secondhand, but my	
cont'd	19:36:25 10	understanding -- I purchased the property a	
	11	year and a half ago, and in talking with the	
	12	people I purchased the property from, my	
	13	understanding was is that they decided that my	
	14	property was not adequate because of severe	
	19:36:39 15	slide dangers.	
	16	They've moved the location where they are	
	17	intending to bring it up, I believe, about a	
	18	quarter of a mile into my neighbor's yard. I	
	19	hope that you are doing appropriate studies and	
	19:36:54 20	looking at very carefully to make sure that	
	21	that short distance of travel is enough that	
	22	the threat of landslides really has been	
	23	eliminated. So, you know, it's -- I'll leave	
	24	it at that.	
PM5-41	19:37:14 25	The third issue I'd like to question, ask	48
	19:37:17 1	a question about, is we already have in	
	2	Washington a natural gas line that goes right	
	3	through that area. Why, if we're going to use	
	4	eminent domain to put in an additional gas	
	19:37:31 5	line, would we not put it in the exact same	
	6	route?	
	7	It seems to me that if you're talking	
	8	about minimizing environmental impact, the best	
	9	way to possibly reduce the impact of natural	
	19:37:47 10	gas lines is to lay two of them side by side,	
	11	space them apart whatever distance is	
	12	appropriate to make sure that there's no	
	13	accidental breakage of one line while you're	
		Page 40	

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PM5-41 See our response to comment SA3-7. The proposed Bradwood Landing Pipeline is adjacent to the existing KB pipeline for as much of its length as possible for about 8 miles between MPs 19.4 and 36.3 in Cowlitz County, Washington. It deviates away from the KB pipeline in places to reduce geological hazards, waterbody crossing impacts, or residential conflicts.

PM5-41
cont'd

PMS RN-110707-FERCpm.txt

14 working on the second line, and run the line
15 exactly the same spot. It seems to me that you
16 can't make smaller environmental imprint than
17 doing that rather than running a second gas
18 line that's separated in some cases completely
19 encircled property, making the values very,
19:38:21 20 very low. And that's it.
21 MR. FRIEDMAN: Thank you, John.
22 Vonda Kay Brock.
23 MS. VONDA KAY BROCK: Good evening. I'm
24 hoping that you will not --
19:38:44 25 MR. FRIEDMAN: Please spell your name.
□ 49

19:38:46 1 SPEAKER: My name is Vonda Kay Brock.
2 Last name is B-R-O-C-K. I live out of
3 Longview, up in the hills, a place called
4 Stella. And I'm hoping that I can get
19:38:58 5 everything said that I need to say in my three
6 minutes time.
7 MR. FRIEDMAN: And if not, you can send in
8 detailed written comments to the commission.
9 MS. VONDA KAY BROCK: Right. I understand
19:39:05 10 that. But I have just this little small thing,
11 but I don't read very well tonight. I'm having
12 a little difficulty. So I hope you'll just
13 bear with me and let me get my statement said.
14 Thank you. Thanks.
19:39:26 15 First of all, I've heard some very
16 interesting comments here tonight, and I think
17 that some of those comments are very
18 far-reaching, and FERC is an organization that
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PM5 RN-110707-FERCpm.txt

PM5-42 19 needs to also be far-reaching. You need to be
 19:39:41 20 thinking ahead rather than at the moment. And,
 21 therefore, some of these statements that have
 22 been made in regard to the DEIS should be
 23 considered very carefully, because you can't
 24 judge whether -- that's one of the issues that
 19:40:02 25 we have here in the Pacific Northwest, is a lot
 □ 50

19:40:04 1 of hydrology, a lot of geology, and a lot of
 2 both of them getting mixed together, which
 3 means that we have slippery slopes all over the
 4 place. And Washington is number two in the
 19:40:17 5 nation as far as frequencies of earthquakes,
 6 also.

PM5-43 7 However, what I have to say is something
 8 about the fact that this DEIS thing is a
 9 redundancy. Shouldn't even -- you shouldn't
 19:40:29 10 have to be here. You shouldn't have to be here
 11 tonight listening to us. And the reason you
 12 shouldn't have to be here is because FERC
 13 already had a good plan, and I want to tell you
 14 a story about that plan.

19:40:45 15 I have right here statements published in
 16 December of 2003 by FERC. The title of this
 17 statement is California Natural Gas Market
 18 Outlook. And a statement of interest that I
 19 quote in that is: Planned gas-fired electric
 19:41:02 20 plant in the West for the period 2003 to 2006
 21 will be located along the major interstate
 22 national -- natural gas pipelines and along the
 23 intrastate natural gas pipelines in California.
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PM5-42 Geological hazards are addressed in section 4.1 of the EIS. Also see our responses to comments SA1-4 and LA7-25.

PM5-43 See response to comment PM1-23.

PM5-43

cont'd

PM5 RN-110707-FERCpm.txt

24 Another FERC statement from that same
 19:41:17 25 paper says: Between 2006 and 2009,
 □
 19:41:22 1 approximately 8.65 billion cubic feet per day
 2 of natural gas may be available to California
 3 from potential LNG import terminals to be
 4 located in California and Baja California, but
 19:41:38 5 then the wars began. California doesn't want
 6 LNG. The people don't want LNG. I have a map
 7 here that has 21 locations on it that have been
 8 either stopped completely or they're stranded,
 9 because the LNG facilities can't go any further
 19:41:58 10 right now.
 11 The wars have started. California --
 12 here's a map showing 21 California/Baja
 13 California LNG projects put on hold or
 14 discontinued. No LNG. World War III developed
 19:42:17 15 between Conoco Phillips, Marathon, Chevron,
 16 Texaco, Sempra, and Shell to gain the permit
 17 for Baja California LNG. I'm sure you're all
 18 familiar with that. Sempra and Shell joined
 19 forces, and they won that war. And that's what
 19:42:33 20 we mean when we say first come, first serve
 21 with FERC. First come, first serve. The first
 22 one on the block is the one who gets the apple.
 23 Sempra has since dedicated \$11 billion to
 24 develop their West Coast infrastructure.
 19:42:47 25 Sempra experienced a huge blow when their
 □
 19:42:51 1 Frontier Line coal-fired electric generator

51

52

Public Meetings

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PM5-43
cont'd

2 PMS RN-110707-FERCpm.txt
plant and their sunrise link coal-fired
3 electric generator plant and subsequent
4 interstate transmission lines failed.

19:43:03 5 MR. FRIEDMAN: Ms. Brock, can you wrap it
6 up?
7 MS. VONDA KAY BROCK: After those defeats
8 and the loss of the Frontier Line campaign,
9 California energy czar Joseph F. Desmond --
19:43:12 10 Sempra switched gears and concentrated on LNG
11 gas-fired generators. They are now working to
12 achieve that end, and Joseph Desmond is still a
13 familiar name in that same pursuit. Joseph
14 Desmond championed Sempra's Frontier Line and
19:43:29 15 now champions NorthernStar's Bradwood Landing
16 as senior vice president of external affairs.
17 The gas and oil exploration by the name of
18 Venoco owns Grace Oil Platform that
19 NorthernStar has contracted to purchase for an
19:43:42 20 offshore LNG terminal in California. Venoco
21 now has plans to explore for natural gas in
22 this region and is aware of previous
23 explorations which discovered potential natural
24 gas storage chambers in the region. Sempra has
19:43:53 25 no storage chambers in their territories. 53
□

19:43:56 1 Sempra's chairman of finance is on the board of
2 directors of Venoco. Now comes Northwest --
3 MR. FRIEDMAN: Please wrap it up and you
4 can send in details.
19:44:06 5 MS. VONDA KAY BROCK: I will take one more
6 minute.

PM5-43

cont'd

7 PMS RN-110707-FERCpm.txt
 -- a partner with NorthernStar and

8 TransCanada, Palomar natural gas pipeline

9 project. It turns out that a Mr. Henry Morse,

10 president and former CEO of TransCanada, is the

11 general manager of the North Baja California

12 pipeline, Semptra's LNG hook-up, and is also the

13 project manager for the Palomar project, which

14 will mesh with Bradwood Landing and intends to

15 accommodate the Midwestern and Southwest

16 natural gas markets.

17 Now, the last quote from your FERC people.

18 Another FERC 2003 quote: In 2011, increased

19 pipeline capacity in the West is projected to

20 serve the Midwest, primarily, and California to

21 a lesser extent.

22 We don't need this pipeline coming through

23 Washington because it isn't for us. It isn't

24 for us at all. Now, it's about big government,

19:44:56 25 it's about big money, and it's not about Oregon

19:44:59 1 and Washington, who want to stay green, who

2 want to stay clean, and who want to step

3 forward quickly on renewable energy resources.

4 We don't need plan B. Thank you.

19:45:09 5 MR. FRIEDMAN: Thank you for your

6 comments. And if you have detailed comments,

7 please mail them to us.

8 Nancy Munk Christie.

9 MS. NANCY MUNK CHRISTIE: My name is Nancy

19:45:31 10 Munk Christie. My last name is

11 C-H-R-I-S-T-I-E. I'm here on behalf of myself

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PM5 RN-110707-FERCpm.txt
 12 and also my mother, Audrey Munk, who has sent
 13 you her own comments already. Her home, in
 14 which three generations of our family have
 15 lived, has been described as at ground zero for
 16 this pipeline. She's been -- she's 86 years
 17 old. She's been in this home since she was a
 18 child. She would -- her family was there
 19 before that. It's at mile marker 34, and I
 19:46:08 20 also live at that residence.

PM5-44

21 If I were not opposed to this for the
 22 personal reasons that it's going to destroy our
 23 family home, I would be opposed to it for many
 24 other reasons. First, around our location,
 19:46:25 25 which is on 40 hilly acres, the ground is

55

19:46:29 1 extremely unstable. Every year for the last
 2 six years I've had to spend a substantial
 3 amount of my time helping clean up from a
 4 full-size fir tree that has fallen or has had
 19:46:44 5 to be cut from disease or age.

6 The area where this pipeline is going to
 7 go through has many, many full-size fir trees
 8 around it. I often worry that one of them is
 9 going to fall on our house. I greatly fear

19:46:58 10 what would happen if one of them fell across
 11 this pipeline. So I'm wondering, would they
 12 cut every tree, you know, within miles of it so
 13 they wouldn't fall down? These are very big
 14 trees.

PM5-45

19:47:12 15 If I were not opposed to it, again, for
 16 personal reasons, I would still be opposed to

Page 46

PM5-44 See our response to comment PM3-6. Section 4.4.2 discusses potential project impacts on forest. The pipeline would be installed underground, and therefore would not be affected by falling trees. Section 4.4.2.3 describes how the permanent right-of-way would be maintained in areas of upland vegetation, including forested areas.

PM5-45 No one would lose their property because of this project. Along the pipeline, NorthernStar would have a 50-foot-wide utility easement, but the land would still belong to the original owner. The project is located in a rural area, and would therefore affect fewer people than if it were located in a densely populated urban center. The location of the LNG terminal was chosen, in part, because it was a previously existing industrial facility accessible to LNG carriers. The portion of the pipeline route in Washington was chosen largely because it is collocated for a majority of its length with the existing KB pipeline, which would minimize the potential for environmental impacts. Impacts on salmon are addressed in sections 4.5 and 4.6; CO₂ emissions are addressed in section 4.10; and environmental justice is addressed in section 4.8.

PM5-45

cont'd

17 PM5 RN-110707-FERCpm.txt
it for the larger reasons, for the reasons
18 others have mentioned: For the salmon spawning
19 ground problems, for the CO2 emissions, for all
19:47:25 20 the other people who may lose their property.
21 But I am especially enraged over what I would
22 call environmental justice.
23 Whenever a company like NorthernStar and
24 the others who have filed for permits have a
19:47:40 25 very questionable and nasty environmental
□

56

19:47:43 1 project that they can't seem to manage to site
2 in a large-population area which it's
3 ultimately going to benefit, they try to run it
4 through a rural area, more sparsely populated,
19:47:54 5 where they think perhaps people will jump at
6 the jobs and the chance for industry. And I'm
7 just really enraged that they think that this
8 area where I grew up is -- falls into that
9 category.

19:48:10 10 I think you can see by the comments of the
11 people around here tonight that this is an
12 activist, educated population who are not going
13 to let this issue drop. And if they think this
14 is -- this is a place where they can put this
19:48:26 15 pipeline because people are so desperate for
16 it, they have another thing coming.

PM5-46

17 The few extra jobs, the extra initial
18 possible boost to the economy, I think, is
19 shortsighted. I think in the long term this
19:48:40 20 will be a disaster for this area. Even the
21 larger area, the other ports -- Portland,

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5

PM5-46 Based on our discussion in sections 4.8.1.7 and 4.8.1.8, we believe the project would not have any significant impacts on shipping or on other users of the Columbia River.

PM5-46 22 PMS RN-110707-FERCpm.txt
 cont'd 23 Kalama -- it will be terrible. It will damage
 24 all the other shipping to the exclusion of the
 19:48:57 25 LNG, and I really do not want to see this
 happen in my home.

57

19:48:58 1 Thank you.
 2 MR. FRIEDMAN: Thank you for your
 3 comments.
 4 Next is -- please correct me when I
 19:49:06 5 mispronounce your names. Leslie Hildula.
 6 MS. LESLIE HILDULA: Yes.
 7 MR. FRIEDMAN: And don't forget to spell
 8 your name for the court reporter.
 9 MS. LESLIE HILDULA: Leslie Hildula.

19:49:18 10 H-I-L-D-U-L-A.
 PM5-47 11 I have a farm in Clatskanie. It looks
 12 like is a possibility that the pipeline will go
 13 through our farm, and the farm has been in our
 14 family since the '30s, and so that's probably
 19:49:32 15 my initial objection to it. It doesn't seem
 16 like the best use of the land or of the river
 17 of this area. When healthy, this land and the
 18 river has the potential to support a lot of
 19 jobs, create a lot of food, and it's not what I
 19:49:48 20 consider the best and highest use of the land
 21 or the river.

PM5-48 22 Second of all, the point that other people
 23 have made is that California rejected it
 24 because of concerns. They are the primary
 19:50:02 25 customer; then why should we be so foolish as

58

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PM5-47 As discussed in section 4.4.2.3, agricultural land would be allowed to revert to its previous use after construction of the proposed pipeline. Therefore, we do not believe that this project would reduce the potential for the region to produce food. Nor should the project have a negative impact on other river users (see our response to comment PM5-46). Local land use is discussed in section 4.7.

PM5-48 See our response to comment PM1-23.

PM5 RN-110707-FERCpm.txt

19:50:05 1 to allow it?

PM5-49 2 Three, the other issue that concerns me,
3 it seems that we're putting -- we have a lot of
4 difficulty, including fighting wars, with
19:50:13 5 foreign energy, and it doesn't seem like the
6 best use of our government resources or even of
7 our nation's resources to be spending time
8 developing an energy source that is not
9 domestic.

PM5-50 19:50:22 10 And my final point gets into wanting to
11 support renewable sources of energy. I'd be
12 willing to pay more taxes. I drive vehicles
13 that use biofuels, and I would love to have
14 subsidies for domestic renewable sources of
19:50:39 15 energy and to put our efforts there instead of
16 into an LNG facility that has such potential to
17 hurt our land and our river.
18 And I also want to say thank you for being
19 here. I appreciate the opportunity to come
19:50:53 20 here tonight, the fact that you held some more
21 public input meetings, and that you're taking
22 the time to take our testimony.
23 MR. FRIEDMAN: Thank you for your
24 comments.

19:51:07 25 Now I've reached the time where people
□

19:51:09 1 would be talking who have previously spoken at
2 other meetings. So before I give them that
3 opportunity, I want to know if there's anyone
4 else who has not signed up who wishes to speak,
19:51:17 5 who did not speak at an earlier meeting. If
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PM5-49 As section 1.1 briefly explained, the purpose of the project is to provide another source of natural gas, by importing LNG from countries with large reserves, to supplement domestic supplies.

PM5-50 See our response to comment PM5-21.

PMS RN-110707-FERCpm.txt

6 you do, please raise your hand.

7 MS. MELISSA WILKIE: I haven't spoken.

8 MR. FRIEDMAN: All right. And you'd like

9 to speak? Come on up, please, to the

19:51:27 10 microphone and have an opportunity. Just

11 remember to state your name for the record and

12 spell your last name.

13 MS. MELISSA WILKIE: Hi. Thanks for being

14 here tonight. My name is Melissa Wilkie,

19:51:41 15 W-I-L-K-I-E. I live west of Longview near the

16 site where the pipeline's coming through.

PM5-51 17 I'm here this evening to address the lack

18 of concern on the part of NorthernStar and our

19 federal government when it comes to the safety

19:51:54 20 of the citizens who will live along the

21 pipeline corridor. In the DEIS, pipeline

22 safety is basically mentioned in only regard to

23 laws and the Pipeline Safety Act of 1968. In

24 fact, the term "pipeline emergency" is only

19:52:08 25 mentioned once.

□

60

19:52:09 1 Beginning on page 4-440, part 192 of the

2 law explains area classifications are based on

3 population density in the vicinity of the

4 pipeline, with "vicinity" defined as 220 yards

19:52:22 5 on either side of the pipeline along one

6 continuous mile of pipeline. Areas are divided

7 into classes, depending on the number of

8 buildings. Most of the pipeline route is

9 designated class one and class two, for a total

19:52:37 10 of 33.3 miles.

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PM5-51 NorthernStar would be required to construct its pipeline in accordance with the safety regulations in the DOT's Minimum Federal Safety Standards in 49 CFR Part 192 regardless of Class location.

		PM5 RN-110707-FERCpm.txt	
PM5-51	11	No homes within that distance are	
cont'd	12	considered HCAs, or high consequence areas,	
	13	meaning our federal government considers those	
	14	living in the class one and two areas	
	19:52:50 15	acceptable risks in case of a pipeline failure.	
PM5-52	16	Additionally, on page 4-442 it is clearly	
	17	stated no additional specialized local fire	
	18	protection would be required to handle pipeline	
PM5-53	19	emergencies. Southwest Washington is an area	
	19:53:05 20	where three pipeline explosions have happened	
	21	in the last 20 years, with two of those events	
	22	happening in Cowlitz County, all due to	
	23	ground-shift issues, each within short miles of	
	24	this proposed pipeline.	
	19:53:19 25	Section 4.11.9.2, pages 4-442 to 4-444,	61
	19:53:26 1	pipeline accident data, absolutely no mention	
	2	of William Northwest pipeline issues, multiple	
	3	leaks and explosions resulting in the emergency	
	4	shutdown of the 24-inch line and transfer of	
	19:53:40 5	capacity to the parallel 30-inch line.	
	6	How many people in this room were even	
	7	aware the smaller Williams line running through	
	8	Cowlitz County had been abandoned because	
	9	repairs were too costly? There is no need for	
	19:53:53 10	the additional capacity. The remaining	
	11	operational 30-inch line was exposed during	
	12	heavy rains last winter and floated into the	
	13	Toutle River.	
	14	Section 4.11.3 on page 4-444, impact on	
	19:54:09 15	public safety. When national figures are used	
		Page 51	

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- PM5-52 Section 4.11.9.1 states that NorthernStar would provide appropriate training to emergency services personnel but no additional specialized fire protection equipment would be required for the pipeline. The equipment used by typical fire departments is appropriate to respond to natural gas incidents.
- PM5-53 See our response to comment PM2-16.

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PM5-53
cont'd

16 in support of the regional issue, at best those
17 figures should be considered skewed. Regional
18 topography, climate, seismic activity, winds,
19 et cetera, create issues specific to a region.

19:54:24 20 What happens in southwest Washington is not the
21 same as what happens in the high-plains area of
22 central and eastern Washington.

23 Therefore, using a figure of potentially
24 -- of potential fatality every 2,752 years is
19:54:42 25 ludicrous. Tell that to the families with the
□

19:54:44 1 12 people who died as a result of the El Paso
2 pipeline explosion in the '90s. The force of
3 the explosions associated with the disaster was
4 strong enough to set off three seismic readings
19:54:53 5 that were used as evidence in wrongful-death
6 lawsuits against El Paso.

7 Ground shift is enough of a concern in
8 this area that Mike Kay would -- with Northwest
9 Natural Gas, NorthernStar's partner, has told
19:55:07 10 more than one landowner that following the KB
11 pipeline is not an option along most of the
12 route for that exact reason. No human life is
13 an acceptable risk, and for this data to be
14 left out or generalized is unacceptable.

19:55:22 15 Thank you.

16 MR. FRIEDMAN: Thank you for your
17 comments.

18 Again, I would ask if anyone who has not
19 spoken previously who wishes to speak, please
19:55:34 20 raise your hand now. Please come on up, and
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21 you have the opportunity. I just ask that you
 22 state your name and spell your last name for
 23 the record.

24 MR. JERRY JANSSEN: I can do that. My
 19:55:45 25 name is Jerry Janssen, J-A-N-S-S-E-N. So 63
 □

19:55:50 1 anyways, I'm not real prepared here. I'm not
 2 going to -- I don't have the draft EIS. I'm
 3 just going to give you a couple of my opinions.

PM5-54

4 First of all, in the overall project, I
 19:56:01 5 grew up in Astoria, and I remember, you know,
 6 20, 30 years ago, fishing was a very large
 7 industry down there, and it pretty much has
 8 dwindled away. So with that in mind, it kind
 9 of doesn't make sense for me, even though I
 19:56:17 10 don't live there but I still have family and
 11 friends there, to -- how they can think that
 12 they're going to spend a bunch of money to
 13 bring the salmon back or protect the salmon,
 14 and on and on and on, while they're doing so
 19:56:31 15 much damage to the river. Okay? The salmon
 16 haven't come back in 30 years, so I don't
 17 know -- money isn't going to make them come
 18 back.

PM5-55

19 The other thing that kind of concerns me
 19:56:41 20 is, you know, you put this plant at the mouth
 21 of the -- near the mouth of the Columbia and
 22 bottleneck it, when you got four or five ports
 23 upriver, and supposedly these ships have to be
 24 escorted in and out, which nobody really knows
 19:56:59 25 for sure because the Coast Guard is being very
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PM5-54 See our response to comment PM3-68.

PM5-55 The Coast Guard determines how LNG carriers would be escorted in its WSR and LOR. With expansion of the vessel traffic information system, we do not anticipate significant impacts on shipping traffic during operation of the project. See also our response to comment PM5-46.

PM5-55 19:57:02 1 hushed on what's actually required. Okay?
 cont'd 2 So, you know, people up the river I don't
 3 think realize -- maybe they do. I don't
 4 know -- that it's going to affect the shipping,
 19:57:16 5 you know, more than just the mouth of the
 6 Columbia.

PM5-56 7 The jobs. You know, I have friends that
 8 are union, you know, carpenters and jobs are
 9 good. Okay? So they're going to go work for a
 19:57:31 10 couple years maybe, get their pay, move on, and
 11 everybody's got families to support. That's
 12 fine. I don't have a problem with that. Five
 13 years from now or five years from when the
 14 plant's built, you know, you got 20, 30, maybe
 19:57:44 15 40 people working at this plant, probably
 16 aren't going to be from this area, probably are
 17 going to be more, you know, technical people.
 18 So, I don't know, you know, shortsighted. Who
 19 knows? I don't know.

PM5-57 19:58:00 20 The other thing that kind of concerns me,
 21 and this is now more of a personal deal, is
 22 probably for the last five years I've worked my
 23 ass off to buy this piece of property and built
 24 my house for my family, my kids. So now I get
 19:58:20 25 this rumor starting a few years ago that this
 19:58:23 1 pipeline is coming and pretty much going to go
 2 up 450 feet of my five acres that I own. So --
 3 but there again, I don't know for sure because

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5

PM5-56 As discussed in section 4.8.2.4, operation of the Bradwood Landing Project would result in about 65 new permanent positions. In addition, tug operations necessary to support the LNG terminal would require about 40 employees. NorthernStar plans to hire mostly local residents for operation of the proposed project.

PM5-57 Landowner compensation and the easement negotiation process are discussed in section 4.8.3.3. See our response to comment PM3-6. This project was not rushed, and was not kept a secret. We discuss dissemination of information about the project to the public in section 1.4. NorthernStar entered the Pre-filing review process with the FERC in March 2005, and we issued a Notice of Pre-filing Review on March 18, 2005. We issued a Notice of Intent to Prepare an EIS on September 13, 2005, and held public scoping meetings in Knappa, Oregon on September 29, 2005 and Cathlamet, Washington on October 26, 2005. NorthernStar filed its applications in June 2006, and the FERC issued a Notice of Application on June 15, 2006. NorthernStar was required to contact landowners along the route of its project according to our Pre-filing guidelines and regulations at 18 CFR 157.69(d)(5). We produced our draft EIS in August 2007, and held public meetings to take comments on the draft EIS in Knappa and Clatskanie, Oregon and Longview and Cathlamet, Washington in early November 2007. Our notices went out to federal, state, and local officials and agencies, non-governmental organizations and regional environmental groups, Indian tribes and Native American organizations, landowners, and local libraries and newspapers.

PM5-57
cont'd

PM5 RN-110707-FERCpm.txt
nobody can give us a straight answer. okay?

19:58:38 5 Because a lot of this is hushed.

6 So I'm at the point where I don't know
7 what I'm supposed to do with my property. Do I
8 let the -- let them come in? Do I get a
9 lawyer? Do I fight it? Can I fight it? I
19:58:52 10 don't have, you know, money to fight it. You
11 know, so there you go. I just -- I don't know.
12 I think the project is moving ahead too
13 quickly, and with all these comment periods, 30
14 days or whatever they are, and the decisions
19:59:07 15 are too big to be made in that short of time.
16 And the only information that I've really
17 received directly was a letter a few years ago
18 from somebody basically asking permission to
19 survey my property. And being on the pipeline
19:59:28 20 route, I haven't received anything else in that
21 amount of time, other than this Corps of
22 Engineers report that was inaccurate. And it's
23 just -- there's so many questions to be
24 answered, I just don't really see how it can be
19:59:45 25 done in 30, 40 days or whatever the time line

□

19:59:47 1 is. So anyways, thank you.
2 MR. FRIEDMAN: Thank you for your
3 comments.
4 As those of you know, in our notice of
19:59:55 5 availability, there is 120-day comment period
6 on the DEIS, 120 days. So don't think that's a
7 short time or period.
8 UNIDENTIFIED SPEAKER: Could you mention

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 the deadline, please, Paul.

20:00:10 10 MR. FRIEDMAN: The deadline is December
 11 24, 2007, for comments on the DEIS. If you
 12 don't know if you are a property owner on the
 13 pipeline, there are NorthernStar
 14 representatives in the room. Please talk to
 20:00:22 15 them. I think they can tell you whether or not
 16 their pipeline is crossing your property.
 17 Next on -- no. Once again, is there
 18 anyone who has not spoken who would like to,
 19 who has not spoken before? Please come up,
 20:00:39 20 state your name, and spell it for the court
 21 reporter.
 22 MS. NANCY ASHLEY: I'm Nancy Ashley.
 23 A-S-H-L-E-Y.
 24 I was raised Native American. This land,
 20:00:52 25 the trees, the fish, the rivers, the mountains,
 26
 20:00:55 1 all of it is our religion. It's our life.
 2 It's our great spirit. This river is a living
 3 entity. It's not just something to be used to
 4 make money for big business, to benefit
 20:01:08 5 somebody on the other side of the earth. The
 6 U.S. government has run over us from the
 7 beginning. Thank you.
 8 (Applause.)
 9 MR. FRIEDMAN: Thank you for your
 20:01:19 10 comments.
 11 Is there anyone else who has not
 12 previously spoken who would like an opportunity
 13 to do so at this time? If not, I'm going to
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PM5-58 We discuss consultations with Indian tribes and Native American organizations in section 4.9.3.

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14 start calling on people who have previously
 20:01:31 15 spoken but want a second opportunity.
 16 Duncan, you're the first. And don't
 17 forget when you come up here to restate your
 18 name and spell it again for the court reporter.
 19 I'm sorry that that's redundant.
 20:01:42 20 MR. DUNCAN MacKENZIE: Good evening. My
 21 name is Duncan McKenzie. D-U-N-C-A-N,
 22 M-A-C-K-E-N-Z-I-E.
 PM5-59 23 Your attention is directed to the
 24 discussion of routine discharge condensing
 20:01:52 25 water from the submerged combustion vaporizers 68
 20:01:54 1 as found on pages 4-149 and 4-150 of the DEIS.
 2 It is noted that the discharge will be
 3 approximately 68 degrees and will contain a
 4 concentration of total dissolved solids of ten
 20:02:07 5 times the concentration found in the river.
 6 It is assumed that the dissolved solids
 7 are the reaction products arising from the
 8 treatment using caustic soda to adjust the PH
 9 of the condensive water to a neutral state, and
 20:02:21 10 these reaction products are typically carbon,
 11 sodium carbonate and sodium nitrate.
 12 The National Marine Fishery Service has
 13 commented on this aspect in its request for
 14 additional information on the Bradford Landing
 20:02:34 15 LNG terminal on page 10, lines 27 through 43.
 16 The applicant has partially replied to the
 17 National Marine Fishery Service in a letter
 18 dated the 6th of July on pages 25 and 26: The

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PM5-59 The temperature of the SCV discharge would meet Oregon Standards without treatment. As stated in section 4.3.2.3 using LNG in a heat exchange process to further cool the SCV discharge would not be economically feasible or practicable at the Bradwood Landing LNG terminal.

PM5-59
cont'd

19 PM5 RN-110707-FERCpm.txt
scaling down of a heat exchanger system to use
20 LNG to cool the discharged water is too
21 expensive and not a feasible solution.
22 However, this argument is found less than
23 convincing as one finds in appendix D on pages
24 217 and 218 of the Kitimat LNG terminal
20:03:04 25 environmental assessment report and
□ 69

20:03:06 1 comprehensive study prepared by the British
2 Columbia Environmental Assessment Office, dated
3 13 April 2006, that the proposed and permitted
4 LNG terminal at Kitimat will employ a covered
20:03:18 5 settling pond, precipitated dissolved solids,
6 and an LNG-to-conductive-water heat exchanger
7 to hold the discharged water to within half a
8 degree centigrade of the receiving waters.

PM5-60

9 There is a concern that the current design
20:03:30 10 envisioned by the applicant does not address
11 the long-term effects on the downstream river
12 environment occasioned by a localized plume of
13 alkalin material emanating from the outfall.
14 As found in the United Nations Environment
20:03:45 15 Program Publication, sodium carbonate --
16 initial assessment report for SIAM 15 held in
17 Boston in October of 2002, sodium carbonate in
18 concentrations greater than a hundred
19 milligrams per liter will cause mortality in
20:03:59 20 fish.
21 However, for salmon and trout lethal
22 effects were observed at levels of 67 to 80
23 milligrams per liter. Add to this the active

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PM5-60 The SCV discharge would meet ODEQ standards and NPDES permit requirements. The pH of the discharge would be adjusted so that it would be neither too alkaline nor too acidic. We do not anticipate that alkaline sediment buildup would occur downstream of the LNG terminal.

PM5-61	24	PM5 RN-110707-FERCpm.txt and chronic mixing aspect now found in the	70
	20:04:10 25	applicant's thermal mixing model of hexavalent	
	20:04:14 1	chromium and silver, and the insult to the	
	2	salmon is exacerbated.	
PM5-62	3	In view of the applicant's numerous press	
	4	releases extolling its environmental	
	20:04:23 5	responsibility, and as found at the bottom of	
	6	4-150, quote: The applicant has committed to	
	7	provide an overall benefit to the environment	
	8	of the lower Columbia River ecosystem. The	
	9	applicant's argument of expense found in the	
	20:04:36 10	response to the Fishery Service is considered	
	11	unavailing as a justification for ignoring	
	12	practicable thermal pollution mitigation	
	13	measures for this critical habitat area.	
	14	In view of the potential thermal pollution	
	20:04:49 15	of the receiving waters and the potential for	
	16	long-term discharge of alkaline sediment into	
	17	the river over the operational life of the	
	18	facility, it is strongly suggested that, in	
	19	addition to the recommendation requiring the	
	20:05:02 20	applicant, as he has now furnished the	
	21	thermal-mixing model, FERC recommend to the	
	22	applicant that they fully examine and address	
	23	the long-term effects of alkaline sediment	
	24	buildup downstream of the STP outfall and to	
	20:05:14 25	review the Kitimat LNG system of discharge	71
	20:05:17 1	water treatment for possible incorporation of	
	2	this system into the applicant's proposed	
		Page 59	

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- PM5-61 As described in section 4.3.2.3, the thermal mixing modeling was conducted under a scenario of worst-case conditions, and assumptions were made about the presence of chromium VI, which is not a contaminant expected to be produced in the regasification process. Even under these worst-case conditions, the SCV discharge would meet the NPDES permit requirements. See also our response to comment FA1-14.
- PM5-62 The SCV discharge would meet thermal standards so no mitigation is required.

PMS RN-110707-FERCpm.txt

3 facility design.

4 Thank you very much.

20:05:23 5 MR. FRIEDMAN: Thank you for your
6 comments.

7 Gloria MacKenzie. By the way, when I get
8 written comments given to me directly, like
9 this case with Gloria, I do put them into the
20:05:48 10 public record.

11 MS. GLORIA MACKENZIE: Thank you. Good
12 evening, Mr. Friedman and staff. My name is
13 Gloria MacKenzie. M-A-C-K-E-N-Z-I-E.

PM5-63

14 This evening I am speaking for myself and
20:06:00 15 on behalf of the Audubon Societies of Willapa
16 Hills, Portland, and Washington state. I am
17 submitting a CD and testimony from the October
18 22nd Clatsop County Board of Commissioners
19 hearing in which I also addressed the
20:06:16 20 information regarding the need for LNG. I will
21 continue to refer to these reports now.

22 In the introduction page 1-3 of the DEIS
23 it states, and I quote: There has been and
24 will continue to be an increasing demand for

20:06:32 25 natural gas in the United States and the
□

72

20:06:35 1 Pacific Northwest, end of quote.

2 I have two problems with this statement.

3 One, in the July 10 public hearing Gary

4 Coppedge, senior vice president, clearly stated

20:06:48 5 that the gas is not going to California, but

6 that it is to remain in the Northwest and not

7 even mentioning anything about the rest of the
Page 60

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PM5-63 See our response to comment PM1-23.

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8 West.

PM5-64

9 Two, the information that I have just --

20:07:04 10 the information -- excuse me. The information
 11 that I have seen to justify the demand or need
 12 for natural gas has been exaggerated.

13 NorthernStar has repeatedly in their
 14 presentations used the economic impact analysis

20:07:18 15 of Dr. Philip Romero and information from the
 16 Northwest Gas Association. In several
 17 instances the information has been doctored,
 18 materially altered, or eliminated to establish
 19 need. A complete letter with this information

20:07:36 20 and backup material, more of this, will be
 21 submitted to FERC.

22 While none of this information appears in
 23 the DEIS, it has been used locally to establish
 24 and justify the need for the proposed zoning

20:07:55 25 and comprehensive land use changes and

73

20:07:58 1 amendments. If you and your staff look at the
 2 volume 2 under the section entitled Safety
 3 Advisory Report, you will find a 24-page
 4 document from the Clatsop County Community

20:08:14 5 Development Department -- I'm not sure how it
 6 got stuck in that section. But anyway, it did.
 7 In it you will find goal two, land use
 8 planning, which discusses public need as a
 9 basis for amending our long-standing county and
 20:08:32 10 state comprehensive plans.

11 In conclusion, if we are discussing need
 12 for additional gas supplies in the Northwest, I
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PM5-64 See our response to comment PM1-8.

		PMS RN-110707-FERCpm.txt	
PM5-64 cont'd	13	do not believe that the applicant has displayed	
	14	sufficient reason to change our local or state	
	20:08:48 15	approved plans. I would ask that FERC and its	
	16	staff to please consider the information from	
	17	the Northwest Power and Conservation Council	
	18	when reviewing the matter of energy needs for	
	19	the Northwest.	
	20:09:02 20	Thank you for your attention to this	
	21	matter, and I'm sure you're very tired by this	
	22	time. Thank you.	
PM5-65	23	MR. FRIEDMAN: I'm just getting started.	
	24	I'm not tired at all. Thank you for your	
	20:09:10 25	comments.	74
	20:09:11 1	Next is Frans.	
	2	MR. FRANS EYKEL: Good evening. Thank you	
	3	for accepting our comments. Eykel, E-Y-K-E-L,	
	4	my last name.	
	20:09:29 5	My comments are in reference to the DEIS,	
	6	page 4-78, the water resources. This is -- the	
	7	data is not in your DEIS. This was a document	
PM5-65	8	submitted, a technical memo by Coast & Harbor	
	9	Engineering for NorthernStar about the mixing	
	20:09:53 10	zone analysis for Bradwood Landing point-source	
	11	discharges.	
	12	I'd like to mention a minor error on	
	13	paragraph 2.4, page 3, where they mention a	
	14	flow rate of 4,200 gallons per hour. This in	
	20:10:16 15	regard to fire/water discharge. It should read	
	16	4,400 gallons per minute.	
	17	My other comment is in regard to the	

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PM5-65 The discussion of water resources in section 4.3 has been revised.

PM5 RN-110707-FERCpm.txt

PM5-66

18 memorandum, paragraph 2.2, page 2 and 3, the
 19 hydrodynamic conditions. The analysis of the
 20:10:37 20 mixing zone was intended for a worst-case
 21 scenario of the -- and under hydrodynamic
 22 conditions. The research recognized a reversal
 23 flow of the river during flood stage -- excuse
 24 me -- which is very significant at times. The
 20:11:02 25 memorandum, however, uses a 0.0 foot per second

75

20:11:10 1 flow as a worst-case scenario.
 2 And I disagree with this statement or with
 3 the practice of the modeling because as they
 4 discharge the effluent and the river reverses
 20:11:23 5 flow again, it actually gets a double dose of
 6 the effluent, and you get a much stronger plume
 7 of discharge.

PM5-67

8 My major concern, however, is the amount
 9 of chromium 6 created by the -- by the process,
 20:11:44 10 by the submerged conversion vaporizers. They
 11 create .27 milligram per liter, and I know that
 12 doesn't sound very much, but if you figure that
 13 the United States export/import bank, the
 14 baseline total -- total for chromium is .5,
 20:12:12 15 this being .27 for chromium 6 only. You also
 16 have discharge of additional chromium, of
 17 chromium 3, which is a beneficiary chromium,
 18 but total chromiums should never exceed .5 by
 19 the World Export Bank, which finances
 20:12:34 20 third-world country infrastructure, not the
 21 United States.

22 And the total discharge of this chrome
 Page 63

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PM5-66 See our response to comment IND27-2.

PM5-67 Existing data for chromium in SCV discharges are sparse and are expressed for total chromium only. Because ODEQ standards specify chromium VI, as a worst case scenario the available data (total chromium) used for the thermal mixing modeling was assumed to represent chromium VI. Because only one data point above detection limits was available (0.03 mg/L), statistics were used to determine an even more conservative value by multiplying the measured concentration by a factor of 9. See also our response to PM5-61.

		PM5 RN-110707-FERCpm.txt	
PM5-67 cont'd	23	crumb is 190.55 pounds per year, that being in	
	24	the estuary, with the cumulative effect of	
	20:13:00 25	years of operation, and subsequent dredging of	76
	20:13:04 1	the channel would -- would create considerable	
		pollution, and because of that issue I have	
		notified the U.S. Corps of Engineers to make	
		them aware of the situation. Since we are a	
	20:13:26 5	beach nourishment site, I will refuse any and	
		all dredge oils on our property from now on,	
		and if I refuse it, nobody else gets it because	
		we all have to agree on this. And for the	
		Corps to lose that -- that much potential of	
	20:13:45 10	dredge-oil property, upland property, is	
		detrimental.	
PM5-68	12	I have two requests for you, Paul. In	
	13	your presentation you show a liquefaction on	
	14	your slides. You show a liquefaction plant. I	
	20:14:03 15	was wondering if since we are here talking	
		about a regasification facility, if you could	
		show a slide of a regasification facility with	
		submerged conversion vaporizers, because these	
		vaporizers have large -- it's all stacks, 48	
	20:14:22 20	inches in diameter, per -- per vaporizer. And	
		this facility will have -- this proposed	
		facility will have seven of them. And that is	
		another addition of site pollution.	
		One more item, a request for NorthernStar	
	20:14:43 25	to be more forthcoming and show those stacks on	77
Page 64			

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PM5-68 Our figures presented in the EIS include a depiction of the stacks.

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K-222

PM5-68
cont'd

20:14:47 1 PM5 RN-110707-FERCpm.txt
their artwork and make people aware of that --
2 that is what you see, not just camouflaged
3 tanks and minimize ship sizes and maximize
4 river property, but put it in the right

20:15:02 5 perspective. Thank you very much.

6 MR. FRIEDMAN: Thank you for your
7 comments. And, Frans, if you have more
8 detailed comments, please send them in writing.
9 You know we like stuff in writing.

20:15:14 10 MR. FRANS EYKEL: They're in the mail.

11 MR. FRIEDMAN: Thank you.

12 Next is Gary Allen. Is Gary not here?

13 Okay. Chris Bock?

14 MR. CHRISTIAN BOCK: Hello. My name is

20:15:42 15 Christian Bock, B-O-C-K, but I go by Kilo. I
16 live on the west end of Cowlitz County.

PM5-69

17 Before I built a house on a cliff, I hired
18 a geologist, and he advised me how to

19 distribute the load on the cliff side and to
20:16:07 20 remove any excess weight from the side to the
21 river, upon which I removed 570,000 pounds and
22 built a house. Now the starting point for the
23 pipeline is near my house, behind it, and from
24 that point it is planned to drag a pipe

20:16:33 25 approximately one mile long under the Columbia
□

78

20:16:37 1 River. An extreme force has to be applied,
2 which is distributed in the ground towards the
3 river.

4 When Mr. Garrett was asked about how he
20:16:58 5 will prevent this hillside from collapsing,

PM5-69 See our response to comment PM1-41.

PM5-69 cont'd

PM5-70

PM5-71

PM5 RN-110707-FERCpm.txt

which so far it's pretty stable, but we prevent it -- we try to prevent any unbalance. Now, if the pipeline is put through there, at the moment it may be stable, but after a few years of heavy rain and a little earthquake, I'm afraid the situation will not just slide my house down, but also it may break the 36-inch pipeline or sheer it off, which would be a disaster beyond our imagination.

Of course, NorthernStar says it needs a source of ignition, but if pipeline -- if steel is ruptured, I understand sparks could fly and offset it. On the other hand, we have no escape route. Even an automobile engine could be a source of ignition. So I would like to register that I'm -- a definite objection for this pipeline project.

Another situation is that we don't really need the natural gas here. The state of Washington does not have any financial

benefits. We just have negative effect. Thank you.

MR. FRIEDMAN: Thank you for your comments.

Next is Bill castle.

MR. BILL CASTLE: Thank you. My name is Bill Castle, C-A-S-T-L-E. My comments tonight will be directed towards the sections of the DEIS that address private water supplies, wells.

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PM5-70 Section 1.1 is a brief summary of the purpose and need for this project. However, the Commission will make a final decision about need in its project Order.

PM5-71 NorthernStar has prepared a preliminary well protection plan which states that in the event of a disruption to a water supply, a freshwater tank truck and pump assembly would be immediately supplied to the affected party. A third-party well contractor would assess the situation and remedy the existing well or construct a new well if necessary. Any potential disruptions to water supply would occur during the active construction phase of the project and therefore we do not believe an escrow account would be necessary. FERC would monitor the project throughout construction and restoration to ensure compliance with the applicant's proposed construction procedures and mitigation measures as identified in the EIS and conditions of the FERC Certificate.

PM5-71
cont'd

11 PM5 RN-110707-FERCpm.txt
On page 4-59, paragraph 3, we are told in

12 the event of that water well is damaged as a

13 result of the construction, NorthernStar would

14 arrange for a temporary source of potable

20:19:11 15 water, if required, and provide for the repair

16 of the well or replace the water supply. On

17 page 4-314, in the last paragraph, we are told

18 there could be potential damage to existing

19 septic systems or wells.

20:19:31 20 This is a major concern to a majority of

21 the landowners along the pipeline route. If

22 our water is gone, our property is worthless.

23 What is meant by "replacement of water supply"?

24 Does that mean potable water will be trucked in

20:19:47 25 daily for infinity? How about those of us that

80

20:19:51 1 irrigate with it in the summer for three or

2 four weeks, 24/7?

3 If NorthernStar is so sure that they will

4 not disturb the wells, and which I've had

20:20:03 5 conversation with three members, let them put

6 their money on the table. Let the money speak,

7 not their mouth. Put this money in an escrow

8 to be able to secure a replacement possibility.

9 We don't want to risk them going bankrupt, like

20:20:23 10 some in the country have.

PM5-72

11 In the Mill Creek area, there are six

12 wells forming a circle around and within 300

13 feet of the approximate Columbia River HDD

14 site. An additional 14 wells are within 1,320

20:20:41 15 feet, a quarter mile, of the drill site. All

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PM5-72 See our response to comment PM1-40.

PM5-72
cont'd

16 PM5 RN-110707-FERCpm.txt
of these wells potentially share the same
17 aquifer. That drill site goes right through
18 the fractured basalt that supplies the water
19 coming from the aquifer. All 20 of these wells
20:20:58 20 have the potential of becoming contaminated
21 from the bentonite or loss of water,
22 potentially all the waters.

23 Let's remember the final depth of this
24 pipe going under the river we were told by Mike
20:21:12 25 Heywood, representative of Northwest Natural

81

20:21:14 1 Gas, would be approximately a 600-foot drill,
2 to be 50 feet below the bottom of the channel.
3 Based on the information supplied by Mike
4 Heyward on -- Heywood on the drill site,
20:21:30 5 placement of the drill would be at a 13-degree
6 angle and the HDD -- for the HDD, 13 degrees.

7 Since common sense tells us the hole will
8 be about 500-foot mark, will be within ten to
9 99 foot of some of the water wells at the
20:21:47 10 bottom of the hill, which are only drilled to
11 125 feet. Our well is 522 feet deep and
12 supplies 14.5 gallons a minute with a static
13 column of water 140 feet from the surface,
14 which means we have 382 feet of water at our
20:22:07 15 disposal at any time.

PM5-73

16 More importantly data listed on table
17 4.3.2-2 where NorthernStar indicates 20 private
18 wells within 150 feet of the pipeline
19 construction is incomplete. Many wells in
20:22:22 20 Cowlitz County are not registered and,

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PM5-73 Table 4.3.1-2 is not intended to be a comprehensive list of all wells but only those wells within the state databases at the time of the search. NorthernStar would work with property owners along the pipeline route to identify new or unregistered wells located in or near the construction right-of-way.

PM5-73
cont'd

21 PMS RN-110707-FERCpm.txt
therefore, not listed. Our own well was not
22 listed a year ago and does not appear on that
23 chart. Our well will be within 150 feet or
24 less of the construction area, to our best
20:22:38 25 knowledge. 82
□

20:22:39 1 MR. FRIEDMAN: Mr. Castle, please wrap it
2 up.
3 MR. BILL CASTLE: One paragraph.
4 The DEIS needs to include more information
20:22:45 5 and requirements for loss or contaminated --
6 contamination of water due to construction of
7 the pipeline. An open time frame needs to be
8 included over the life of the pipeline.
9 Remember, FERC, we did not ask NorthernStar or
20:23:01 10 any other private utility to disturb us.
11 Mr. Friedman, I'd also like you to know
12 that you keep making comments to ask a
13 NorthernStar member about where this pipeline
14 is. Two weeks ago in Astoria I had a
20:23:17 15 conversation with Mr. Si Garrett and Mr. Paul
16 Soanes about where the hole was to be drilled
17 on this ridge. Mr. Garrett would not answer me
18 other than, "It is not on your property." But
19 he would not tell me where it's at. Mr. Paul
20:23:34 20 Soanes told me that he would get back to me and
21 promised that he would share that information.
22 To this date, that has not happened, sir.
23 MR. FRIEDMAN: Is there a representative
24 from NorthernStar here who could stand up,
20:23:48 25 please? Mr. Coppedge, would you be able to 83
□

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20:23:51 1 answer Mr. Castle's -- privately, his question?
2 Thank you.

3 I want to remind everyone to please try to
4 keep your comments to three minutes, and if you
20:24:09 5 have detailed comments that would exceed three
6 minutes, we would welcome your written comments
7 sent in to FERC.

8 Next is Gayle Kiser.
9 MS. GAYLE KISER: Gayle Kiser. That's
20:24:28 10 G-A-Y-L-E, K-I-S-E-R, but I'm sure you remember
11 from my previous speeches.

PM5-74

12 Last night I spoke to the specifics.
13 Tonight I'm here to speak to the process as a
14 whole. This document has all the appearances
20:24:41 15 of being rushed into print. Why? The former
16 head of your agency was quoted as saying that
17 the United States only needed about eight
18 receiving terminals. At this date, I believe
19 around 22 have been permitted. Again, why?

20:24:58 20 I believe the answer lies in the Energy
21 Policy Act of 2005. We were warned by our
22 legislators what would happen if FERC were
23 given sole siting authority over LNG
24 facilities, but we didn't pay close enough
20:25:11 25 attention. I'm in the process of contacting
□

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20:25:13 1 every Senator and Representative in every state
2 that is experiencing a battle over where to put
3 these facilities and asking them to revisit
4 that act and the Natural Gas Act, paying
Page 70

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PM5-74 See our responses to comments PM2-20 and PM2-32. The FERC's role as the lead federal agency responsible for authorizing onshore LNG import terminals was outlined by Congress in the NGA, and clarified in the EPAct 2005. The laws were not kept secret, and the EIS discusses them in section 1.0.

		PM5 RN-110707-FERCpm.txt	
PM5-74 cont'd	20:25:25	5	particular attention to the Hackberry decision.
		6	Many people don't realize what this
		7	decision does. It flew in under the radar, and
		8	I seriously doubt if many of our Congresspeople
		9	even realize it exists. It incentivizes the
	20:25:41	10	building of LNG facilities. I love that word,
		11	"incentivize." Even my computer doesn't
		12	recognize it.
		13	By making a special law that removes all
		14	commercial regulations covering tariffs, rates,
	20:25:51	15	and open access, you handed the energy
		16	companies the key to the cash box. That
		17	explains the rush to build these plants and
		18	I believe the rush to colonize the Pacific
		19	Northwest.
PM5-75	20:26:04	20	I've attended many meetings in the past 18
		21	months, and two demographics stand out: One,
		22	the average age and, two, the average income of
		23	the people whose lives are going to be
		24	destroyed by the proposed pipelines. Most are
	20:26:15	25	elderly, rural folks who only want to retire on
			85
	20:26:18	1	their property, and most are in the lower
		2	income bracket. It is unconscionable to ask
		3	them to bear the brunt of this assault so
		4	energy speculators can make another huge profit
	20:26:30	5	at their expense. I believe this is
		6	inadequately addressed in the DEIS.
		7	In a time when we see certain portions of
		8	the federal government shrinking -- for
		9	instance, here locally the U.S. Forest Service
			Page 71

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PM5-75 As discussed in sections 4.8.1.9, 4.8.2.9, and 4.8.3.9, low-income and minority populations would not be disproportionately affected by the proposed project.

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20:26:41 10 had to recently close the Coldwater Ridge
 11 visitors' center on Mount St. Helens -- it
 12 would seem FERC is experiencing a growth boom.
 13 You people have been handed a tremendous amount
 14 of power, and with that should be a tremendous
 20:26:55 15 amount of responsibility.

PM5-76

16 I am sorely disappointed in the DEIS. I
 17 expected so much more from an agency with the
 18 power you have. It is my opinion that this
 19 document is deficient and should be completely
 20:27:08 20 reissued. Next time include material that will
 21 help in the decision-making process, things
 22 like an emergency response plan, the complete
 23 water suitability report, the completed
 24 biological assessment, an independent needs
 20:27:25 25 assessment, and an independent economic

86

20:27:27 1 assessment.
 2 Rework your evaluation criteria to include
 3 the human element. If this cannot be done,
 4 then this document should be placed where it
 20:27:36 5 will never be affected by solar energy.

6 MR. FRIEDMAN: Thank you for your
 7 comments.

8 Next is Steve Dragich.

9 MR. STEVE DRAGICH: Mr. Dragich,
 20:27:54 10 D-R-A-G-I-C-H, representing Dragich Trust.

PM5-77

11 The specific comments I have tonight deal
 12 with the local court's designation in the
 13 FERC's introductory statement, presentation,
 14 and CFR 49192.5, class location. If time
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PM5-76 See our response to comment PM4-20.

PM5-77 Section 7h of the NGA states when a holder of a FERC certificate cannot reach an agreement for an easement with a landowner, it may "acquire the same by the exercise of the right of eminent domain in the district court of the United States for the district in which such property may be located...." In other words, the settlement would be made in the local district court. Or, the settlement may be made in an applicable local state court if the value is less than \$3,000. Maps of the pipeline route are in Appendix B of the EIS.

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PM5-77
cont'd

PMS RN-110707-FERCpm.txt

20:28:16 15 permits, ex parte communications and CEI
16 revision order, CEI standing for critical
17 energy infrastructure information.
18 In your introductory comment to this DEIS
19 presentation, you mention local courts if a
20:28:37 20 negated settlement is unable to be reached, yet
21 on August 8th, 2005, President Bush signed the
22 Energy Policy Act, giving you, FERC, exclusive
23 jurisdiction over LNG facilities. The
24 cooperating agencies are exclusively federal,
20:28:56 25 as designated in the DEIS: United States Army
□ 87

20:29:01 1 Corps of Engineers, U.S. Coast Guard, U.S.
2 Department of Transportation.
3 Yet you distinctly do not mention the
4 United States District Courts as a remedy for a
20:29:13 5 person or landowner unable to come to
6 negotiated agreement; yet if you uses the local
7 courts, using an example from the Superior
8 Courts of the State of Washington, RCW 8.24,
9 eminent domain, miscellaneous provisions, in
20:29:31 10 relation to order of immediate use and
11 possession, which a proponent such as a
12 pipeline or NorthernStar Energy Limited
13 Liability Corporation can request that the
14 landowner so stipulate to an order of immediate
20:29:52 15 use and possession.
16 If the landowner does not stipulate to the
17 order of immediate use and possession, he will
18 not receive court or attorneys' fees, yet there
19 is no such requirement under the U.S. federal
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PM5-77
cont'd

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20:30:08 20 court system, and payment for just compensation
21 has to be up front under the U.S. District
22 Court system.
23 To use an example from the office of
24 Washington State Attorney General, eminent
20:30:26 25 domain task force, assistant attorney general 88
□

20:30:29 1 Tim Ford and eminent domain task force member
2 Craig Johnson characterizes negotiations under
3 eminent domain as negotiation by shotgun.
4 I cannot tell you the location of the
20:30:48 5 pipeline on the Dragich Trust land. You must
6 first submit a CEII request to the FERC CEII
7 coordinator before I can tell you that
8 information, because I don't have it myself.
9 And if NorthernStar is to abide by that same
20:31:08 10 regulation, they have submitted documents
11 through their attorney, VanNess & Feldman in
12 Washington, D.C., citing privacy of individuals
13 on the pipeline for reasons for not releasing
14 pipeline maps or individual lists of pipeline
20:31:24 15 owners. These are filed under the FERC
16 Commission.
17 MR. FRIEDMAN: Mr. Dragich, can you wrap
18 it up, please.
19 MR. STEVE DRAGICH: In conclusion, under
20:31:35 20 the revision for CEII orders issued on October
21 30th, a week ago, FERC order 121 FERC 61.107,
22 it is now possible to access pipeline maps for
23 landowners and adjacent landowners to identify
24 which specific property -- property is under
Page 74

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PM5-77
cont'd

20:31:57 25 threat of domain, which FERC has included a fee 89

20:32:02 1 requirement so we may find out which property
2 you will confer eminent domain over.

3 MR. FRIEDMAN: Thank you for your
4 comments.

20:32:11 5 Next, Vance Fraser.

6 MR. VANCE FRASER: Hello. My name is
7 Vance Fraser. It's F-R-A-S-E-R. I represent
8 myself and also Webb Drainage District in the
9 Oregon side.

PM5-78

20:32:30 10 I'd like to say that the Pacific Northwest
11 is and always has been Oregon, Washington, and
12 Idaho. Any references to the Northwest which
13 include any other areas outside Oregon,
14 Washington, and Idaho should not be allowed.

20:32:46 15 Any redefinition in terms from historic and
16 commonly understood is only intended to mislead
17 the public and responsible authorities. FERC
18 should not allow this and cause any information
19 or data outside Oregon, Washington, and Idaho

20:33:03 20 to be separated out in its own segregated area
21 within the DEIS, when it's been previously
22 referred to as in the Northwest, but outside
23 those three states.

PM5-79

24 Regarding dredging the turning basin for
20:33:25 25 the LNG vessels, NorthernStar should be 90

20:33:28 1 required to follow all the same rules the Corps
2 of Engineers are required to follow in their

Page 75

PM5-78 We agree that the Pacific Northwest would include the states of Oregon, Washington, and Idaho.

PM5-79 NorthernStar's sediment sampling followed applicable guidelines and approvals and all dredging would be carried out in accordance with the COE permit required under section 404 of the CWA.

PM5-79 3 PM5 RN-110707-FERCpm.txt
 Columbia River channel deepening project,
 cont'd 4 specifically sampling, removal, and disposal
 20:33:40 5 methods.

PM5-80 6 I'd also like to point out that my uncle
 7 was a ship captain, any ship, any ocean, and he
 8 was based out of Portland, Oregon. I've been
 9 up and down the river with them him, and I can
 20:33:52 10 tell you without a doubt he would not
 11 appreciate having to wait for an LNG ship while
 12 heading out to sea.
 13 The river channel is now being deepened to
 14 support grain exports, container ships and --
 20:34:08 15 that are supported by over 50,000 jobs. How
 16 soon before these export ships and jobs move
 17 elsewhere when LNG ships delay export ships,
 18 all for LNG which we don't need? And I ask
 19 that these economic impacts be made more clear
 20:34:32 20 and studied further and included in the DEIS.

PM5-81 21 As far as the Webb Drainage District,
 22 which is on the pipeline route, we depend on
 23 our levies to protect us from flooding. The
 24 soils in the districts such as ours is
 20:34:50 25 corrosive, saturated type at a depth the
 □

20:34:53 1 pipeline will be set at. The soil can also be
 2 described as jelly- and putty-like. When
 3 earthquakes occur or when heavy agriculture
 4 equipment cross over the pipeline, this will
 20:35:07 5 cause soil and pipeline movement and possible
 6 accelerated deterioration of the concrete
 7 fittings of the pipeline, which will also cause

Public Meetings

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PM5-80 See our response to comment PM5-46.

PM5-81 Soil liquefaction relative to the pipeline is discussed in section 4.1.4.3. See also our response to comment PM1-32. Odorant (methyl mercaptan) is required for all natural gas distribution lines but it is not required, nor is it typically used, for interstate natural gas transmission lines. One reason it is not used for transmission lines is that methyl mercaptan can interfere with the end use if natural gas is being used as a manufacturing feedstock.

PM5-81 8 PMS RN-110707-FERCpm.txt
 accelerated corrosion of the pipe.

cont'd 9 The expected life of this pipeline cannot
 20:35:21 10 be considered to be even close to 50 years,
 11 especially when the KB pipeline leaked in less
 12 than one year in a similar district. Please
 13 address why we are not worth putting odorant in
 14 the line.

20:35:43 15 Thank you.

16 MR. FRIEDMAN: Thank you for your
 17 comments.

18 Next is Marjorie Castle.

PM5-82 19 MS. MARJORIE CASTLE: Marjorie Castle.
 20:35:56 20 C-A-S-T-L-E. This is my second time to speak
 21 before you, and another concern I wish to bring
 22 to your attention has to do with the roads in
 23 Cowlitz County.

24 Since the majority of this county would be
 20:36:09 25 considered rural, it must be brought to your
 □

20:36:11 1 attention, FERC, that the cliff -- that like
 2 Clifton Road, many roads are narrow, to the
 3 point of being single to one and a half lanes
 4 wide. Yes, these are paved roads. They are
 20:36:24 5 public roads.

6 I bring this up because in the DEIS, on
 7 page 2-35, paragraph 1, it reads:
 8 Modifications or improvements to existing roads
 9 used to access the project would not be
 20:36:37 10 required. It also says on the footnote A of
 11 table 4.3 -- 4.2.3-2, NorthernStar would use
 12 existing access roads that would not require

Public Meetings

5

PM5-82 Section 4.8.2.7 of the EIS has been revised to address NorthernStar's proposal for improvements to Clifton Road. Section 4.8.3.7 has been revised to include additional discussion of NorthernStar's requirements regarding local road permits and our recommendation that NorthernStar revise its final traffic management plan to include measures to reduce impacts on narrow roads (including Whitewater Road, AKA Old Mill Creek Road) that would be used to access the construction right-of-way.

PM5-82
cont'd

13 PMS RN-110707-FERCpm.txt
modification or improvement and would,
14 therefore, not represent additional soil
20:36:58 15 impacts.
16 Paragraph 3, page 4-98, NorthernStar would
17 use existing access roads, which would not
18 require modification or improvement and would,
19 therefore, not represent any additional impacts
20:37:11 20 on wetlands.
21 Page 4-305, paragraph 4, NorthernStar
22 would access the construction right-of-way via
23 existing public and private roads that
24 intersect the right-of-way. Modifications or
20:37:26 25 improvements to support the expected roads
□ 93
20:37:28 1 would not be required.
2 Whitewater Road is a public road. Yes, it
3 does eventually go into a private road. It is
4 only one example of the kinds of roads we have
20:37:41 5 in Cowlitz County. Many of them that
6 NorthernStar wishes to use at one time were
7 logging roads that have been paved over. They
8 are not two-lane or larger.
9 Whitewater Road is a planned access road
20:37:56 10 for NorthernStar to reach the site for the
11 Columbia River HDD. That road is paved, one
12 and a half lanes wide, has hazardous blind
13 spots and no turnouts for opposite traffic.
14 People currently use the shoulder, which is
20:38:11 15 gravel, as their turnout. Each side is
16 dangerous.
17 That road will be used for at least 37

Public Meetings

PM5-82
cont'd

18 PM5 RN-110707-FERCpm.txt
days during the drilling process. Three
19 tractor-trailers we've been told will carry the
20:38:25 20 drill rig and is extremely heavy. All the
21 support vehicles will be using that road.
22 Heavy vehicles this road is not accustomed to
23 will traverse its length. Twenty families
24 depend on that road as their only access in and
20:38:41 25 out on any daily basis.

94

20:38:44 1 This public road cannot withstand this
2 traffic, and those modifications are not
3 included or any consideration of modifications
4 of that road included, nor has the Cowlitz
20:38:56 5 County road department been apprised of this
6 situation. And this is not the only example.

PM5-83

7 There are many areas in the draft DEIS that are
8 not addressed. The biological assessment is
9 not finished and is not totally in there.
20:39:14 10 There is communication happening daily on
11 the FERC Web site, that we all read, that
12 indicate that the draft -- that the DEIS should
13 not have been released when it was.
14 Mr. Friedman, this piece of cheese (indicating)
20:39:28 15 is like the DEIS: It's full of holes.

16 Thank you.

17 MR. FRIEDMAN: Thank you for your
18 comments.

19 Next, Carol Kriesel.

20:39:47 20 MS. CAROL KRIESEL: I am Carol Kriesel.
21 K-R-I-E-S-E-L.

PM5-84 | 22 I have several concerns regarding the

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Public Meetings

5

PM5-83 See our responses to comments PM4-20.and PM5-26.

PM5-84 The maximum number of LNG carriers calling at the LNG terminal would be 125 per year. The Columbia River would not be shut down during LNG carrier transits.

PM5-84 23 PMS RN-110707-FERCpm.txt
 NorthernStar project, and jobs is one of them.
 cont'd 24 In the DEIS, on page ES-4, 65 jobs for a total
 20:40:04 25 annual payroll of 3.8 million is listed. Now, 95
 □
 20:40:08 1 I can tell you jobs are important, but I
 2 question at what risk to others. I'm not
 3 talking about injury to a person or to their
 4 property but employment risk. I don't do any
 20:40:17 5 of that new math they teach kids, but I'm
 6 pretty good at adding and subtracting.
 7 In the DEIS on page 2-3 under Section
 8 2.1., LNG ships, it states: NorthernStar has
 9 stated that it expects about 125 LNG carriers
 20:40:37 10 per year to unload cargo at its terminal, with
 11 LNG ships ranging in size from 100,000 to
 12 200,000 cubic millimeters in capacity.
 13 Seems to me good business sense leans
 14 towards getting the biggest profit you can go
 20:40:54 15 with the most, you can get and turn around and
 16 sell. So I'll start with the big ships which
 17 NorthernStar told the Coast Guard they wanted
 18 to use: Anticipated numbers of deliveries as
 19 stated in the DEIS, about 125. Size of ship,
 20:41:10 20 200,000 cubic meters. Total amount of LNG
 21 received per year, 25 million cubic meters.
 22 Now, the Coast Guard has determined
 23 NorthernStar can use no ships larger than
 24 148,000 cubic meters until some type of study
 20:41:26 25 is conducted on big ships and they are deemed 96
 □
 20:41:29 1 safe. So that means that best NorthernStar can
 Page 80

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		PM5 RN-110707-FERCpm.txt
PM5-84 cont'd	2	hope again for using, again, their 125
	3	shipments per year, is 118,500,000, cubic
	4	meters or a loss of about 6.5 cubic meters.
	20:41:46 5	I can't see NorthernStar or any other
	6	company choosing to lose money. I think they
	7	will try to recoup what they can. They have
	8	investors that want to see a return on their
	9	money. Therefore, NorthernStar will increase
	20:41:57 10	the number of shipments to gain that additional
	11	6.5 million cubic meters with an additional 44
	12	ships. That increase in traffic, with
	13	consideration of today's homeland-security
	14	issues, would mean there could be potentially
	20:42:14 15	three LNG tankers in the river at any given
	16	time, with one maybe even parked in the channel
	17	waiting its turn at the earth.
PM5-85	18	Because LNG is labeled a terrorist target
	19	and needing escort convinced me, and a whole
	20:42:29 20	lot of other people, this will not affect our
	21	ports. Nowhere in the DEIS is this potential
	22	negative economic issue addressed. Nowhere in
	23	the DEIS is the loss of jobs, far more than 65,
	24	addressed and what those losses will do to the
	20:42:43 25	economy of these two states if shipping is
	□	
	20:42:46 1	interrupted.
	2	I'm not saying the river and bar pilots
	3	are not capable in their jobs; I am saying
	4	security conditions change, and LNG will have a
	20:42:54 5	precedence over everything on this river but
	6	military and cruise ships. After all, the
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Public Meetings

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PM5-85 There is no evidence that the project would cause a loss of jobs, or have negative economic impacts. In fact, as discussed in section 4.8 of this EIS, the project would most likely have economic benefits for the region. The project should not have significant impacts on upriver ports, commercial shipping in the lower Columbia River, or other river users. See responses to PM1-52, PM3-9, PM5-31, and MP5-46. The Coast Guard determines requirements for escorts of LNG carriers in its WSR and LOR, and safety is discussed in section 4.11 of this EIS.

Public Meetings

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PM5 RN-110707-FERCpm.txt

PM5-85
cont'd

7 Coast Guard expressed these same concerns a
8 year ago last August.
9 NorthernStar uses the word "about." The
20:43:07 10 DEIS used the word "about." So what's the real
11 number of how many ships and what will the
12 impact beyond the ports on this river system,
13 which goes far beyond Portland? This topic
14 needs to be addressed. The livelihoods of
20:43:19 15 thousands of people depend on it.
16 Thank you.
17 MR. FRIEDMAN: Thank you for your
18 comments.
19 I've reached the end of the speakers'
20:43:27 20 list. Is there thing else who has not yet
21 spoken who wishes to do so?
22 If there is no one else who would like to
23 speak, who has not already spoken at this time,
24 I'm going to close the meeting. I want to
20:43:41 25 thank you all for coming tonight and for
□ 98

20:43:43 1 providing your comments on the Bradwood Landing
2 LNG project DEIS.
3 Let the record show that we concluded
4 tonight at approximately 8:43 p.m. Thank you.
20:44:29 5 (MEETING ADJOURNED AT 8:43 P.M.)
6 * * *
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PMS RN-110707-FERCpm.txt

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PMS RN-110707-FERCpm.txt

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101

1

CERTIFICATE

2

I, Robin L. Nodland, a Washington

3

Certified Shorthand Reporter, an Oregon

4

Certified Shorthand Reporter, a Registered

5

Diplomate Reporter, and a Certified Realtime

6

Reporter, do hereby certify that I reported in

7

stenotype the proceedings had upon the hearing

8

of this matter, previously captioned herein;

9

that I transcribed my stenotype notes through

10

computer-aided transcription; and that the

11

foregoing transcript constitutes a full, true

12

and accurate record of all proceedings had

13

during the hearing of said matter, and of the

14

whole thereof.

15

Witness my hand at Portland, Oregon, this

16

28th day of November, 2007.

17

18

19

20

Washington CSR No. 2530

21

Oregon CSR No. 90-0056

22

23

24

25

□

Public Meetings

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PM6 RN-110807-FERCpm.txt

1

1 U.S. DEPARTMENT OF ENERGY
 2 FEDERAL ENERGY REGULATORY COMMISSION
 3
 4 BRADWOOD LANDING LNG PROJECT
 5 FERC DOCKET NUMBERS CP06-365 and 366
 6
 7

8 PUBLIC MEETING
 9 TRANSCRIPT OF PROCEEDINGS
 10 * * *
 11
 12

13 Thursday, November 8, 2007
 14 6:30 p.m.
 15

16 Hilda Lahti Elementary School
 17 42535 Old Highway 30
 18 Astoria, Oregon
 19 * * *
 20

21 BEFORE: Mr. Paul D. Friedman
 22 Federal Energy Regulatory Commission
 23 Office of Energy Projects
 24 * * *
 25

□

2

1 P R O C E E D I N G S
 2

3 MR. FRIEDMAN: Good evening, ladies and
 Page 1

Public Meetings

Public Meeting Transcript of Proceedings
Thursday, November 8, 2007, 6:30 p.m.
Knappa, Oregon

The introductory comments for this public meeting are not included in the FEIS because they are very similar to those of the Monday, November 5, 2007, 6:30 p.m. meeting in Cathlamet, Oregon, which are included. The complete transcript of the Tuesday, November 6, 2007, 6:30 p.m. meeting in Clatskanie, Washington can be obtained at the FERC's internet website (www.ferc.gov) using the eLibrary link. Click on the eLibrary link, click on "General Search," and enter the docket number excluding the last three digits in the Docket Number field (i.e., CP06-366). Be sure you have selected an appropriate date range. For assistance, please contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll free at 1-866-208-3676, or for TTY, contact (202) 502-8659.

Public Meetings

Public Meetings

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PM6 RN-110807-FERCpm.txt
 11 signed up on the speakers' list to do so. So
 12 if you haven't signed up but you wish to speak
 13 tonight, you can go back to Janelle and sign
 14 up, and we'll reconvene in about three minutes.
 18:55:25 15 (Recess.)
 16 MR. FRIEDMAN: All right. We'd like to
 17 reconvene and take public comments at this
 18 time. I was told during the break that you
 19 couldn't hear me in the back. Can you hear me
 19:00:59 20 in the back? Is the sound system working? If
 21 you can hear me in the back, raise your hands.
 22 Not very good. I apologize for that.
 23 UNIDENTIFIED SPEAKER: Reduce the bass,
 24 increase the treble, it might help.
 19:01:19 25 MR. FRIEDMAN: It's too late because I'm
 19:01:20 1 done speaking. A record of what I said will go
 2 in the public record. I understand my big rear
 3 end was blocking the slides. So we'll put the
 4 slides in the public record as well, so you can
 19:01:32 5 download it from the Internet.
 6 I'm going to call people in the order in
 7 which they signed up. You only have three
 8 minutes to speak. I am a runner and I have a
 9 stopwatch on my wrist at all times. So I will
 19:01:44 10 hold you to the three minutes so we're
 11 consistent between meetings.
 12 If you've spoken at previous meetings,
 13 you'll go last. We'll give you an opportunity
 14 to speak, but everyone who has not spoken will
 19:01:53 15 go first. I ask that you come up to the

17

Public Meetings

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PM6 RN-110807-FERCpm.txt
 16 microphone here at the front. Hopefully, that
 17 will work better than this one. You need to
 18 tell us your name and spell your last name for
 19 the court reporter. Identify any organization
 19:02:06 20 you may represent, if you represent one. If
 21 you just represent yourself, you can say that.
 22 If you are a landowner along the pipeline
 23 route, please indicate where your property is
 24 according to the mile marks. If you don't know
 19:02:18 25 where your property is by the mile marks, see

18

19:02:22 1 if Janelle has a copy of the DEIS -- there are
 2 mile marks in the DEIS -- or ask a
 3 representative of NorthernStar. They may know
 4 where your property is located if you don't.

19:02:31 5 The first speaker don't is John Dunzer.
 6 Also, if I mispronounce your name, please
 7 correct me.

8 MR. JOHN DUNZER: John Dunzer,
 9 D-U-N-Z-E-R.

19:02:48 10 I'm a supporter of this project, which of
 11 course you don't really care about, which is
 12 fine with me. I've been a big supporter of
 13 this project but have become disenchanted with
 14 this particular EIS. This EIS, Section

PM6-1

19:03:00 15 3.1.6.3, alternative vaporization technologies,
 16 I feel is totally deficient and is not accurate
 17 and for the following reasons:

18 The sources of vaporization heat that were
 19 considered in this had to do with ambient air,
 19:03:17 20 river water, electrical power, wood chips,

Page 15

PM6-1 See our response to comment IND32-2.

PM6-1
cont'd

PM6 RN-110807-FERCpm.txt
 21 waste heat from cogeneration, natural gas. The
 22 waste heat from cogeneration was initially
 23 selected. However, there were some problems,
 24 technical problems, so that the NorthernStar
 19:03:29 25 just decided not to proceed that way, so they
 □
 19:03:31 1 selected natural gas as the method of heating
 2 up this LNG.
 3 Takes about one and a half percent of the
 4 product to heat it up. We have a new law in
 19:03:41 5 the state of Oregon, passed under emergency
 6 legislation August 6. It's called the Climate
 7 Control Act, which requires a reduction in
 8 greenhouse gas emissions in Oregon. This, of
 9 course, doesn't tell the federal government
 19:03:55 10 what to do, but it should tell people like
 11 Clatsop County what to do. But telling Clatsop
 12 County what to do is very difficult for anyone.
 13 But anyway, this will increase the
 14 greenhouse gas emissions by 1.5 percent -- from
 19:04:10 15 natural gas by 1.5 percent, but actually since
 16 it's a regional facility will increase natural
 17 gas emissions in the state of Oregon by 5
 18 percent. It's a little difficult to lower your
 19 greenhouse gas emissions when you're approving
 19:04:26 20 projects that increase them by 5 percent. This
 21 is a huge generator of greenhouse gases.
 22 Now, the states of California, Oregon,
 23 Washington, here in the west all care about
 24 this. There's a lot of people that care about
 19:04:42 25 this. We've got people over in Stockholm that
 □

19

20

Public Meetings

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6

PM6 RN-110807-FERCpm.txt

PM6-1
cont'd

19:04:44 1 even care about this. And there's nobody
2 paying any attention in this EIS about
3 greenhouse gas emissions. There are many, many
4 alternatives to natural gas to provide this
19:04:58 5 heat and a much better engineering solution for
6 this particular gasification plant. This is
7 30-year-old technology. It's tremendously
8 inefficient.

9 Now, I know I won't please most of the
19:05:10 10 people because I think we need this project in
11 the United States because we need energy
12 independence, and this is simply a way to try
13 to save some time in the next 40 years so we
14 can get there, and I think it's very important
19:05:24 15 that we do this project. But we don't need to
16 provide an inefficient, bad design to do it.

17 And so I fully support the project, and I
18 fully don't support the EIS because the
19 description is inadequate; it's not correct.
19:05:40 20 The information that's in there on wood chips
21 is not accurate. NorthernStar knows it's not
22 accurate. Everyone knows it's not accurate.
23 All the EIS contractor did was parrot back
24 exactly what NorthernStar gave them initially.

19:05:55 25 There are already changes in there. Nobody

21

19:05:56 1 wants to say what it is they're really going to
2 do in this project. They just want to keep on
3 going and pushing and pushing and pushing.

4 This EIS is inadequate for the FERC to
Page 17

		PM6 RN-110807-FERCpm.txt	
PM6-1 cont'd	19:06:10	5	make a technical decision on. I've been
		6	preparing federal EISs for longer than your
		7	biologist has been alive back there, and I know
		8	what the heck I'm talking about.
		9	MR. FRIEDMAN: Mr. Dunzer, wrap up,
	19:06:24	10	please.
		11	MR. JOHN DUNZER: All done.
		12	MR. FRIEDMAN: Thank you for your
		13	comments.
		14	I would appreciate if we don't applaud,
	19:06:29	15	don't boo, just be neutral and treat everyone
		16	the same. Thanks.
		17	Next is Debbie Twombly. And if I
		18	mispronounce your name, please correct me.
		19	MS. DEBBIE TWOMBLY: Thank you. I am
	19:06:44	20	Debbie Twombly, T-W-O-M-B-L-Y. I live in
		21	Brownsmead, Oregon, not far from the Columbia
		22	River. I am a Clatsop County native. I care
		23	deeply for this area. I am a mother, a
		24	daughter. I have grandchildren who live close
	19:07:02	25	by, and I want this place to stay safe for
			□ 22
PM6-2	19:07:05	1	them.
		2	What I want to bring to your attention
		3	today -- this may not be exactly what you're
		4	looking for, but I have an edition of National
	19:07:14	5	Geographic from February of this year, 2007,
		6	and it tells about, in an article on energy and
		7	oil edition, how in Nigeria there has been an
		8	LNG plant. And I'm not going to leave this
		9	because I need it for something else, but these
			Page 18

Public Meetings

6

PM6-2 Socioeconomic impacts are addressed in section 4.8.

Public Meetings

6

K-250

PM6-2
cont'd

PM6 RN-110807-FERCpm.txt

19:07:28 10 are the exact plants that the storage tanks
11 that are going to be in place at Bradwood, if
12 NorthernStar has their way.

13 And the caption: Uprooted to make room
14 for a liquified natural gas plant. People in
19:07:41 15 the village of Finima on Bonny Island complain
16 that the facility has damaged fishing grounds,
17 with few jobs offered in return. A native
18 there says, "It's not fair. We can hardly
19 catch fish anymore. Surviving is very hard."

19:07:56 20 It goes on to state that people were
21 forced to give up fishing. Young men of the
22 village had put their hopes in landing a job in
23 the facility, but offers are scarce. A quote
24 from another native, "People from the outside
19:08:11 25 get all the jobs."

23

19:08:12 1 I fear that that is exactly what we could
2 expect here. So not only are we losing natural
3 wetland habitat, but we'd also be hurting
4 people, hurting our economy, and really
19:08:23 5 destroying a lot of natural resources. And
6 it's really not fair. Now, somebody might look
7 at this and they'll say, well, god, that's
8 Africa, that's Nigeria. Well, maybe somewhere
9 right now in Texas somebody is saying, That's
19:08:37 10 the West Coast, Oregon. They're just a bunch
11 of hicks out there. It's a small town.

12 And we're not. It's like that's how we're
13 being treated. I feel like we're being bought
14 off in a lot of ways. NorthernStar comes in
Page 19

PM6 RN-110807-FERCpm.txt		
PM6-2 cont'd	19:08:50	15 and they give money to local charities, a
		16 little trickle here and a little trickle there,
		17 and they're not treating us fair. We're being
		18 treated like second-class citizens, like peons,
		19 and we don't appreciate it.
	19:09:03	20 We are bright, intelligent people, and
		21 there are local jobs. People can come back
		22 here and get jobs that are being created as we
		23 speak. I've lived here all my life. I feel
		24 like I have a perfectly good job. I'm a
	19:09:17	25 third-grade teacher at Astor School, and I
		24
	19:09:20	1 would hate to think of the danger that there
		2 could be as those horrible tankers are passing
		3 by the playground where so many children are
		4 playing. And that's my statement.
	19:09:30	5 Thank you very much.
		6 MR. FRIEDMAN: Thank you.
		7 Next is Ned Heavenrich.
		8 MR. NED HEAVENRICH: Good evening. Ned
		9 Heavenrich, and that's as in where you want to
	19:09:51	10 go and what you want to be, heaven and rich
		11 together. Saves a lot of spelling.
		12 It's my privilege to work in this building
		13 right here, and I am not in favor of this
PM6-3		14 project, and one of the reasons -- I have many
	19:10:13	15 reasons. One of the reasons is because of the
		16 dredging. There's a great picture here of the
		17 amount of dredging that will be done in the
		18 turning basin, 700,000 cubic yards of material,
		19 enough to fill dump trucks that would reach
		Page 20

Public Meetings

6

PM6-3 Dredging is addressed in sections 4.2 and 4.3 of the EIS.

PM6-3 cont'd

PM6-4

PM6-5

PM6 RN-110807-FERCpm.txt

19:10:33 20 from Longview, Washington, to the

21 Oregon-California border. That's a lot of

22 material.

23 And when I first came to this area in

24 1973, it was on the deck of a fishing boat.

19:10:47 25 And I'm very concerned -- I've seen the

□

19:10:51 1 degradation of the river over the years, the

2 decline in the salmon. We have a lot of

3 endangered, threatened species, and to allow

4 another project like this is just going to

19:11:02 5 continue on the road to further degradation of

6 the resource that is so precious: The icon of

7 the Pacific Northwest, the salmon. And just in

8 30 years I've seen it go from, you know, an

9 abundant amount of fish to a trickle.

19:11:23 10 And so I'm sure that you've looked at this

11 on the Environmental Impact Statement, and I

12 just want to say that to allow this to happen

13 would be another tragedy and not healthy for

14 the environment here in Clatsop County.

19:11:43 15 Thank you.

16 MR. FRIEDMAN: Thank you.

17 Next is Ted Messing.

18 MR. TED MESSING: I'm Ted Messing.

19 M-E-S-S-I-N-G. I'm 35-year resident of Clatsop

19:12:10 20 County and a former commercial fisherman.

21 After following these proposed LNG

22 projects for three years, during which we have

23 attended nearly every federal, state, and

24 county meeting, I have my doubts that anything

Page 21

Public Meetings

6

PM6-4 The project's potential impact on salmonids is discussed in sections 4.5 and 4.6 of the EIS. We will also address this issue in our revised BA and EFH Assessment.

PM6-5 Public meetings are part of the NEPA process.

PM6 RN-110807-FERCpm.txt

PM6-5
cont'd

19:12:22 25 I could say here today will make much
□ 26

19:12:25 1 difference. I am sure the main purpose of this
2 meeting is so you can check the box that says
3 you held a public meeting.

PM6-6

4 However, the consensus outside the bubble
19:12:34 5 is that this project is a bad idea. The
6 Bradwood site and the head of Clifton Channel
7 is an incredibly sensitive area for all
8 Columbia River salmonids. It is the gateway to
9 their estuary.

19:12:49 10 The dredging involved will completely
11 destroy the natural shallow-water entrance to
12 the entire downstream estuary ecosystem.
13 Changing river currents will wash away fragile
14 islands, all of which are part of a wildlife
19:13:04 15 refuge. This disruption of a natural path to
16 the estuary of the 13 endangered salmonid
17 species will be a daily occurrence. Dredging,
18 tugs turning massive tankers, millions of
19 gallons of river water sucked up for ballast
19:13:21 20 does not seem healthy for salmonids.

21 The LNG industry says they can mitigate
22 for this destruction, but how do you mitigate
23 for a river that has been turned into an
24 industrial ditch? Mitigation is a pathetic
19:13:34 25 attempt to restore what we already have after
□ 27

19:13:36 1 it has been damaged or destroyed. And if
2 mitigation is so good, why are we literally

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PM6-6

Based on the results of modeling conducted by WEST, dredging of the maneuvering area and berth are unlikely to modify flow velocities within the river such that the destruction of the entrance to the lower Columbia River estuary or erosion of entire islands would result.

Potential impacts from dredging and water intake on aquatic resources are discussed in section 4.5.2.1. Potential impacts from tug maneuvering are discussed in section 4.1.3.3.

The adequacy of mitigation for impacts on aquatic resources due to the project is discussed in the response to comment FA2-10.

PM6-6
cont'd

PM6 RN-110807-FERCpm.txt
 3 fighting over the last salmon now, and 13 out
 4 of 16 runs are threatened or endangered?
 19:13:47 5 There could not be a worse site on the
 6 entire West Coast to put an industrial gas
 7 terminal and tank farm than Bradwood. I am
 8 submitting three testimonies given at the
 9 Clatsop County zone change hearing to support
 19:14:01 10 our objection.
 11 Number one testimony is by Lee Cain,
 12 fisheries biologist about the importance of
 13 protecting the estuary. Number two testimony
 14 is by Hobe Kyter of Salmon For All, as to the
 19:14:17 15 negative impacts on our commercial river
 16 fisheries. And the third one is the Clatsop
 17 County planning staff report itself,
 18 recommending denial of the zone change requests
 19 for Bradwood.
 19:14:31 20 In spite of the heavily influenced and,
 21 therefore, illegal vote in favor of zone
 22 changes by some of the planning commissioners,
 23 the staff report is good science on the
 24 consequences of this project and its
 19:14:44 25 noncompliance with zoning laws. I have
 □
 19:14:46 1 included the web site at which the report can
 2 be read, and I also understand that it's
 3 already been submitted.
 4 So I'm just asking, surprise us. Don't
 19:14:54 5 let this cancer get started in our estuary.
 6 Thank you.
 7 MR. FRIEDMAN: Thank you for your

28

Public Meetings

8 PM6 RN-110807-FERCpm.txt
 comments.
 9 I think it's Georgia Macencourt? Not
 19:15:23 10 close? Please fix it.
 11 MS. GEORGIA MARINCOVICH: Not even close.
 12 MR. FRIEDMAN: I'm sorry.
 13 MS. GEORGIA MARINCOVICH: It's Georgia
 14 Marincovich. M-A-R-I-N-C-O-V-I-C-H.
 19:15:30 15 MR. FRIEDMAN: I apologize.
 16 MS. GEORGIA MARINCOVICH: I am a landowner
 17 in Clifton. (Pause.) My husband said I'd be
 18 too emotional, but I'm going to do it anyway.
 19 We're right next to Bradwood, and it's a
 19:15:49 20 fishing village, and we've fished there for a
 21 hundred years. And my fear is that they're
 22 going to build this horrible project here and
 23 they'll destroy the wetlands.
 24 MR. FRIEDMAN: Georgia, do you want to
 19:16:10 25 wait and come later?
 □ 29
 19:16:12 1 MS. GEORGIA MARINCOVICH: No, I want to
 2 finish. Thank you.
 3 And that these wetlands, they say they can
 4 replace them by mitigation. There is no way
 19:16:20 5 that these wetlands can be replaced. And my
 6 question is this: You have -- we have all
 7 these environmental regulating agencies, and we
 8 don't hear from any of them. You ask them
 9 about the project, and they say we cannot
 19:16:40 10 comment. Who's protecting the environment?
 11 They can't comment on something as big as this?
 12 I want to just read the agencies off.

Public Meetings

6

PM6-7

We address impacts on wetlands and mitigation in section 4.4.1. NorthernStar will have to obtain permits from the COE, ODSL, and WDE, and those permits would contain conditions to mitigate for any wetland losses. The FERC has consulted with the FWS and NMFS about impacts on marine mammals, aquatic resources, and threatened and endangered species, and has produced a BA and EFH assessment. The FWS, NMFS, and ODFW have all commented about this project on the record. Their comments on our draft EIS can be found in volume 2 of the final EIS under FA2, FA4, and SA1. This EIS discloses environmental impacts and includes recommended conditions to protect resources.

PM6-7
cont'd

PM6 RN-110807-FERCpm.txt
Are the laws? 404 of the Clean Water Act,
the Magnuson-Stevens Fishery Conservation and
Management Act, the Fish and Wildlife
Conservation Act, the National Environmental
Policy Act, the Rivers and Harbors
Appropriation Act of 1899, the Endangered
Species Act, the NOAA Fisheries Services
Activities Related to Wetlands Policy and
Guidance, the National Marine Fisheries
Service, the Pacific Fisheries Management
Council, the Oregon Fish and Wildlife, the
Washington Department of Fish and Game.
Where are all these agencies that are
supposed to protect the fish? And also your
department. You're also supposed to be
protecting the environment.
(Applause.)
MR. FRIEDMAN: Thank you for your
comments.
I do understand that this is an emotional
issue. It affects people deeply, and they have
very strong opinions, but I am going to ask you
again to not applaud, not boo, just be neutral.
Thanks.
I hope to do better pronouncing your
husband's name. Jack Marincovich.
UNIDENTIFIED SPEAKER: Mr. Friedman, it's
hard to hear in the back. Is it possible to
turn it up?
MR. FRIEDMAN: I don't know how. If I put

Page 25

30

Public Meetings

PM6-8	18	PM6 RN-110807-FERCpm.txt it closer to my face, is it better?	
	19	UNIDENTIFIED SPEAKER: Yes.	
	19:18:39 20	MR. JACK MARINCOVICH: Mr. Chairman, my	
	21	name is Jack Marincovich. I'm a commercial	
	22	fisherman on the river and also representing	
	23	the Columbia River Fishermen of Astoria.	
	24	Our organization is well over a hundred	
	19:18:52 25	years old. We represent the interests of	31
	19:18:55 1	commercial fishermen on the Columbia River.	
	2	There's roughly 500 commercial fishermen that	
	3	participate on the Columbia River. We come	
	4	from three and four generations of fishermen.	
	19:19:08 5	They spend most of their time on the Columbia	
	6	River, so they like to believe they know what's	
	7	good and what's bad for the Columbia.	
	8	I've been following this for the best part	
	9	of three years. I went to the first open house	
	19:19:20 10	in Bradwood, and we talked with people there,	
	11	and we've been going to meetings ever since. I	
	12	testified at the mark (inaudible) deal. I	
	13	testified at the meeting at the Astoria High	
	14	School in the first part of July, I think it	
	19:19:34 15	was, along with 200 other people, and I think	
	16	two-thirds spoke against the project. We had	
	17	good testimony, professional people.	
	18	But for some reason all that testimony was	
	19	pushed under the table and it was -- it was --	
	19:19:51 20	it was discarded, wasn't even used, and that	
	21	really, really turned me off on the process of	
	22	public input, you know. So I've come to the	
Page 26			

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PM6-8 We address impacts on wetlands and mitigation in section 4.4.1. Hunt Creek is discussed in section 4.3.2.3. NorthernStar's mitigation plan would protect the habitat of Hunt Creek, and restore wetland environments in the lower Columbia River estuary. Impacts on fishing are addressed in section 4.7.1.4 and 4.8.1.7. We do not think that the project would result in significant adverse effects on commercial or recreational fishing.

PM6-8
cont'd

23 PM6 RN-110807-FERCpm.txt
conclusion that I think the project is a
24 bigger -- is a bigger task, it's a bigger deal
19:20:11 25 than our county people handle and make 32
□

19:20:15 1 decisions.
2 I just -- sorry -- elected officials,
3 Clatsop County Commissioners, we elected them,
4 we voted them in, but right now I think it's
19:20:25 5 too big of a task for them to judge. I
6 think -- we've got all these federal agencies
7 that -- I know our commercial fishing seasons,
8 most of our seasons and regulations come down
9 from National Marine Fisheries. They hand down
19:20:40 10 the regulations to the states.
11 And then we have meetings, and they decide
12 when we can work on the river and when we can't
13 work on the river. We have Endangered Fishing
14 Act -- Fish Species Act. There's certain fish
19:20:56 15 we can catch, certain fish we can't catch.
16 They stop us, on our line they stop us. I'm
17 just waiting for these agencies, these federal
18 agencies -- we have a list of them here: Clean
19 Water Act, Magnuson Act, Fish and Wildlife
19:21:09 20 Conservation Act, National Environmental Policy
21 Act, Rivers and Harbors, Endangered Species.
22 All these federal agencies that have more
23 to say about what goes on the rivers than
24 county commissioners or county planning
19:21:25 25 commission. And I'm waiting for them to step 33
□

19:21:27 1 in because they're the ones that curtail our
Page 27

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PM6-8
cont'd

PM6 RN-110807-FERCpm.txt

2 operations, and go back to Bradwood Landing.
3 We grew up in Clifton. About a dozen families
4 still own property.
19:21:41 5 Very few days through the year I don't
6 drive down the county road. My dad's house is
7 still there. We spend most of all our time
8 there. We work there. We play there. We do
9 fishing. We do hunting in the area. It's more
19:21:54 10 than -- it's more than just a way of making a
11 living through the years and our people behind
12 us; it's a way of life.
13 And the wetlands in Bradwood Landing,
14 we've been through them, you know, all through
19:22:08 15 the years and --
16 MR. FRIEDMAN: Jack, can you wrap it up.
17 MR. JACK MARINCOVICH: Okay. Hunt Creek
18 runs down through wetland, and it's too
19 valuable of a wetland, and it can't be
19:22:19 20 mitigated downstream anyplace. If those
21 wetlands are destroyed, they can't be replaced
22 anyplace else.
23 So thank you for the time, and we'll catch
24 you at the next meeting.
19:22:30 25 (Laughter.)
□

34

19:22:32 1 MR. FRIEDMAN: Thank you for your
2 comments.
3 Brent Foster.
4 MR. BRENT FOSTER: Good evening. Thanks
19:22:47 5 for the opportunity. My name is Brent Foster.
6 I'm speaking on behalf of Columbia Riverkeeper.
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PM6 RN-110807-FERCpm.txt

PM6-9 7 I'm executive director of Columbia Riverkeeper.

19:22:59 8 And in many ways I think that the EIS
9 reads more like a promotional document than a
10 candid assessment of what this project might
11 actually do. I understand that the political
12 push that has resulted in what I'd call the
13 rush to develop LNG terminals, put strong
14 pressure on FERC to, let's say, look more
19:23:13 15 favorably on high-impact facilities like
16 NorthernStar's Bradwood project, but
17 fortunately enough, NEPA and other federal laws
18 still apply, and this EIS simply does not meet
19 them.

19:23:26 20 I'm going address -- we're preparing
21 detailed comments which we'll be submitting
22 before the deadline, but I'll just touch on two
23 issues today, both the EIS's failures in terms
24 of evaluating the project's effect on salmon
19:23:39 25 and, secondarily, on people, two things that I
□

35

19:23:41 1 think are extremely important to this
2 community.

PM6-10 3 As a starting point, on salmon, the EIS is
4 completely unrealistic. It essentially is
19:23:51 5 painting a very rosy picture of what putting a
6 major industrial port in the middle of the
7 United States lower 48's best terrain salmon
8 runs. It not only downplays the very specific
9 effects of the LNG terminal but, frankly, is
19:24:09 10 not comprehensive of the fact that there is an
11 actual salmon crisis going on. Virtually
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PM6-9 See our responses to comments PM2-20 and PM4-20,

PM6-10 See our response to comment FA1-28.

		PM6 RN-110807-FERCpm.txt	
PM6-10 cont'd	12	ignores the biological opinion process which	
	13	has now been rejected multiple times by a	
	14	federal judge in which the federal government	
	19:24:21 15	is an intimate player.	
	16	The Columbia River estuary, in those	
	17	discussions, which have resulted from	
	18	litigation over the operation of the Columbia	
	19	River main stem, is specifically focused from	
	19:24:32 20	the federal government, of which you're a part,	
	21	on banking basically the future of Columbia	
	22	River salmon largely on the success of the	
	23	Columbia River estuary.	
	24	This EIS completely ignores, I think, the	
	19:24:46 25	importance, how this is going in a very	36
PM6-11	19:24:49 1	direction than another arm of the federal	
	2	agency, which I get to hear in court on a	
	3	regular basis, talking about how the estuary	
	4	and improvements here are going to be the	
	19:24:57 5	solutions to the Columbia's hydropower system.	
	6	Specifically, the EIS grossly downplays	
	7	the effects of several billion, not million,	
	8	gallons of ballast water withdrawal thanks to	
	9	the unproven, never tested, never even built,	
	19:25:13 10	let alone prototyped or proven methods of	
	11	putting ballast water in ships using fish	
	12	screens. The EIS is optimistic, but blindly	
	13	so.	
	14	It unreasonably assumes that mitigation	
	19:25:27 15	measures are going to work. It ignores the	
	16	fact that central components of NorthernStar's	
		Page 30	

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PM6-11 We have recommended in section 4.4.1.2 that NorthernStar's final Compensatory Mitigation Plan be filed, along with agency comments and appropriate approvals, with the Secretary prior to construction of the project. We do not feel that it is unreasonable to assume that agency-approved mitigation measures would be effective. The fact that another entity had offered to purchase Svensen Island prior to NorthernStar is not relevant to the discussion of potential impacts from the Bradwood Landing Project.

NorthernStar submitted its Mitigation Plan – 3rd Revision for the Bradwood Landing Terminal and Pipeline to the FERC on August 3, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

		PM6 RN-110807-FERCpm.txt	
PM6-11 cont'd	17	mitigation, like the Svensen Island purchase,	
	18	are essentially little more than a sham.	
	19	Svensen Island was about to be purchased by	
	19:25:41 20	Columbia Land Trust, although this is ignored	
	21	by the EIS, and prior to the finalization of	
	22	the purchase, NorthernStar came in, offered a	
	23	higher price; next thing you know, it's	
	24	mitigation.	
	19:25:52 25	It was going to be already bought and	37
PM6-12	19:25:54 1	purchased. It's completely inappropriate to	
	2	consider as mitigation since essentially this	
	3	is the project, and NorthernStar is the company	
	4	which stored it as conservation benefit.	
	19:26:04 5	Impacts on salmon stranding are also just cast	
	6	aside.	
	7	I want to address quickly three points on	
	8	people. We are going to echo Dr. Havens'	
	9	testimony in regard to FERC's use of the	
	19:26:19 10	incorrect model. In evaluating, it's very	
	11	important you portray a clear picture of what a	
	12	tanker breach of a tanker passing Astoria in	
	13	Puget Island would actually mean in terms of	
	14	lost lives, in terms of damaged structures and	
	19:26:33 15	economic damage to infrastructure.	
	16	Relying on Sandia's estimate no longer	
	17	makes sense because the GAO clearly says Sandia	
	18	likely underestimates the actual effect of a	
	19	cascading failure due to one rupture in one	
	19:26:49 20	tank, you're likely to lose -- or at least	
	21	there's good reason to believe you'd lose the	
		Page 31	

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PM6-12 Section 4.11.5.3 discusses the hazards associated from a release of LNG from an LNG carrier. Section 4.11 includes a discussion of cascading failures from LNG tanks on an LNG carrier.

PM6-12 cont'd

PM6-13

PM6 RN-110807-FERCpm.txt

22 whole tanker. With that I'll wrap up my
 23 comments and look forward to submitting them in
 24 the final.

19:26:59 25 MR. FRIEDMAN: Thank you. 38

19:26:59 1 Next speaker is Jerry Havens.

2 DR. JERRY HAVENS: Thank you for
 3 permitting me to comment at this meeting. I'm
 4 appearing as a scientist and as a concerned
 19:27:18 5 citizen to inform you of potential problems in
 6 FERC's approval of vapor cloud exclusion zones
 7 prepared for the Bradwood Landing DEIS.

8 Recent events indicate to me that FERC's
 9 compliance with the Congressional mandate to
 19:27:35 10 consider remote siting of LNG terminals in
 11 order to protect public safety is being based
 12 largely on exclusion, or safety, zones required
 13 by the U.S. Department of Transportation
 14 regulation 49 CFR 193. As a result, the
 19:27:51 15 establishment of such exclusion zones, which
 16 are mandated for land-based facilities only,
 17 has become the key method by which the
 18 sufficiently remote siting is insured. I
 19 believe that such methods as are presently
 19:28:05 20 applied do not and cannot insure the public
 21 safety as intended.

22 In the limited time available, I'll
 23 comment only on the vapor cloud exclusion zone
 24 determination.

19:28:17 25 Presently, only two modeling methods are 39

Public Meetings

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PM6-13 See our responses to Dr. Jerry Havens' comments, IND73-1 through IND73-5.

Public Meetings

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PM6 RN-110807-FERCpm.txt

PM6-13
cont'd

19:28:19 1 approved for determining vapor cloud exclusion
 2 zones. The DEGADIS model, of which I am a
 3 co-author, was developed with the support of
 4 the U.S. Coast Guard and the Gas Research
 19:28:30 5 Institute. Approved for use in the federal
 6 regulation in the early '90s, DEGADIS does not
 7 account for any holdup of LNG vapor by dikes or
 8 other obstructions.
 9 Because of the need for models which can
 19:28:45 10 account for such complicated effects, the FEM3A
 11 model was developed as a result of a
 12 ten-year-long research effort supported by the
 13 Gas Research Institute and a consortium of
 14 international LNG interests, for which I was
 19:28:58 15 the principal investigator. FEM3A, approved in
 16 the year 2000, is clearly specified in 49 CFR
 17 193 as the model that must be used if vapor
 18 cloud holdup by impoundment is to be taken into
 19 account.
 19:29:17 20 Here, the Bradwood Landing applicant
 21 attempts to take the vapor holdup effect of the
 22 impoundment into account without using the only
 23 permissible method, FEM3A, for doing so.
 24 Instead it uses DEGADIS coupled with an absurd
 19:29:38 25 assumption that the LNG vapor evolved from a
 □
 19:29:40 1 spill would accumulate in the impoundment
 2 without mixing with air. In effect, the
 3 applicant assumes that zero LNG vapor would be
 4 released from the impoundment during the first

40

PM6-13 cont'd

19:29:51 5 PM6 RN-110807-FERCpm.txt
several critical minutes after a spill, when

6 the rate of vapor generation is the greatest.

7 This assumption has the effect of

8 substantially reducing the calculation of the

9 size of the vapor exclusion zone. Most

19:30:03 10 importantly, the assumption has been proven to

11 be wrong. Experiments have conclusively shown

12 that the LNG vapor does not simply remain

13 unmixed and unwarmed until it fills up and

14 overflows the impoundment.

19:30:18 15 However, that absurd and demonstrably

16 wrong assumption is the basis for the

17 calculation of the vapor exclusion zone in this

18 case. To be reasonable, this must be redone

19 either using negatives without attempting to

19:30:31 20 take the effect of the vapor holdup, or by

21 using FEM3A.

22 I believe that the vapor cloud exclusion

23 zones determined in the DEIS fail to provide

24 for public safety as intended by 49 CFR 193 in

19:30:46 25 two other ways, briefly:

□

19:30:48 1 The design spill used by the applicant

2 here has been arbitrarily specified as the

3 breakage of a six-inch line on the cargo

4 unloading line for the facility, with a

19:31:00 5 ten-minute duration spill of 140,000 gallons,

6 while the impoundment volume into which the

7 spill would occur has been sized to account for

8 530,000-gallon spill.

9 My review of 11 other environmental impact

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PM6-13 19:31:16 10 PM6 RN-110807-FERCpm.txt
 cont'd 11 statements shows DEIS approval for design spill
 12 from the ship unloading line ranging from
 13 29,000 gallons to 810,000 gallons. I do not
 14 understand how FERC can approve such a large
 15 variation in the design spill which determines
 19:31:36 16 the extent of the exclusion zone. After all,
 17 the ship unloading lines, as well as the
 18 arrangement of the smaller lines serving the
 19 unloading line, are all based on similar
 20 technology.
 19:31:48 21 Since the vapor cloud's own determinations
 22 are directly related to the size of the spill,
 23 it could have the appearance of simply
 24 determining the size of the spill that the
 25 property distance allows.
 19:32:01 26 MR. FRIEDMAN: Dr. Havens, please wrap it
 19:32:04 1 up, and we need to see it in writing because
 2 it's a complex issue.
 3 DR. JERRY HAVENS: The determination of
 4 the vapor cloud exclusion zone has been made
 19:32:10 5 assuming a wind speed of two meters per second.
 6 This assumption is not conservative, although
 7 it's allowed by 49 CFR 193. Models and
 8 experiments indicate that the worst case is at
 9 a higher wind speed. In this regard, I point
 19:32:25 10 out in closing the fire radiation exclusion
 11 zone is required to be determined by FERC, and
 12 Bradwood Landing appears to have done so for
 13 the wind speed that maximizes the exclusion
 14 zone. The same reasoning is applicable to the

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K-267

19:32:41 15 PM6 RN-110807-FERCpm.txt
termination of the vapor cloud exclusion zone.

16 Thank you.

17 MR. FRIEDMAN: Thank you for your

18 comments.

19 (Applause.)

19:32:47 20 MR. FRIEDMAN: I expect if you have more
21 detailed comments, that you'll send us another
22 letter, much more detailed.

23 DR. JERRY HAVENS: I'm sorry?

24 MR. FRIEDMAN: If you have more detailed
19:32:55 25 comments, you can send those in as well.

43

19:32:58 1 DR. JERRY HAVENS: I'm done.

2 MR. FRIEDMAN: Next is Carolyn Eady.

3 MS. CAROLYN EADY: My name is Carolyn

4 Eady, E-A-D-Y.

PM6-14 19:33:14 5 I'm opposed to the Bradwood Landing, and
6 my comments regarding the DEIS are as follows:
7 First, omissions. You have a table there,
8 that's actually a map, figure 4.7.1-1, page
9 4-276: Sensitive resources along the waterway.

19:33:33 10 It omits Station Camp and Dismal Nitch and part
11 of the Lewis and Clark National Historic Park;
12 the Astoria bridge connecting Oregon and
13 Washington; Clatsop County parks on or near the
14 Columbia River, including the John Day boat

19:33:50 15 ramp, a very popular one, the Westport boat
16 ramp, and the Big Creek Park; the Oregon
17 Department of Forestry campground and trail at
18 Gnat Creek; the City of Warrenton trails along
19 the Columbia River; the City of Astoria river

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PM6-14 Figure 4.7.1-1 depicts potential sensitive resources within the Zones of Concern. We have added to the figure the features listed in this comment that are within the Zones of Concern. However, Station Camp, Dismal Notch, Westport boat ramp, Big Creek Park, and the Gnat Creek campground and trail are located outside of the Zones of Concern.

PM6-15	19:34:04	20	PM6 RN-110807-FERCpm.txt walk.	
		21	In addition, it omits the frequency of	
		22	floods in northwest Oregon. There have been	
		23	five over the past 150 years. They usually	
		24	close the Columbia River and have freighters	
	19:34:16	25	lined up all along the waterfront. It should	44
	19:34:20	1	also be noted that ODF reported the flood of	
		2	'96 -- 1996 caused thousands of shallow,	
		3	rapidly moving landscapes.	
PM6-16		4	You omit the frequency in which the Coast	
	19:34:32	5	Guard closes the bar at the mouth of the	
PM6-17		6	Columbia River due to extreme weather. You	
		7	omit the fact that the URS geological hazard	
		8	report -- they mention, in fact, in the DEIS,	
		9	we should feel okay about the pipeline because	
	19:34:51	10	California has not had a major failure in the	
		11	last 60 years.	
		12	The URS report mentions specifically that	
		13	the only failure was in Alaska during their 9.2	
		14	earthquake. I think that's a significant	
	19:35:08	15	omission in the DEIS. A level-nine earthquake	
PM6-18		16	is 30 times stronger than a level seven, and	
		17	they had not experienced a level nine in	
		18	California during those years.	
		19	There's a statement -- this is more in the	
	19:35:27	20	case of an error: An earthquake associated	
		21	with a portion of the Cascadian subduction zone	
		22	in northwest Oregon and southwestern Washington	
		23	has not occurred in historic time, page 4-11.	
		24	I'm baffled by that statement. We can	
			Page 37	

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- PM6-15 As indicated in section 2.1.2.4, the anchorages at Astoria would not be suitable for use by LNG vessels. Therefore, if the Columbia River is closed to ship traffic due to flooding (or other poor weather conditions), LNG ships would not be allowed to enter the river. Loaded LNG ships would not anchor at Astoria. Landslides are addressed in section 4.1.
- PM6-16 Section 2.1.2.2 describes wave hazards and storm conditions at the Columbia River Bar, including conditions that do not allow transit by ships.
- PM6-17 California is referenced as it is a very active seismic region and therefore illustrates how well natural gas pipelines perform under such conditions.
- PM6-18 In the seismic hazard analysis report for LNG terminal, the phrase "historic time" refers to the period from 1850 to the present. That is time period during which reasonably complete earthquake records are available. This has been clarified in the final EIS. In addition, we have added information regarding past large subduction zone earthquakes and the event of 1700 was taken into account in assessing the site-specific risk at the site..

PM6-18 19:35:44 25 PM6 RN-110807-FERCPm.txt
 □ give you the exact dates going back thousands 45
 cont'd

19:35:47 1 of years, including the last one, January 26,
 2 1700. We are 307 years into a 300- to 500-year
 3 range of having major earthquakes. A local
 4 geologist estimates our risk of such an
 19:36:08 5 earthquake at 15 to 20 percent. I cannot
 6 understand -- and I'll give you these
 7 comments -- how they came up with the figures
 8 they did.
 9 This is not an academic exercise for
 19:36:22 10 people who live here. This research that's
 11 developed over the last 20 years has changed
 12 everything, including building codes,
 13 education, signage, escape routes, you name it.
 14 The final comment --
 19:36:37 15 MR. FRIEDMAN: Please wrap it up.
 PM6-19 16 MS. CAROLYN EADY: I'll wrap it up. The
 17 hazards associated with the pipeline, they
 18 identify them, but they never looked at the
 19 compounding effect that a major earthquake
 19:36:48 20 would have on an area that is already hazardous
 21 and subject to landslides and faults.
 22 Thank you.
 23 MR. FRIEDMAN: Thank you for your
 24 comments.
 19:37:01 25 Next is Joseph -- and correct me if I
 □ 46

19:37:05 1 mispronounce it -- Boehm.
 2 MR. ROBERT BOEHM: I think you're talking
 3 Bob Boehm. That's all right.
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PM6-19 Geologic hazards are grouped in categories in the EIS for organizational purposes. While it is true that some hazards could occur simultaneously and may be interrelated (e.g., flooding and landslides or earthquakes and landslides), the existing descriptions are still valid and the mitigation measures are the same. Site-specific slope stability evaluations to be performed prior to construction along the pipeline route must take earthquake effects into account.

PM6 RN-110807-FERCpm.txt

4 MR. FRIEDMAN: All right. Please correct
19:37:19 5 me.

PM6-20

6 MR. ROBERT BOEHM: My name is Bob Boehm,
7 spelled B-O-E-H-M. I live approximately a mile
8 and a half from Clifton, and I'd like to
9 address the security problems at the site
19:37:32 10 itself.

11 I may not be a terrorist, but I am a
12 hunter, and unless they plan on defoliating a
13 thousand yards around the whole perimeter of
14 that area, any terrorist could sit up in the
19:37:46 15 woods and lob bombs in that area all day long.

16 It is one of the worst places to have an LNG
17 terminal, just because the location. There are
18 hills surrounding the east side and the west
19 side, and it's -- and it's very heavily wooded,
19:38:05 20 and anyone could sit up there and just raise
21 havoc with it.

PM6-21

22 And the second problem I have with the
23 project is that I've lived in Clifton probably
24 approximately 40 years, and I have seen the
19:38:21 25 amount of rain that we have in the area, and

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19:38:27 1 you could say that coming down Clifton Road in
2 the middle of wintertime is at times horrific.
3 And all the little tributaries that run into
4 Hunt Creek, a lot of times we have so much
19:38:39 5 rain, it overfills the culverts and it spills
6 right across the road.

7 And if there was ever a spill -- and when
8 I read, there's going to be approximately at
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PM6-20 Section 4.11.8 discusses terrorism and security issues. As stated in that section, it is possible that a release from the LNG storage tanks could be caused by an intentional act, such as a terrorist attack. Although an intentional breach scenario could result in greater thermal radiation in the immediate vicinity of the release, such scenarios are typically associated with the desire to inflict damage to major infrastructure and population and commercial centers.

PM6-21 As described in section 4.11.3, the LNG storage tanks at the Bradwood Landing terminal are double-walled tanks so that the contents of the inner tank would be contained in the event of a failure. In addition, a tertiary berm surrounding the tank and processing area would provide further spill containment in the event of an unforeseen catastrophic failure. Therefore, it is highly unlikely that a spill would flow into Hunt Creek.

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PM6 RN-110807-FERCpm.txt

PM6-21
cont'd

9 times a thousand trips a day up and down that
10 Clifton Road for this LNG terminal. And if
11 there is a spill, and odds are there probably
12 will be, and if it happens in the winter, there
13 is no way that there will be any type of
14 emergency vehicles to get to that spill,
15 because it will run right into Hunt Creek and
16 right into the estuary, and then you'll have a
17 problem, a real big problem.
18 And I don't think any of this has been
19 addressed. It's really nice to see it in the
20 summertime when there's no rain, but in the
21 wintertime, when we have snow and everything
22 else, and they'll be working, what, 24/7, and
23 there will be problems. And then what?
24 And really the only reason, in my opinion,
19:39:37 25 that it is put in that area is because they

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19:39:41 1 figure it was out of sight, out of mind, and
2 what would happen would happen. And the people
3 that live on Puget Island and in Brownsmead and
4 Clifton, we're kind of disposable, and that's
19:39:53 5 the way I feel about it.

PM6-22

6 And also one other thing. I feel really,
7 to be quite candid with you people, this is
8 nothing but a big facade, and it's been kind of
9 shoved down our throat. They throw a little
19:40:06 10 money around, and you people -- I don't know
11 you, but this is the way I see it. People go
12 like that with their hands (indicating) and
13 it's a done deal. And I -- and I don't know if

Page 40

PM6-22 See our response to comment PM2-3.

PM6 RN-110807-FERCpm.txt

PM6-22

cont'd

14 it's a done deal, but a lot of people tell me
 15 it's a done deal.
 16 That's all I have to say.
 17 MR. FRIEDMAN: Thank you for your
 18 comments.
 19 Next is Cheryl Johnson.

19:40:39 20 MS. CHERYL JOHNSON: Cheryl Johnson,
 21 Astoria, Oregon.

PM6-23

22 What changes are necessary to allow a
 23 private company access to the Columbia River
 24 for the purpose of making a profit for its
 19:40:48 25 shareholders? In examining the DEIS, a number

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19:40:50 1 of disturbing questions emerged. The WSR
 2 recommends facilities and infrastructure to
 3 make the waterway suitable for LNG marine
 4 traffic. These are listed on page 4-432.
 19:41:03 5 Among them, quote: Augmentation of shoreside
 6 firefighting capabilities to provide protection
 7 services to the facility as well as the
 8 communities along the transit route and, quote,
 9 shoreline patrols.

19:41:18 10 Continuing on page 4-433, the DEIS refers
 11 to additional measures that may include, quote:
 12 Security boardings, surveillance and
 13 monitoring, patrols, vessel escort and
 14 additional security measures. The DEIS makes
 19:41:31 15 repeated reference to such facilities and
 16 infrastructure. Here comes the problem.
 17 Quote: Because any unauthorized disclosure of
 18 the details of these measures could be employed

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Public Meetings

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PM6-23 As discussed in section 4.11.6, the ERP must be developed in consultation with appropriate federal, state, and local agencies. The plan would be available to the local agencies and emergency personnel who need the information to ensure public safety. Non-SSI components that are necessary for public involvement, such as emergency notification or evacuation route information, would be made public as appropriate.

Public Meetings

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PM6-23 cont'd

PM6 RN-110807-FERCpm.txt

19:41:46 19 to circumvent proposed security measures, it is
20 not releasable to the public, page 4-433.
21 Problem number one: We, the communities
22 that will be directly affected, cannot know
23 what safety and security measures will be
24 required. The plan is secret.

PM6-24 19:41:59 25 On page 5-17 the EIS references another 50
19:42:03 1 problem, costs of these requirements. Quote:
2 An issue that has developed for several LNG
3 terminal projects, including Bradwood Landing
4 project, is a concern that local communities
19:42:14 5 would have to bear some of the costs of
6 insuring the security emergency management of
7 the LNG facility and the LNG vessel while in
8 transit and unloading at the dock.
9 Here comes the problem. Quote: The
19:42:28 10 specific security emergency management costs
11 for the proposed project are not yet available.
12 Page 5-17. Problem number two: Nobody knows
13 what these safety and security measures are
14 going to cost.
19:42:42 15 And now we come to the heart of this
16 issue, who will pay. On page 4-436, quote:
17 The ERP shall include a cost-sharing plan that
18 contains the description of any direct cost
19 reimbursements NorthernStar agrees to provide
19:43:01 20 to any state and local agencies with
21 responsibility for security and safety.
22 Problem number three: What if
23 NorthernStar agrees to pay 10 or 20 percent of
Page 42

PM6-24 As discussed in section 4.11.6, the ERP must include a Cost Sharing Plan which must be approved by FERC before any final approval to begin construction. If the needed resources are not available and properly funded, construction and operation of the project would not be approved by the FERC. Also see our response to comment PM1-1.

PM6-24 24 PM6 RN-110807-FERCpm.txt
 cont'd 19:43:16 25 the safety and security costs required in our communities so that their ships can travel the 51
 19:43:19 1 Columbia River three times a week? Who pays
 2 the remaining 80 or 90 percent?
 PM6-25 3 In conclusion, in the alternative section,
 4 5.1.02, the only alternatives considered by
 19:43:33 5 FERC were those along the coast of Washington
 6 and Oregon. Since the majority of the gas is
 7 clearly headed for California, all California
 8 sites must be considered.
 9 Currently NorthernStar has a proposal for
 19:43:46 10 an offshore site in Northern California.
 11 Wouldn't it make more sense to keep 80 percent
 12 of the gas in California and send 20 percent to
 13 the Pacific Northwest than the current plan to
 14 trash the Columbia River, endanger the citizens
 19:44:02 15 of Washington and Oregon, while using hundreds
 16 of miles of pipeline to send 80 percent to
 17 California?
 18 FERC should include consideration of all
 19 proposed terminals in California before asking
 19:44:15 20 our communities to assume these incredible
 21 burdens for the profit of an individual company
 22 serving the energy needs of California.
 23 Thank you.
 24 (Applause.)
 19:44:26 25 MR. FRIEDMAN: Thank you for your 52
 19:44:27 1 comments.

Public Meetings

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PM6-25 See our response to comment PM1-23.

Public Meetings

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PM6 RN-110807-FERCpm.txt
Next is James Kodama.

MR. JAMES KODAMA: James Kodama, 1015
Ellen Street, Kelso, Washington.

19:44:46 MR. FRIEDMAN: Spell your last name for
the court reporter, please.

MR. JAMES KODAMA: Kodama, K-O-D-A-M-A.

PM6-26 I read in the paper today that we'd hear
from Jerry Havens on the subject of LNG, so I
spent a few moments on the Internet, and here's
what I found: To believe Mr. Havens' claim
that he is not an LNG proponent or opponent is
to ignore the obvious. He is simply a hired
gun brought in by the project proponents to
scare the bejeebies out of people who aren't
familiar with the details of the project, the
safety record of the industry, or the science
behind LNG.

Mr. Havens would have us believing our
lives in fear, that there is a terrorist hiding
behind every tree and bush in the Pacific
Northwest, just waiting for a chance to get us.

The U.S. Coast Guard is aware of the risk
of the proposed LNG carriers from terrorists as
well as the construction of LNG carriers. The

19:45:47 measures identified by the Coast Guard are
designed to harden the target and make it
difficult for a terrorist to damage an LNG
carrier.

19:45:58 In '04, Sandia National Laboratories
published guidance on risk analysis and safety

PM6-26 Comment noted.

PM6-26
cont'd

7 PM6 RN-110807-FERCpm.txt
8 implications of a large liquified natural gas,
9 LNG, spillover water. The 167-page report has
10 been widely accepted as accurately representing
11 the risk of the LNG spillover water. The
12 report discusses the issues relating to massive
13 spills into the water, and it also discusses
14 the probability of such an event, rather than
15 use the Sandia lab's guidance to analyze their
16 project.
17 The probability of an actual release of
18 LNG is extremely unlikely. In fact, it's close
19 to zero. On the Columbia River, LNGs carry --
20 carriers will be attached to -- tugboats which
21 travel at 12 knots or less. The bottom of the
22 river is mostly sand. Given these factors and
23 the excellent safety records of the pilots, it
24 is extremely unlikely that an LNG carrier would
25 suffer an accident which could reach the cargo
tanks. In fact, to date, there has never been
a significant spill of LNG from any LNG
carrier.
It turns out that Mr. Havens has testified
against the LNG projects across the country.
He has -- was recruited by the mayor of Fall
River, Massachusetts, to oppose the Weavers
Cove LNG. He has filed testimony against Sound
Energy Solutions in Long Beach, California.
And for some people here today, Mr. Havens
should be a familiar face. In '05 an
environmental group opposed Bradwood Landing

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PM6-26
cont'd

12 PM6 RN-110807-FERCpm.txt
brought Mr. Havens to Astoria to deliver his
13 fear-mongering stump speech. So I have to
14 wonder, Mr. Havens, who is paying for you to be
19:47:56 15 here tonight? I challenge you to tell us.
16 Despite his testimony, since Mr. Havens
17 made his concerns known to the Secretary of
18 Homeland Security in February of '04, FERC has
19 issued 14 separate final Environmental Impact
19:48:14 20 Statements related to the LNG facilities. I've
21 included this list in my written testimony.
22 Finally, most telling, was a rebuttal I
23 came across on the Weavers Cove project, and I
24 quote: Finally and perhaps most importantly,
19:48:32 25 Dr. Havens is not an expert on the safety and
□
19:48:37 1 security of LNG vessels or the security of LNG
2 terminal facilities. He has no identifiable
3 experience whatsoever in analyzing terrorism
4 events, their effects, their probabilities, or
19:48:56 5 the potential to mitigate such threats.
6 MR. FRIEDMAN: James, can you --
7 MR. JAMES KODAMA: In summary, based on
8 these flaws, Dr. Havens' modeling and criticism
9 based on modeling are erroneous, unreliable,
19:49:11 10 and add nothing though this record. His
11 opinions, which voiced to the Commissioner or
12 Congress are just that, opinions, but opinions
13 nevertheless, unsupported by the scientific or
14 technology -- technical analysis.
19:49:31 15 MR. FRIEDMAN: Thank you for your
16 comments.

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PM6 RN-110807-FERCpm.txt
 17 UNIDENTIFIED SPEAKER: May I make a point
 18 of order, sir?
 19 MR. FRIEDMAN: No. You'll have to wait
 19:49:35 20 for your turn to speak, sir.
 21 UNIDENTIFIED SPEAKER: I met this
 22 gentleman at their office. Can you just
 23 clarify whether you're on their payroll or not.
 24 I met him their office.
 19:49:46 25 UNIDENTIFIED SPEAKER: Ex parte, huh?
 □

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19:49:49 1 MR. FRIEDMAN: Next is Lori Durheim.
 2 Let's be quiet, let the next speakers
 3 speak, please.
 4 MS. LORI DURHEIM: I'm Lori Durheim,
 19:50:00 5 D-U-R-H-E-I-M, from Astoria. And I've been
 6 fighting this for three years since Cal Pine
 7 slithered into town. You know what happened to
 8 Cal Pine.

PM6-27

9 I will address three areas of many
 19:50:18 10 concerns. First, in the DEIS, FERC recommends
 11 that NorthernStar develop an emergency response
 12 plan with a cost-savings plan -- cost-sharing
 13 plan to reimburse the local providers of these
 14 services. Since the local fire, law
 19:50:38 15 enforcement, and rescue departments are
 16 understaffed with inadequate equipment and
 17 funds, I question this. The money is scarce,
 18 and how are they going to do the cost-sharing?

PM6-28

19 Second, in the DEIS, page ES-5, FERC in
 19:50:59 20 part says: We have recommended that
 21 NorthernStar defer construction until surveys

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PM6-27 See our responses to comments PM1-1 and PM6-24.

PM6-28 See our responses to comments PM2-3 and PM2-20.

PM6-28 22 PM6 RN-110807-FERCpm.txt
 cont'd 23 are completed. This sounds like it's already
 24 been a fast track to approval. NorthernStar is
 in like flint.

PM6-29 19:51:19 25 Third, the noise during construction, as 57
 □

19:51:22 1 stated on page ES-5, could occur up to 24 hours
 2 per day, seven days a week, for approximately

PM6-30 3 two months. What was not mentioned was the
 4 light pollution during construction and also
 19:51:37 5 when the plant is up and running. Why should
 6 the families on Puget Island and on the Oregon
 7 side be subjected to this? This project is not
 8 wanted and not needed.

9 Thank you.
 19:51:51 10 MR. FRIEDMAN: Thank you for your
 11 comments.

12 Next is Erie Johnson.

13 MR. ERIE JOHNSON: My name's Erie Johnson.
 14 Last name is Johnson, S-O-N. Thank you for the
 19:52:21 15 opportunity to make a statement. My wife and I
 16 reside in Astoria, and we moved to this
 17 location from the state of Alaska. And one of
 18 the things that we enjoy about this area is
 19 that there are some -- a number of

19:52:39 20 environmental similarities: water, green,
 21 ocean, all those kinds of things that most of
 22 the people that speak here at these events
 23 appreciate.

24 I was pleased to see that you had a
 19:52:56 25 picture of the LNG export plant from Alaska. I 58
 □

Public Meetings

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PM6-29 The EIS addresses noise in section 4.10.2.

PM6-30 Section 4.7.2.7 includes a discussion of potential visual impacts, including those from lights at the proposed LNG facility.

PM6 RN-110807-FERCpm.txt

PM6-31

19:53:00 1 can tell you that I support this project at
 2 Bradwood, and I also supported that project.
 3 So I'm confident that we have elected
 4 officials, government agencies that will see
 19:53:14 5 that this project's done correctly and will
 6 hold the company to the -- to what the rules of
 7 environmental impact statement and other kinds
 8 of licensing requirements require for a
 9 successful project.
 19:53:32 10 I've been, as I said, in Alaska. I've
 11 worked in several western states with other
 12 kinds of industrial developments, mining and
 13 other things like that, and it's been my
 14 experience, while I'm not a scientist and don't
 19:53:45 15 propose to be one, that -- that these agencies
 16 do hold these companies accountable and, thus,
 17 the projects are -- are not completely without
 18 fault, but for the most part they have been
 19 positive influences on the communities where
 19:54:03 20 they've located.
 21 Some things that I like about the
 22 environment is the water and the wetlands and
 23 those kinds of things, and I was pleased to
 24 hear and see that the company, in its plans,
 19:54:16 25 does have mitigation activities that will
 19:54:19 1 provide for additional wetland and habitat that
 2 might be disturbed with the project.
 3 You asked if people owned property along
 4 the route. I would say that there are a number
 19:54:38 5 of people that live here that would like to own
 Page 49

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PM6-31 Comment noted.

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PM6 RN-110807-FERCpm.txt

PM6-31

cont'd

6 property, but because of the types of
 7 employment opportunities we have, there's not a
 8 lot of young people that are going to be able
 9 to have that opportunity. Projects such as
 10 this one and others that I've seen provide jobs
 11 that will allow people to make family wages and
 12 thus be able to become landowners.

13 Thank you for the opportunity to testify.

14 MR. FRIEDMAN: Thank you for your
 15 comments.

16 Becky -- Becky Read.

17 MS. BECKY READ: Becky Read, R-E-A-D,
 18 (inaudible), Oregon.

PM6-32

19 Three quick comments. Number one, the
 20 relationships are being built with public
 21 safety agencies in the region. I serve the
 22 tricity area, region one, as a work force
 23 development officer, and of course that is my
 24 emphasis. I am pro business, and I know
 25 that -- I mirror some of the comments that the

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19:55:55 1 previous speaker, Eric Johnson says, that we
 2 really do need this. This is a component of
 3 job growth and economic viability.

4 Number two, we have need for natural gas
 19:56:13 5 as our region grows. And the last -- and
 6 lastly, this is going to have a positive
 7 economic impact on our region that, as we are
 8 becoming business-friendly, more
 9 business-friendly, people are looking at

19:56:31 10 Astoria; that we have an opportunity to make
 Page 50

PM6-32 Comment noted.

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PM6 RN-110807-FERCpm.txt

11 something of ourselves with this economic
12 opportunity.

13 Thank you.

14 MR. FRIEDMAN: Thank you for your
19:56:40 15 comments.

16 Richard Parker.

17 MR. RICHARD PARKER: My name's Richard
18 Parker. P-A-R-K-E-R. And I'm here
19 representing myself and my wife. We are
19:56:58 20 residents of Astoria, have been for the last
21 five years.

PM6-33 22 I want to comment just on a couple of
23 items concerning restoration and mitigation
24 being done to accomplish that. NorthernStar

19:57:17 25 has proposed a very robust mitigation plan,

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19:57:21 1 including restoration programs at Hunt Creek,
2 Svensen Island, and Kalama Creek. They're
3 doing this in order to create or to enhance
4 wetland habitats as compensation for wetlands
19:57:35 5 and habitats impacted by its project.

6 Now, NorthernStar would also implement
7 various mitigation plans to compensate for
8 impacts on water bodies, wetlands, vegetation,
9 and habitats. NorthernStar natural gas will go
19:57:51 10 well beyond, I'm confident of this, what is
11 required for mitigation, and that is why I
12 support Bradwood Landing and this project.

13 MR. FRIEDMAN: Thank you for your
14 comments.

19:58:15 15 Jean Dominey.

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PM6-33 Comment noted.

PM6 RN-110807-FERCpm.txt

16 MS. JEAN DOMINEY: My name is Jean
 17 Dominey. D-O-M-I-N-E-Y. I live in Astoria. I
 18 have a small letter and an attachment to
 19 submit.
 19:58:42 20 You wanted things directed specifically to
 21 this draft Environmental Impact Statement. I
 22 find in reading it that many of the problems
 23 that are identified, the solutions, however,
 24 are followed very frequently, such as, "there
 19:59:00 25 will be mitigation in part."

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PM6-34

19:59:07 1 This project is a direct threat to the
 2 restoration of salmon along the entire Columbia
 3 River basin, into British Columbia, Canada.
 4 Our government has spent billions of dollars on
 19:59:20 5 salmon restoration. I was going to specify the
 6 number in here, but I think all of you know it.
 7 The gouging out of the 47 acres we have
 8 heard of -- in here I believe it says 52 of
 9 sediment -- in Clifton Channel will destroy
 19:59:43 10 habitat and organisms in the salmon food chain
 11 as well as the small salmon themselves.

PM6-35

12 I looked for the section on entrainment
 13 and impingement. These will destroy not only
 14 what I mentioned, but in some cases even the
 19:59:59 15 larger fish which can suffocate. I was in
 16 contact today with the National Marine
 17 Fisheries. They tell me that NorthernStar has
 18 yet to specify what type of screening will be
 19 employed. No matter how small this might get
 20:00:19 20 to be, there still be organisms of the food
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PM6-34 See our response to comment PM3-68.

PM6-35 See our response to comment FA1-28.

PM6 RN-110807-FERCpm.txt

PM6-35
cont'd

21 chain that will pass through, will be contained
22 in the ships, will be carried out, and then
23 when the water is exchanged in the ocean, as is
24 very common, the freshwater organisms will die.
20:00:39 25 Therefore, the NorthernStar project is a great
□ 63

20:00:44 1 collection point for organisms to eradicate
2 from our environment.

PM6-36

3 Maintaining the turning basin will result
4 in continued silt disturbance, which in here
20:01:00 5 they call silt turbidity, and I must say that
6 the salmon don't limit themselves to 20 feet of
7 water. We will also have, from maintaining the
8 turning basin, increased velocity of channel
9 flow, which in turn results in more shoreline
20:01:21 10 erosion and more destruction of wetlands than
11 has previously been admitted by the applicant.
12 It is not limited just to the section shown
13 here.

PM6-37

14 I mention that the screen has not been
20:01:38 15 addressed, nor has the problem of the waves,
16 stranding of displaced fish. There has been
17 absolutely no study of the amount of displaced
18 fish with wave standing -- stranding by these
19 megalith ships.

20:02:04 20 I would state unequivocally --
21 MR. FRIEDMAN: Wrap up, please.

PM6-38

22 MS. JEAN DOMINEY: -- that this project is
23 in direct violation of goal 16 of the state of
24 Oregon. I am attaching a letter to this letter
20:02:17 25 I'm submitting to you that enumerates some of
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PM6-36 Section 4.5.2.1 discusses the potential impacts on aquatic resources, including salmonids, due to increased suspended sediment and turbidity levels. Section 4.5.2.1 has been revised to include additional information on the potential impacts on aquatic resources due to sediment transport within the lower Columbia River due to creation and maintenance of the berth and maneuvering area. Specific portions of this comment were not clear, and therefore, could not be addressed.

PM6-37 Screened water intakes are discussed in the response to comment FA1-28. Wake stranding is discussed in the response to comment FA2-19.

PM6-38 See our response to comment IND30-3.

PM6-38
cont'd

20:02:19 1 the salmon species listed on the ferry landing
2 that's two miles upriver from the Bradwood
3 project site. I do not take this threat to the
4 salmon or the thousands of jobs, all the way up
20:02:39 5 to British Columbia that are threatened by this
6 project. Thank you.
7 MR. FRIEDMAN: Thank you for your
8 comments. Put them right here. Thank you.
9 MS. JEAN DOMINEY: Thank you very much.
20:02:53 10 MR. FRIEDMAN: Please correct me if I
11 mispronounce your name. Elizabeth Mannarino.
12 MS. ELIZABETH MANNARINO: Elizabeth
13 Mannarino.
14 MR. FRIEDMAN: Thank you for correcting
20:03:04 15 me.
16 SPEAKER: Elizabeth Mannarino. I'm an
17 Astoria resident.
18 MR. FRIEDMAN: Spell your last name.
19 SPEAKER:
20:03:14 20 MS. ELIZABETH MANNARINO: Oh.
21 M-A-N-N-A-R-I-N-O. I'm an Astoria resident,
22 and I have a number of concerns about this
23 Bradwood Landing project and other LNG projects
24 along the Columbia River that I don't feel have
20:03:36 25 been adequately addressed.

PM6-39

20:03:40 1 One of the issues which has been addressed
2 on the side of problems are dredging and
3 habitat degradation for salmon. I don't think

Public Meetings

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PM6-39 Because the EIS is a summary document, we believe that the level of detail provided in sections 4.5.2.1 and 4.6.2.2 on the potential impacts due to dredging and habitat modification on salmonids is adequate. However, these topics will be addressed in additional detail in the revised BA and EFH Assessment. See also our response to comment PM3-68.

PM6-40 20:03:57 4 PM6 RN-110807-FERCpm.txt
the solutions have been adequately addressed.

5 I feel that this project is not compatible with
6 the livelihoods of many people in this area.
7 while there will be some jobs by the project,
8 there are many jobs now in fishing and in
9 tourism and recreational boating which would be
10 impacted by the passage of these tankers.

PM6-41 20:04:18 11 The public information on what has to be
12 done for exclusion zones has been quite vague,
13 and for those who know the Columbia River bar,
14 for smaller boats, fishing boats, recreational
20:04:43 15 boats, it's very important to pass at the
16 proper time and tide. If you don't, it's
17 extremely dangerous.
18 Now, if a tanker holds up recreational
19 fishing -- and the recreational fishing season
20:04:59 20 at times are often quite short and the
21 commercial are also quite short -- this could
22 negatively impact the tourism and would also
23 impact the safety and livelihood of the
24 fishermen and women.

PM6-42 20:05:15 25 My other concerns are livelihood of people 66
20:05:20 1 here who depend upon tourism, who depend upon
2 people coming to this area because it is
3 beautiful and attractive and a lovely place to
4 live. The sheer size of the tanks and the
20:05:38 5 project do not at all fit with small and medium
6 sized industrial development. They don't fit
7 with the marine- and aquatic-related industries
8 which are supposed to be fostered.

Public Meetings

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- PM6-40 We do not believe that the passage of LNG carriers in the waterway to the proposed terminal would have any significant impacts on tourism, fishing, or recreational boating. See sections 4.8.1.7 and 4.8.1.8 in the EIS. As explained in section 4.8, the project would generate jobs, not take them away, and would benefit the regional economy.
- PM6-41 The security zones around LNG carriers in transit to the terminal are discussed in section 4.8.1.7 of this EIS.
- PM6-42 We address the potential impact of the project on tourism in sections 4.8.1.8, 4.8.2.8, and 4.8.3.8. Safety is addressed in section 4.11. The proposed Bradwood Landing LNG import terminal would occupy about 42 acres on land during its operation. This would be smaller than LNG import terminals currently operating at Cove Point, Maryland, Elba Island, Georgia, or Lake Charles, Louisiana, which occupy approximately 100 and 380 acres, respectively.

PM6-43

PM6 RN-110807-FERCpm.txt
The safety is a real concern for me.

20:06:04 10 There are -- there may not have been a large
11 LNG accident; that doesn't mean there won't be
12 one. Chernobyl is something -- we were told
13 nuclear power was safe. Well, sometimes it
14 isn't. Three Mile Island; sometimes it isn't.

20:06:24 15 So it's likely that at some time an accident
16 will happen. We are not prepared for that sort
17 of thing.

18 MR. FRIEDMAN: Elizabeth, wrap it up,
19 please.

20:06:32 20 MS. ELIZABETH MANNARINO: Wrap it up.
21 Okay. The other thing is that the path of
22 ships goes right along the shore in many
23 places, along the Columbia River, between the
24 mouth and Bradwood Landing. There's no way to

20:06:42 25 alter that. I -- I am not entirely familiar

20:06:47 1 with the capacities of shoulder-fired missiles,
2 but I understand that on the black terrorist
3 market they are rather easy to obtain.

4 Now, in order to keep somebody a few

20:07:02 5 hundred feet away from a tanker might be very
6 difficult. Our shoreline is wooded. There are
7 houses along there. What do you have to do?
8 Do you have to move all the people away, or
9 simply not protect them adequately?

20:07:19 10 MR. FRIEDMAN: Elizabeth, let's wrap up.
11 MS. ELIZABETH MANNARINO: Thank you very
12 much.

13 MR. FRIEDMAN: Thank you for your

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PM6-43 Security measures would be required to be put into place to protect the vessel both landside and waterside before approval of the project.

PM6 RN-110807-FERCpm.txt
 comments.

20:07:27 15 Correct me if I mispronounce your name.
 16 We're going to guess it's Cal Dominey.
 17 MR. CARL DOMINEY: It's Carl.
 18 MR. FRIEDMAN: We apologize. We had
 19 trouble reading your writing.

20:08:09 20 MR. CARL DOMINEY: I understand. It's
 21 probably my printing.
 22 Anyway, I have a couple things I want to
 23 enter into the record. The Oregonian --
 24 Oregonian newspaper, interestingly enough, has
 20:08:17 25 a section called Northwest Earthquakes and --
 □

20:08:23 1 MR. FRIEDMAN: Carl, you need to fix the
 2 microphone.
 3 MR. CARL DOMINEY: Is that better?
 4 MR. FRIEDMAN: Yes, it's better.

20:08:27 5 MR. CARL DOMINEY: Okay. The Oregonian
 6 newspaper has a section called Northwest
 7 Earthquakes here, and the other day I just was
 8 glancing at it, and it was kind of interesting.
 9 On November 4th, November 4th, and November 5th
 20:08:40 10 there were earthquakes in Kalama, Washington,
 11 and Maupin, and Forest Grove, Oregon. Those
 12 names should sound pretty familiar to you
 13 people, even if you are from the East Coast.
 14 What it demonstrates, they're not major,
 20:08:51 15 but it demonstrates the instability of the
 16 Pacific Rim. But we do know, and we've been
 17 told a lot of times, that the big one is
 18 coming. Now, these comments are covered in

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PM6-44 The seismicity of the area and mitigation measures are addressed in section 4.1.3.3.

PM6-45 19 PM6 RN-110807-FERCpm.txt
your DEIS report, Section 5.1.8. NorthernStar

20:09:05 20 proposes 125 to 150 tankers a year. A day

21 upriver and a day back equals 250 to 300 days a

22 year when the river will, practically speaking,

23 be shut down.

PM6-46 24 If the Warren facility is built, these

20:09:22 25 numbers will double. When an LNG tanker is in 69

20:09:24 1 the river, it must be escorted with two

2 vessels, also the same priority designation as

3 search and rescue, which means the Coast Guard

4 vessels cannot leave to go save someone's life.

20:09:36 5 If the Warren facility is built another 150

6 tankers are proposed, which means four Coast

7 Guard vessels would not be available to save

8 lives a majority of the year.

9 Does the Coast Guard have the resources,

20:09:49 10 funding, and manpower to do this? We don't

11 know. The report is classified. And the

12 definition of "classified" is, and I quote,

13 withheld from general circulation for reasons

14 of national security.

20:10:01 15 The public has a right to know what kind

16 of pickle they will be in. The Coast Guard

17 report must be a large part of these

18 deliberations. Without full knowledge of the

19 serious curious consequences of this proposal,

20:10:14 20 common sense would dictate that this

21 application be denied.

PM6-47 22 Now, I'd like to enter this into the

23 record from the water suitability report by the

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PM6-45 The maximum number of LNG carriers calling at the LNG terminal would be 125 per year. The Columbia River would not be shut down during LNG carrier transits. The cumulative impacts section (4.12) addresses the combined impacts if both the Bradwood Landing Project and the Oregon LNG Project are authorized and built. Protective escorts for LNG carriers would be handled by the Coast Guard. The public version of the Coast Guard's WSR is included as Appendix H of this EIS.

PM6-46 The Coast Guard has not yet obligated any resources to the project.

PM6-47 The WSR requires that a cruise ship in port at Astoria have separate waterside security while an LNG vessel is in transit and that a cruise ship and LNG vessel shall not pass each other in the navigation channel. That does not mean that an LNG vessel cannot pass a cruise ship while in port. With proper scheduling of cruise sailings relative to LNG ship transits, the LNG ship traffic would not impact the cruise ships. As discussed in section 4.8.1.7, the project would have minor impacts on other ship traffic.

PM6-47

cont'd

PM6 RN-110807-FERCpm.txt
 Coast Guard, safety and security zone. Moving
 20:10:26 25 safety and security zone will be established 70
 20:10:28 1 around the LNG vessel, extending 500 yards
 2 around the vessel, but ending at the shoreline.
 3 No vessel may enter the safety and security
 4 zone without first obtaining permission of the
 20:10:39 5 Coast Guard in their report.
 6 Now, comments on the pictures that I'm
 7 about to give to you on these boards. These
 8 pictures --
 9 MR. FRIEDMAN: Thank you.
 20:10:51 10 MR. CARL DOMINEY: These pictures were
 11 taken on Monday and Tuesday of this week in the
 12 middle of Astoria over in the East Warren
 13 Basin. They're mounted so that you'll be able
 14 to follow them along in logical order.
 20:11:03 15 Two comments: Number one, there's a
 16 cruise ship in one these, and that cruise ship
 17 is covered under DEIS report 4.1.8.8: Cruise
 18 ships and LNG tankers are not to be near each
 19 other. I'm paraphrasing that a little bit.
 20:11:19 20 Two, Columbia River Channel Organization
 21 estimates 40,000 jobs are in some way connected
 22 to shipping on the Columbia River. You think
 23 about that. Directly or indirectly. LNG
 24 tankers will have a dramatic adverse effect on
 20:11:32 25 the shipping, i.e., jobs. In these pictures 71
 20:11:38 1 you will see on Monday that there are nine
 2 tankers. Most of them are moored in the river.
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PM6-47
cont'd

PM6 RN-110807-FERCpm.txt

3 One or two are moving up and down the river.
4 In the set of pictures taken on Tuesday, you
20:11:51 5 will see that there are ten tankers and one
6 cruise ship.
7 MR. FRIEDMAN: Carl, wrap up, please.
8 MR. CARL DOMINEY: Ten more seconds.
9 Okay. There are ten tankers and one
20:12:01 10 cruise ship. The channel of the cruise ship is
11 just a few hundred feet from the side of cruise
12 ship. Now, what is the point of these
13 pictures? The congestion obviously. The point
14 of the pictures is you cannot have both. The
20:12:17 15 commerce shipping and the cruise shipping won't
16 be able to operate effectively, and that's
17 where the adverse effect comes on the jobs.
18 Okay. So a choice really needs to be
19 made. If you're going to have LNG, you're
20:12:29 20 going to have to expect a massive adverse
21 effect on jobs and shipping and cruises in
22 Astoria. If you're going to have those, then
23 you can't have LNG. Thank you for allowing me
24 to finish.
20:12:40 25 MR. FRIEDMAN: Thank you for your
□

20:12:41 1 comments.
2 Next is Roger Rocka.
3 MR. ROGER ROCKA: Hi. It's Roger Rocka,
4 R-O-C-K-A. I live in Astoria, Oregon. From
20:13:01 5 '94 to '04, I was the executive director of the
6 Astoria and Warren Chamber of Commerce.
7 Nothing really makes sense without
Page 60

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PM6-48

8 context, and since the promoters who are
 9 pushing this project and the people who
 20:13:15 10 ultimately will have authority over it are
 11 strangers here, I'd like to offer a little bit
 12 of local context, if I may.

13 The Columbia River is not a suitable site
 14 for an LNG terminal. This is famously the
 20:13:29 15 graveyard of the Pacific, the place where more
 16 than 2,000 ships and boats have perished. Even
 17 today the Columbia is -- the Columbia bar is
 18 impassible for days at a time because of fierce
 19 winter storms.

20:13:43 20 The shipping channel is narrow, with
 21 little room to maneuver, and it hugs the Oregon
 22 shore. As it passes Astoria, the shipping
 23 channel brings LNG tankers very close, within a
 24 stone's throw, of large numbers of people.

20:13:58 25 Whether you're in a metropolitan area of 10

73

20:14:02 1 million or a town of 10,000, I think the point
 2 is to not bring LNG in close contact with
 3 thousands of people. And that will happen
 4 here.

PM6-49

20:14:11 5 we are a long way from where the gas will
 6 be used, meaning long pipelines through
 7 presently unspoiled lands. This is the one and
 8 the only great river of the West, the one and
 9 the only Columbia estuary, where we do all we
 20:14:27 10 can to preserve precious wildlife habitat
 11 that's vanishing elsewhere.

12 This project has no harmony with this
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Public Meetings

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PM6-48 The Coast Guard has determined in its WSR that the Columbia River navigation channel would be suitable for LNG marine traffic if measures were implemented to responsibly manage navigation, safety, and security risks. These measures are discussed in detail in section 4.11.5.4.

PM6-49 See our response to comment PM1-23.

PM6 RN-110807-FERCpm.txt

PM6-50

13 place. It does not complement what exists
 14 here. It does not benefit the people or the
 20:14:39 15 nature that exists here. The project does not
 16 conformed to county or state zoning and
 17 planning policy, unless you somehow suspend
 18 common sense and define this development that
 19 is bigger than anything else in this region as
 20:14:55 20 small.

21 Only a few LNG terminals will be built,
 22 and there may be other places in the country
 23 that have the infrastructure, that have the
 24 separation from population, and that want the
 20:15:07 25 development. This is not one of those places.

74

20:15:12 1 Also I've heard mention made of jobs this
 2 evening, and from what I've seen, there are a
 3 lot of jobs in this project already. There's a
 4 lot of high-priced talent being employed by the
 20:15:24 5 promoters of this project. But those of us who
 6 live here really aren't willing to sell our
 7 river for 35 to 50 jobs, and we think that's
 8 what's happening. Thank you.

9 MR. FRIEDMAN: Thank you for your
 20:15:40 10 comments.

11 (Applause.)

12 MR. FRIEDMAN: Jan Mitchell.

13 MS. JAN MITCHELL: He's a tough act to
 14 follow, but I'm his wife. I'm used to it.

20:16:01 15 I'm a planner, or a retired planner, and
 16 my understanding of the EIS is that it is the
 17 document that follows a project but is the
 Page 62

Public Meetings

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PM6-50 Project impacts on existing land-use are addressed in section 4.7. The Clatsop County Board of Commissioners approved NorthernStar's comprehensive application for permits and land use approvals, including proposed zoning changes, in March 2008. The LNG terminal and pipeline are now accepted uses in Clatsop County, consistent with local zoning and planning guidelines.

PM6-51

PM6 RN-110807-FERCpm.txt

18 thing that gives an unbiased evaluation of what

19 the impacts that we can understand will be.

20:16:22 20 And so it's a very important document, and it's

21 very important that it not be subjective, that

22 it not be influenced by who is running the

23 project and/or pressured. And there are just a

24 few things in this study that I think are very

20:16:46 25 crucial. Roger's mentioned some -- most of

□

20:16:49 1 them.

2 This -- this -- this LNG project would

3 cause an amount of six ships a day to go past

4 Astoria. It would go past sensitive uses, go

20:17:03 5 past an elementary school, a hospital, lots of

6 senior housing and, as mentioned before, it

7 passes our newest national park and lots of

8 historic sites of national significance.

9 We've also talked about salmon here, and

20:17:27 10 unless somebody mistakes salmon for animals

11 that have been joked about in the past major

12 EISs, like butterflies and prairie dogs and so

13 on, the salmon is an indicator for how well

14 we're doing here. The salmon and the people

20:17:44 15 are inextricably linked, and the salmon is sort

16 of our canary in the coal mine, and it's not

17 doing well.

18 And we've built lots of people -- because

19 we are a small community, we have lots of

20:17:58 20 wonderful people sitting out in this audience

21 who you might find cleaning up a river channel,

22 dragging trees to shade a stream, people who

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Public Meetings

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PM6-51 The FERC has taken into consideration weather, seismicity, and the navigational hazards of the Columbia River Bar as part of the EIS.

PM6-51
cont'd

PM6 RN-110807-FERCpm.txt

23 give up their weekends to go and try to make
24 conditions better for the salmon.

20:18:17 25 The immensity of this project argues 76
□

20:18:21 1 against all of those efforts that are under
2 way. I was a planner in California, so I know
3 about seismic safety. I can't even imagine
4 what a level-nine earthquake is. I've seen 7.3

20:18:39 5 or something. I can't even imagine, but it's
6 going to change our world. You know, my house
7 may be down on the next block below me if I'm
8 lucky, but I -- and that we know is going to
9 happen. It happens every three to five hundred

20:18:56 10 years.
11 We have evidence on the ground, you can go
12 to the coastline here, you can go to the Ecola
13 State Park and see the evidence of those
14 earthquakes. You can see the swales and the

20:19:10 15 dunes in Clatsop Plank, and that shows you
16 where those earthquakes have occurred.

17 Now, if you have that kind of
18 destruction -- and we're going to be shut off,
19 say, for a week or two, because Portland's

20:19:25 20 going to be in trouble. They're not coming to
21 us. And then you have a huge facility like
22 this of a flammable material -- I mean, just --
23 it just -- it makes me unable to describe what
24 that -- what that may be happening.

20:19:44 25 MR. FRIEDMAN: Can you wrap up? 77
□

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PM6-51 20:19:45 1 PM6 RN-110807-FERCpm.txt
 MS. JAN MITCHELL: Yes, I will.

cont'd 2 Anyway, I would like you to go back, look
 3 at this impact statement, and look at the
 4 impacts of weather on the coast, the difficulty
 20:19:54 5 of crossing the Columbia bar, and the
 6 likelihood of a catastrophic earthquake, and
 7 see if that doesn't figure more into how you
 8 approach this.

9 MR. FRIEDMAN: Thank you for your
 20:20:07 10 comments.

11 Next on the list is Dale Treusdell.

PM6-52 12 MR. DALE TREUSDELL: Dale Treusdell.
 13 T-R-E-U-S-D-E-L-L. I'm a frequent visitor to
 14 the area and have family living in this area.

20:20:43 15 I've become interested to some degree what's
 16 going on. One of the things that came up in
 17 discussion was the amount of traffic that was
 18 going to be on the -- created because of this
 19 project, if it goes forward. And I got to
 20:21:00 20 thinking about that, and I have a little
 21 information, that this would be approximately
 22 125 ships a year. I think some were saying six
 23 a day, something of that kind. And it's true
 24 that it's an increase, 6 to 8 percent possibly.

20:21:22 25 But there's a price that everybody pays
 78

20:21:24 1 for progress, and I think one of the things
 2 that we have been running into this evening is
 3 that many people are not interested in paying
 4 the price, but if you're going to have
 20:21:40 5 progress, you're going to move ahead, you're

PM6-52 Comment noted.

Public Meetings

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PM6-52

cont'd

PM6 RN-110807-FERCpm.txt
 going to do something in the area -- there's a
 lot more than just the few jobs that are
 concerned with the plant itself when they talk
 about how many jobs are involved, because we're
 talking about running up and down the full
 coast.
 If you've been looking at your gasoline
 prices lately, you can understand where energy
 enters into this. We need energy. We need a
 project of this kind to help -- to help in that
 aspect. In the interest of brevity, I'll let
 it ride at that.
 MR. FRIEDMAN: Thank you very much for
 your comments.
 Next is Jeanette -- please correct me when
 I mispronounce your name -- Nachbar.
 MS. JEANETTE NACHBAR: That was very good.
 It's very close. It's pronounced knock-bar.
 It's spelled N-A-C-H-B-A-R.

PM6-53

20:22:48 25 I want to state that I think Bradwood
 20:22:51 1 Landing -- I'm a proponent of this project, and
 2 I think that Bradwood Landing will continue to
 3 meet and exceed the standards that have been
 4 set forth by the state and federal and county
 20:23:00 5 agencies. I feel it is an important project.
 6 I feel that we need the tax revenue that this
 7 is going to bring to Clatsop County. We're an
 8 extremely poor county, and we need to do
 9 everything we can to open our doors to
 20:23:14 10 industry.

79

PM6-53 Comment noted.

PM6-54

11 PM6 RN-110807-FERCpm.txt
 I think LNG and gas is a good bridge
 12 energy to be used until we can come up with
 13 better things in the future and make a more
 14 massive change throughout the United States.

PM6-55

20:23:28 15 I have heard a lot about fear tonight,
 16 fear of explosions, that type of thing. I live
 17 with someone who's in the disaster-planning
 18 area, works in that area. I actually have to
 19 do that for Washington County for the section
 20:23:41 20 that I work in, and I'm probably very well
 21 prepared for a disaster at my house.

22 I know about tsunamis and destruction
 23 zone, but I don't worry about the day-to-day
 24 fears that I'm hearing here today. And I think
 20:23:58 25 with liquified natural gas plants, the safety

80

20:24:01 1 record they've had in the past speaks for
 2 itself. I also find that it's rather arrogant
 3 and ironic to talk about salmon restoration and
 4 hunting and fishing the animals at the same
 20:24:15 5 time, in the same evening. I've gotten a real
 6 kick out of that, but that's just a private
 7 thing.

8 Thank you.
 9 MR. FRIEDMAN: Thank you. Frank -- again,
 20:24:28 10 correct me when I pronounce your name --
 11 Aquesto.

12 MR. FRANK AQUESTO: Frank Aquesto.
 13 A-Q-U-E-S-T-O. I've lived in the county here
 14 for 20 years, come from Portland. The first
 20:24:48 15 thing I want to address is the safety feature

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PM6-54 Comment noted.

PM6-55 LNG safety is discussed in section 4.11.

PM6-56

16 PM6 RN-110807-FERCpm.txt
 of these tanks. They seem to be everybody's
 17 concern. If anybody's familiar with the east
 18 end of the Ross Island Bridge, years ago there
 19 used to be huge storage gas tanks. At that
 20:25:01 20 time, if anybody remembers, they were
 21 manufacturing gas and coal and storing it
 22 there. Anyway, I never heard of one incident
 23 there in all these years. I'm sure in all
 24 these years the technology has improved
 20:25:13 25 immensely.

81

PM6-57

20:25:14 1 As far as the fish and water intake by LNG
 2 ships at berth would be screened to prevent
 3 entrenchment and impingement of salmon and
 4 steelhead both. This is supposed to set a high
 20:25:27 5 standard on the Columbia. Thank you.
 6 MR. FRIEDMAN: Thank you.
 7 Carol Newman.
 8 Are you being attacked by the microphone?
 9 MS. CAROL NEWMAN: Carol Newman, as in
 20:25:48 10 Paul. Brownsmead resident of 33 years.
 11 And I just -- I can't help but -- there's
 12 the switch. Okay. Talk about arrogance,
 13 arrogance, arrogance of people who care about
 14 salmon restoration and yet hunt and fish. I
 20:26:19 15 was quite interested to hear Jeanette to say
 16 that because I'm a vegetarian. I'm sure she
 17 is, too, because she will not hunt and fish.
 18 Totally blew me away, because the salmon
 19 restoration and fishing go together.
 20:26:33 20 But anyway, the person that I really --

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PM6-56 Comment noted.

PM6-57 Comment noted.

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PM6 RN-110807-FERCpm.txt
 21 all right. I'm just going to handhold this
 22 thing. It's too high for me.
 23 The person that really disturbed me is
 24 gone now, but I just want this on the record.
 20:26:57 25 I couldn't get his name quite right, James
 □

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20:27:00 1 Kodama from Longview, who dared --
 2 UNIDENTIFIED SPEAKER: Kelso.
 3 SPEAKER:
 4 MS. CAROL NEWMAN: Kelso. I'm sorry. The
 20:27:07 5 Longview don't want to hear he's from Longview.
 6 I found his behavior odious, and I also
 7 quote, was that Jerry Havens is a hired gun.
 8 That's what he said. I hope somebody will
 9 investigate and find out who he is and who
 20:27:27 10 wrote that piece that he said. Dr. Havens is
 11 the scientist who prepared all the material
 12 that is used throughout the world. Who the
 13 hell is this guy, talking science as if he
 14 knows what he's talking about?

PM6-58

20:27:42 15 Okay. So, back to what I wanted to say
 16 before these guys talked. Just a couple of
 17 items. I live within three miles of Bradwood
 18 Landing. I do not consider myself someone who
 19 needs to be talking about terrorists or
 20:28:08 20 anything else, but I also don't consider myself
 21 a person who should be thought of, or any of
 22 the other people in this room, for or against,
 23 as dispensable.

24 Whether we are tens, hundreds, or
 20:28:23 25 thousands, or millions, Boston or Long Beach,
 □

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PM6-58 Safety, security, and reliability are discussed in section 4.11 of the EIS.

PM6 RN-110807-FERCpm.txt

PM6-58
cont'd

20:28:27 1 California, the fact is if a tanker blows in
2 front of Astoria, or a pipeline blows, or
3 anything happens to those ships in the Columbia
4 River, we will be impacted. And when I say
20:28:41 5 "we," I don't mean the folks from Texas or you
6 folks; I mean us, those of us who choose to
7 live here because we care for this place. We
8 take care of this place.
9 The major earthquake is expected,
20:28:56 10 according to science, within the next 50 years.
11 Maybe it won't happen. But it is expected.
12 Mitigation? God, we've lived with that word
13 for 30 years, mitigation, and it was Brown &
14 Root, the Halliburton folks, who used it here
20:29:15 15 30 years ago.

PM6-59

16 MR. FRIEDMAN: Carol?
17 MS. CAROL NEWMAN: Okay. I want to say
18 Svensen Island was ours and it still is. It's
19 going to be taken care of without NorthernStar,
20:29:24 20 and I hope FERC will take care of that for us,
21 make sure to use the DEIS, the EIS to protect
22 this area. Thanks.
23 MR. FRIEDMAN: Thank you for your
24 comments.
20:29:35 25 MS. CAROL NEWMAN: I'll put this back
□

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20:29:37 1 carefully so the next person can use it.
2 MR. FRIEDMAN: Here's my quandary, is that
3 when you signed in, some people checked the box
4 they had spoken before, but I do not recognize
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PM6-59 See our response to comment FA3-3.

Public Meetings

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PM6 RN-110807-FERCpm.txt

20:29:46 5 them. So I'd like them to stand up and tell me
6 whether you've spoken at any of the five
7 previous FERC meetings this week. So please
8 stand up and let's clarify this.

9 David Ambrose.

20:29:57 10 MR. DAVID AMBROSE: I have not spoken this
11 week.

12 MR. FRIEDMAN: Thank you for clarifying.
13 Jimmy Beckwith.

14 MR. JIMMY BECKWITH: I have not spoken.

20:30:04 15 It was two years ago when I spoke. So I said,
16 yeah, I spoke.

17 MR. FRIEDMAN: I meant this week. I'll
18 explain why in a second. Jay Kiddle?

19 MR. JAY KIDDLE: No, I haven't.

20:30:14 20 MR. FRIEDMAN: All right. And John
21 Koehler.

22 MR. JOHN KOEHLER: I spoke last night.

23 MR. FRIEDMAN: You did speak. So except
24 for John, I'm going to call the people's whose

20:30:24 25 names I said first, and then we'll have gone

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20:30:26 1 through everybody, and I'm going to again --
2 the way we run these meetings is I let people
3 who have not spoken go first, and then if we
4 have time -- because we're going to close this
20:30:37 5 meeting at 10:00 -- if we have time, then
6 people who did speak at previous meetings will
7 get another opportunity if we have time.

8 So now I'm going to go through that list
9 again. And David Ambrose, you're first.

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PM6-60

20:30:52 10 MR. DAVID AMBROSE: David Ambrose,
 11 A-M-B-R-O-S-E. I live in Astoria.
 12 The first thing is invasive species and
 13 noxious weeds, in another capacity. My agency
 14 is the point agency for noxious weed control in
 20:31:10 15 the county, and I've read very briefly the
 16 section on what the proponents plan to do to be
 17 sure that we don't get any new ones and to be
 18 sure that they don't spread any of the old ones
 19 that we have.
 20:31:28 20 I hope that they keep in good contact with
 21 the Oregon Weed Board and keep up to date on
 22 what's going on. I wanted to list just four
 23 new ones, ones that are of concern to us in
 24 Clatsop County:
 20:31:41 25 Gorse, of which we have only one colony,
 □
 20:31:43 1 and we spend approximately \$1500 a year to
 2 control;
 3 One called clematis vitalba,
 4 V-I-T-A-L-B-A, and that -- we have a small
 20:31:57 5 colony of that, but in the Portland area it's
 6 rapidly taking over a lot of our forests. We
 7 don't want to see that one come here;
 8 Garlic mustard, which has just started its
 9 invasion in the county -- not in the county,
 20:32:11 10 but in the state;
 11 And another big one is Spartina grass,
 12 which, as you may know, in Willapa Bay is a
 13 problem that they're dumping millions of
 14 dollars in to try to eradicate. Their plan
 Page 72

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PM6-60 To prevent the introduction or spread of noxious weeds (including Gorse (*Ulex europaea*), evergreen clematis (*Clematis vitalba*), garlic mustard (*Alliaria petiolata*), and Spartina grass (*Spartina spp.*)), we have recommended in section 4.4.2.3 that NorthernStar continue to consult with the COE, FWS, NMFS, Oregon and Washington Departments of Agriculture, and other appropriate resource agencies to revise its Noxious Weeds and Soil-borne Plant Disease Control Plan.

NorthernStar included its Noxious Weeds and Soil-borne Plant Disease Control Plan as part of its JPA. NorthernStar filed its JPA with the FERC on November 22, 2006, and filed revisions to the JPA on April 5, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link.

PM6-60
cont'd

PM6 RN-110807-FERCpm.txt

20:32:26 15 looks fairly well, but I hope that you'll hold
16 them to a higher standard and make sure that
17 they're completely vigilant with all of the
18 crews and construction crews that would be
19 working on a pipeline.

20:32:38 20 The chances that we get invasive new
21 species, it's pretty high, and once they're
22 here, they're very hard to get rid of. We have
23 a couple that we've been trying to work on for
24 five years in small patches. They're still
20:32:51 25 there, with the arsenal river sites that we can
□ 87

20:32:56 1 use.
2 The other thing I wanted to point out on
3 the point of order was you've asked us not to
4 make personal attacks on people, and at least
20:33:05 5 two of the people that I've heard tonight have
6 done that. I hope that you will be a little
7 more forceful in keeping people to the line
8 because we all get emotional, and those
9 emotions can rise to the -- to the meeting.

PM6-61

20:33:22 10 One other thing now. The 500-meter
11 exclusion zone as it goes past Astoria, the
12 assumption may have been that the center line
13 of the channel was used to make that 500-meter
14 exclusion zone, but I hope that you can
20:33:37 15 research and check a little closer to make sure
16 that the vessels that use that channel may not
17 be in the center line of the channel a lot of
18 the time. Maybe they're to the landward side,
19 maybe to the water side. And that 500-meter
Page 73

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PM6-61 By definition, the Zones of Concern would be centered on the LNG vessel. For purposes of the EIS, we assumed the Zones of Concern were centered in the middle of the navigation channel. Depending on the LNG vessel position, they could be shifted somewhat from the middle of the channel, but they would not be wider. Our identification of features that would fall within the respective zones would not be affected by the uncertainty in vessel position at the scale considered.

PM6-61 | PM6 RN-110807-FERCpm.txt
 cont'd | 20:33:53 20 zone may be a little bit wider than it's
 21 indicated in the maps.
 22 Thank you.
 23 MR. FRIEDMAN: Thank you for your
 24 comments.
 20:34:06 25 Jim Beckwith. 88
 □
 20:34:08 1 MR. JIMMY BECKWITH: Yes. Hello. My name
 2 is Jimmy Beckwith. I have one question for
 3 you --
 4 MR. FRIEDMAN: Mr. Beckwith, spell your
 20:34:12 5 last name for the court reporter.
 6 MR. JIMMY BECKWITH: Oh. B-E-C-K-W-I-T-H.
 7 Beckwith.
 PM6-62 | 8 And I do have one question I wanted to ask
 9 you guys, but most of it is for these people
 20:34:23 10 back here. Seems like everybody is coming up
 11 and talking about emotional issues and concerns
 12 about the environment and stuff like that, and
 13 we're all concerned about that. I'm a 60-year
 14 resident of this community. I was born in
 20:34:36 15 Astoria. I am a construction worker. I have
 16 been around a lot of projects, got turned down
 17 because they were nasty, polluting things.
 18 The aluminum plant, it got turned down.
 19 They wanted to put a train once a week through
 20:34:55 20 Astoria full of coal and dump it in Warrenton
 21 and said it was really good for us. It wasn't.
 22 It got turned down.
 23 Now, LNG, natural liquefied gas, barely
 24 burns. It doesn't explode. It's not
 Page 74

Public Meetings

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PM6-62 LNG safety is discussed in section 4.11.

Public Meetings

6

PM6 RN-110807-FERCpm.txt

PM6-62
cont'd

20:35:11 25 dangerous. It floats on the water. It won't 89
 20:35:13 1 get into the ground. When it does turn into a
 2 vapor, it doesn't go along the ground like
 3 propane; it rises and goes away. It catches
 4 fire, it burns straight up like a candle. It
 20:35:25 5 doesn't go whoosh. I'm telling you, people,
 6 don't let fears from people that are just
 7 afraid of everything, you know, dissuade you on
 8 this. It's just amazing. This is the
 9 cleanest, safest procurement project there is
 20:35:43 10 around.
 11 Our community, I've been -- I've been on
 12 boards for fire departments. I work for the
 13 community. I am invested in this community.
 14 It's my whole life. I'm not going to allow
 20:35:55 15 anything to come in here. I've been working at
 16 this, being at most of the meetings for -- just
 17 holler when I'm done -- for the whole time, and
 18 I'm looking to be sure that it's going to be
 19 safe in some way. If it's not safe, I want to
 20:36:09 20 know about it. I'm going to argue about it.

PM6-63

21 But I'm telling you, this community is
 22 losing timber revenues. The fire departments
 23 are raising taxes and whatnot. Our
 24 communities, everyone from Westport to Cannon
 20:36:22 25 Beach, is going to benefit from the tax 90
 20:36:26 1 revenues that come in. We must have industry.
 2 We can't survive with just tourists and things

PM6-63 Comment noted.

PM6-63

cont'd

PM6 RN-110807-FERCpm.txt
 3 like that.
 4 Our schools are getting less and less
 20:36:38 5 things that they can do because they cut
 6 programs and they cut programs and they cut
 7 programs. Man, when I was a kid, I went to
 8 this school when they first built it. Of
 9 course, they've done a lot of remodeling. I
 20:36:49 10 wish they could remodel me.

PM6-64

11 But my question for you guys is, and this
 12 is of concern, one of the very first speakers
 13 that came on here said that the technologies
 14 that they're using or proposing for these ships
 20:37:01 15 and the plant are not up to snuff, that they
 16 are outdated. Is this true? You're not going
 17 to answer me, of course.
 18 MR. FRIEDMAN: Right. That's a rhetorical
 19 question. We'll answer it in the FEIS.
 20:37:12 20 MR. JIMMY BECKWITH: But it's important
 21 that you folks guard against it, if it is that
 22 sort of thing, and somehow or other let people
 23 know that it's not technology that is viable.
 24 I believe the technology is there --
 20:37:23 25 MR. FRIEDMAN: Mr. Beckwith, you told me
 □

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20:37:25 1 to cut you off when you were done.
 2 MR. JIMMY BECKWITH: Why, thank you. I
 3 believe the technology is safe and is proven.
 4 MR. FRIEDMAN: The answer is that we
 20:37:34 5 employ a suite of engineers who do an extensive
 6 job of looking at the engineering drawings and
 7 the engineering plans, and they would recognize

Public Meetings

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PM6-64 The technical design of the Bradwood Landing Project is safe and sound as discussed in section 4.11.

Public Meetings

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PM6 RN-110807-FERCpm.txt
 8 whether or not this is the most up-to-date LNG
 9 engineering. We look at these kinds of
 20:37:49 10 projects all across the nation all the time and
 11 consider our staff of engineers to be LNG
 12 experts.

13 Next on my list is Mr. Faust. Mr. Faust,
 14 please tell us your first name.

20:38:14 15 MR. FRED FAUST: This newspaper article --

16 MR. FRIEDMAN: Mr. Faust, what's your
 17 first name? Your first name?

18 MR. FRED FAUST: Fred.

19 MR. FRIEDMAN: And spell your last name
 20:38:23 20 for the court reporter.

21 MR. FRED FAUST: It's one of my names,
 22 Faust, F-A-U-S-T.

23 MR. FRIEDMAN: Thank you.

24 MR. FRED FAUST: And the newspaper article
 20:38:31 25 had something about an engineer that lived back
 □

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20:38:34 1 in 1912 in England, and he was noticing an
 2 advertisement from the folks that put out the
 3 S.S. Titanic and where they were mentioning
 4 that their luxury liner was 110 percent safe.

20:38:49 5 And as a professional engineer, he commented,
 6 he said, I can't understand how anything can be
 7 110 percent safe. He said, I'm going to book
 8 passage on the maiden voyage because I want to
 9 get to the bottom of this thing.

20:39:05 10 (Laughter.)

11 MR. FRED FAUST: That was a little
 12 something I just jotted down today.

PM6-65

PM6 RN-110807-FERCpm.txt
 As a World War II veteran, I just wanted
 to say thanks for the air power from the 50
 carriers launched here in the Columbia. As a
 safeguard for national security and more
 dependable air currents, would it be okay to
 locate the LNG operations within three miles of
 our coast, our coastline? And I want to thank
 the LNG folks for considering this beautiful
 state. Thank you.
 (Laughter.)
 MR. FRIEDMAN: Thank you for your comment.
 Jay Kiddle.
 MR. JAY KIDDLE: My name is Jay Kiddle.

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PM6-66

K-I-D-D-L-E. And first off, before I get into
 my comments, I do want to comment on this guy's
 statement about natural gas not being
 explosive. I lived through a natural gas
 explosion when I was 21, in the Portland area.
 It devastated a square-block building that I
 was in. I was the only one in that building
 that walked out unhurt, thank God, and I took
 people out. There were balls of flames, and I
 will never be around this facility, facility in
 our community, and a lot of people will be
 moving out too.

PM6-67

But my comment is I'm a boater, pleasure
 boater, and I spend most of my pleasure time
 out on the Columbia River, and I'm greatly
 concerned about the closure of our river to
 other uses and boaters.

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PM6-65 Offshore alternatives are assessed in section 3.1.4.1.

PM6-66 Natural gas vapors (primarily methane) can explode if contained within a confined space, such as a building or structure, and ignited.

PM6-67 As discussed in section 4.8.1.8, the lower Columbia River and the Columbia River bar would not be closed to recreational boaters during LNG carrier transits in the waterway to the proposed Bradwood Landing LNG terminal.

PM6-67

cont'd

PM6 RN-110807-FERCpm.txt
Against international treaties in the
history, historical use of the seas, while this
20:40:54 river is wide, it is not deep. There is no
room to get out of the channel for sailboaters
and other pleasure crafts that travel the
river. Most travel at four to six knots. Most
have radios, but very rarely do we ever have
20:41:11 them on. Now, I don't know how we're going to
□ 94

20:41:13 extrude us out of the river when we're out
there tooling around.
There is -- I'm especially worried about
bar closures for boaters. There's limited time
20:41:24 for pleasure boaters to cross the bar. If you
ever come down from Washington, come down the
beautiful Juan de Fuca Straits, and you plan 36
to 40 hours to get down here to the Columbia
River. What do you do if you get down here and
20:41:39 the river's closed, the bar's closed to other
uses?
You can only cross that bar at the bottom
of the river tide and the top of the tide for
pleasure boaters. If you're excluded from
20:41:51 those times, you have to wait 12 hours or six
hours before you can cross that river. Who in
their right mind is going to head for our
Columbia River if they're going to be excluded
from getting into here?

PM6-68

20:42:04 I'm worried about storm closures of the
bar. When they open these rivers back up, the
bar back up, who's going to get the

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PM6-68 Decisions regarding vessel movements and priority after storm events
would be made by the pilots.

PM6-68 23 PM6 RN-110807-FERCpm.txt
 cont'd 24 right-of-way? Well, our fishermen have to sit
 20:42:17 25 out there and lose their catches while they
 □ wait for this river (sic) to turn around?

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PM6-69 20:42:21 1 And everyone's talking about terrorists.
 2 Well, it doesn't take a terrorist to cause
 3 harm. In the 20 years I've lived here in
 4 Astoria, lifelong Oregonian here, in the 20
 20:42:32 5 years I've been here, we've had dozens of
 6 freighters, commercial freighters, run aground
 7 by river and bar pilots in our river. In the
 8 early '90s we had a freighter ripped off the
 9 Port of Astoria, pier three, and ended up
 20:42:48 10 against the Megler Astoria bridge, which closed
 11 the bridge for over a day. That ship was
 12 docked by union longshoremen. We don't need
 13 terrorists. All it takes is an accident.

PM6-70 14 We share this river with all kinds of
 20:43:03 15 hazardous materials and ships that carry all
 16 kinds of materials up and down this river. If
 17 this LNG isn't -- if this LNG is so safe, why
 18 are they closing the river to other uses? Our
 19 Columbia is a national treasure. We do not

PM6-71 20:43:21 20 need this plant on it. It will be detrimental
 21 to our wildlife and Lewis and Clark National
 22 Wildlife Reserve.
 23 I thank you and ask you to deny Bradwood
 24 Landing's application.

20:43:36 25 MR. FRIEDMAN: Thank you for your
 □

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20:43:37 1 comments.

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PM6-69 See our response to comment PM6-48.

PM6-70 The Columbia River would not be closed to other users. The safety/security zone would establish the Coast Guard's authority in the area surrounding the LNG vessel to ensure safety during the transit.

PM6-71 Impacts of the project on wildlife and the LCNWR are discussed in sections 4.5 and 4.6.

PM6 RN-110807-FERCpm.txt

2 I believe that I've called everyone on the
 3 list who had not previously spoken. So now I'm
 4 going to ask the audience, is there anyone who
 20:43:46 5 would like to speak who did not speak at the
 6 previous FERC meeting this week? If so, raise
 7 your hand.

8 Yes. Okay. Please come up here, then,
 9 state your name for the record, spell your name
 20:43:59 10 for the court reporter.

11 MR. ROBERT HALSAN: My name is Robert

12 Halsan. I can --

13 (Reporter requests clarification.)

14 MR. ROBERT HALSAN: It's spelled
 20:44:10 15 H-A-L-S-A-N.

16 I can outdo most of these people. I've
 17 been here for 75 years, and if that's any
 18 attribute, then I think I'm in a position to
 19 assess some of the things and make comments on
 20:44:26 20 some of the things that have surfaced this
 21 evening.

22 Safetywise, I personally am married to a
 23 lady whose father fished on the river for some
 24 48 years, and that's one thing that is

PM6-72 20:44:43 25 certainly a concern. Likewise, let's address

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20:44:46 1 the safety features. More especially, if you
 2 have reason to be on the river or frequent the
 3 shoreline, you'll note that there's a lot of
 4 river traffic, namely, container ships.

20:45:01 5 I personally harbor more concern of the
 6 safety features of these container ships that
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PM6-72 Safety is discussed in section 4.11 of the EIS.

PM6 RN-110807-FERCpm.txt

PM6-73

7 are frequenting this river. Namely, there are
 8 five concerns, especially based, I suspect, in
 9 Japan, that frequent the scene, frequent the
 20:45:21 10 port for the most part. And on board those
 11 same ships, who knows what in the world's in
 12 the holds or in the containers. It's not
 13 even -- Homeland Security doesn't have reason
 14 to even have any inkling of what, in fact,
 20:45:38 15 might be on board.

16 Good Lord. Lord knows all it takes some
 17 dirty bomb that would be dropped off the ship
 18 in transit to Port of Portland and what, pray
 19 tell, would happen to our whole river system?

20:45:52 20 This is -- this is a safety concern I'm
 21 really concerned about. I think I'm totally
 22 justified in saying that. I have more than
 23 just a direct bearing on it. I observe these
 24 same ships. There are, like I said, five
 20:46:09 25 different concerns, of Japanese-based concerns.

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20:46:12 1 The river pilots I understand service three and
 2 a half of those same ships a week, and they
 3 spend, what is it, about -- I believe it's
 4 about two and a half hours to take that ship
 20:46:32 5 upriver to a point where it would be at its
 6 resting place at the Bradwood Landing site.

PM6-74

7 One other concern that I heard mentioned
 8 is landslides. Well, granted, there was a
 9 landslide to the immediate east of that locale
 20:46:47 10 that came down, and I don't know -- it did take
 11 the life of a person off of Puget Island. But
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PM6-73 See our response to comment PM6-72.

PM6-74 See our response to comment PM3-39.

PM6-74
cont'd

PM6 RN-110807-FERCpm.txt

12 as far as landslides up there in that Bradwood
13 area, I would certainly stand corrected, but I
14 know of no instances where there have been any
20:47:05 15 landslides per se. I don't feel that's a real
16 critical issue.
17 The other item that I note that is really
18 a concern to a lot of people and people who are
19 more than casual acquaintances of mine --
20:47:23 20 MR. FRIEDMAN: Sir, wrap it up.
21 MR. ROBERT HALSAN: Am I out of time?
22 MR. FRIEDMAN: Yes.
23 MR. ROBERT HALSAN: Already?
24 MR. FRIEDMAN: Yes.
20:47:31 25 MR. ROBERT HALSAN: Already. Goodness 99
□

20:47:32 1 gracious.
2 MR. FRIEDMAN: Thank you for your
3 comments.
4 Is there anyone else who has not
20:47:36 5 previously spoken who wishes to? Please come
6 up here, state your name, spell your name for
7 the record.
8 MR. MURRAY STANLEY: My name is Murray
9 Stanley, S-T-A-N-L-E-Y. And I would like to
20:47:51 10 talk a little bit -- I listened to corporate
11 America speak. (Indicating.) How about that?
12 Is that better?
13 MR. FRIEDMAN: Yes, especially when you
14 lean forward.
PM6-75 20:48:08 15 MR. MURRAY STANLEY: I pay attention to
16 corporate America and the stewardship of our
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PM6-75 The FERC will review the proposed Bradwood Landing Project on its own merits and assess site-specific impacts.

PM6-75
cont'd

PM6 RN-110807-FERCpm.txt

17 environment, and I don't know if you noticed
18 the paper, but Exxon Mobil is in our Supreme
19 Court right now, and the reason they're there
20:48:24 20 is because they do not want to pay the
21 \$2.5 billion that they were fined as -- for the
22 VALDEZ when it ran aground up in Williams Bay.
23 Now, they fined them \$2.5 billion.
24 They're in our Supreme Court refusing to pay it
20:48:51 25 and hoping that the Supreme Court will nullify
□ 100

20:48:55 1 that decision that they had to pay. That was
2 18 years ago, and they're still fighting it.
3 And by the way, Exxon Mobil made \$39 billion
4 last year. The most money by any corporation
20:49:17 5 in the United States to date, but they're not
6 paying.
7 Now, PG&E, they are 20 years behind on
8 their upgrades for emissions. They refuse to
9 do them. DEQ tries to chase them around, do
20:49:36 10 something. They're a toothless tiger. They
11 can do nothing with these people. When and if
12 a tanker runs aground, do you think that
13 they're going to fix things up for us? I don't
14 think so. So I just wanted to bring that point
20:49:53 15 to you people. If you think that NorthStar's
16 going to do us any favors, you're crazy. Thank
17 you.
18 MR. FRIEDMAN: Thank you for your
19 comments.
20:50:08 20 (Applause.)
21 MR. FRIEDMAN: Is there anyone else in the
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PM6 RN-110807-FERCpm.txt

22 audience who has not previously spoken at a
 23 FERC meeting this week who wishes to speak
 24 tonight?

20:50:21 25 Okay. In that case I'm going to call the
 □ 101

20:50:23 1 people who previously signed up to speak at
 2 other meetings and give them one last chance.
 3 Laurie Caplan.

4 MS. LAURIE CAPLAN: I'm Laurie Caplan.

20:50:49 5 C-A-P-L-A-N.

PM6-76

6 Evidence proves that there will be
 7 substantial air and water pollution and
 8 environmental damage resulting from the
 9 construction and day-to-day operations at

PM6-77

20:51:03 10 Bradwood. So what will happen in an emergency?
 11 The Knappa Fire District has sole
 12 responsibility for emergency response and
 13 mitigation for incidents at Bradwood.

14 The fire district researched the four
 20:51:18 15 existing LNG terminal facilities in the United
 16 States, incidents at two LNG peak shaving
 17 plants in Oregon, and information from the
 18 Coast Guard and NorthernStar. In its testimony
 19 submitted last month to the Clatsop County

20:51:35 20 Commissioners, the fire district identified
 21 massive gaps in its resources.

22 More employees, vehicles, equipment,
 23 training, and a new fire station facility are
 24 needed to cope with just the, quote, predicted
 20:51:49 25 routine emergencies, unquote, at the terminal.

□

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PM6-76 As discussed in sections 4.3 and 4.10.1, impacts on air and water quality would not be significant.

PM6-77 See our responses to comments PM1-1 and PM6-24.

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PM6-77
cont'd

20:51:54 1 The report says this will not be enough to deal
2 with, quote, catastrophic incidents, unquote.
3 The report does not include resources needed
4 for emergencies on LNG tankers or along the
20:52:07 5 shipping channel or the proposed pipeline. The
6 report does not include resources needed by
7 other emergency responders such as police,
8 highway patrol, security, haz mat, and
9 ambulances.
20:52:22 10 The Knappa, Astoria, Warrenton, and
11 Clatskanie fire districts will need a total of
12 15 more full-time employees and six interns to
13 provide what the Knappa district calls a,
14 quote, conservative, effective response to
20:52:40 15 incidents at Bradwood Landing. The district
16 will need numerous annual trainings for
17 responders. It will need four specialized
18 fire, rescue, and communications vehicles, a
19 water craft, combustible, and/or multi-gas
20:52:56 20 detectors for all emergency vehicles and
21 personnel, satellite communications equipment,
22 and much more. The fire districts can't afford
23 these essential resources, and NorthernStar,
24 the Coast Guard, the State of Oregon, Clatsop
20:53:13 25 County, and the federal government have not
□ 103
20:53:15 1 offered to pay for them.
2 Environmental damage from even a routine
3 industrial accident at Bradwood could be
4 widespread, long term, and devastating. It's

Public Meetings

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PM6-77
cont'd

20:53:26 5 PM6 RN-110807-FERCpm.txt
hard to imagine what the impact of a actual
20:53:43 10 catastrophe would be, especially without
massive spending for equipment, personnel, and
other resources. FERC must reject LNG at
Bradwood and protect the public and the
Columbia River from this foolhardy project.
11 Thank you.
12 MR. FRIEDMAN: Thank you for your
13 comments. Marge Castle.
14 MS. MARJIE CASTLE: Good evening. Marjie
20:54:00 15 Castle. M-A-R-J-I-E, C-A-S-T-L-E. This is my
fourth time to speak this week. Each time that
I have spoken, I have chosen a topic that I
have found deficient in the DEIS. Tonight I
speak because of information that was given out
last night by NorthernStar.
20:54:17 20 Thank you for this last -- one last
opportunity to publicly express my concerns of
the DEIS, as printed. I hold a degree in
biology, a Master's degree in technology, and
an advanced certification in brain research. I
20:54:30 25
20:54:33 1 am not an amateur to research, and I understand
the hours of commitment FERC staff and
third-party contractors have put into this
document.
20:54:41 5 As I stated last evening, though, it has
many, many holes, and I can't help but wonder
if that was done deliberately. If so, one's
imagination could run overtime as to why so
let -- to let imaginations fly. Many times

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 20:54:57 10 it's not imagination but reality that becomes
 11 the result.
 PM6-78 12 Mr. Friedman, you stated multiple times
 13 over the course of this week that landowners
 14 could go to NorthernStar to get an answer as to
 20:55:10 15 if the pipeline was on their property and at
 16 what mile marker. All my husband could get for
 17 an answer was, "The drill site is not on your
 18 property." We have lived with a drill site on
 19 our property, that proposal, for two years.
 20:55:26 20 The revised Cowlitz County geo hazard
 21 report supported our claims that we submitted
 22 to your organization that the hillside near the
 23 proposed site on our property to have been --
 24 was unstable and further recommend -- and it
 20:55:44 25 was further recommended by the geo hazard
 105
 20:55:47 1 report that three alternative placements for
 2 that drill site should be looked into.
 3 Two of those recommendations would have
 4 seriously increased costs to NorthernStar as
 20:55:55 5 well as required additional HDDs up the
 6 Abernathy Creek draw. The third alternative
 7 was to move the drill site from where it was
 8 currently sited to a more westerly situation.
 9 That would mean further up on top of the ridge
 20:56:12 10 within the association of homeowners to which
 11 we belong. That whole ridge has a different
 12 drainage and goes into a totally different
 13 creek system. Based on the neighborhood survey
 14 on feelings towards the proposed NorthernStar

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PM6-78 The proposed location of the pipeline route, including the route of the HDD borehole beneath the Columbia River, is shown in Appendix B of the final EIS. The route is the same as shown in the draft EIS. The location of the HDD borehole was chosen, in part, based on the results of a geotechnical study to ensure stability of the borehole and to minimize the potential for frac-outs to occur. Additional site-specific geotechnical investigations would be done and reviewed for compliance before construction would be allowed to begin in any areas exposed to significant geological hazards. Also see our response to LA7-25.

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PM6-78
cont'd

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 20:56:29 15 LNG project and location of another pipeline in
 16 our neighborhood, only one piece of property
 17 was left.
 18 The major horizontal drill site for
 19 placement of the 30-inch pipeline has been
 20:56:41 20 moved and not within just a few feet but
 21 possibly over the width of two parcels, or
 22 approximately 1,350 feet. That's a major
 23 change. As of tonight, Mr. Coppedge admitted
 24 NorthernStar does not even know where the drill
 20:56:56 25 site now will be.
 □ 106
 20:56:58 1 This is a major indication. This is the
 2 site to bring the pipeline under the Columbia
 3 River into Cowlitz County, Washington. Any new
 4 location -- any new location on that ridge has
 20:57:11 5 not been communicated to the landowners of that
 6 area. It will be located within a few feet of
 7 a year-round creek that feeds into Mill Creek,
 8 the last native salmon run creek on the
 9 Columbia River. Along each side of the unnamed
 20:57:30 10 creek wetlands exist. Eagles, owls, raccoons,
 11 deer, all kinds of animals live there.
 12 Because of all this information and other
 13 information that is conspicuously missing from
 14 the DEIS and because location change appears to
 20:57:45 15 have been known by FERC prior to the issuance
 16 of the DEIS, I therefore formally demand that
 17 all further discussion and consideration of
 18 this draft Environmental Impact Statement be
 19 stopped until all pertinent environmental, air

PM6-78
cont'd

20:57:58 20 PM6 RN-110807-FERCpm.txt
and water quality, road, safety, socioeconomic,
21 effective residential, and any other additional
22 necessary information is gathered and report
23 submitted for the change of the pipeline HDD
24 under the Columbia River drill site, and that
20:58:14 25 all pertinent agencies be allowed to review and
□ 107

20:58:18 1 comment and a new complete draft Environmental
2 Impact Statement released to the public for
3 further comment.

4 Thank you.
20:58:25 5 MR. FRIEDMAN: Thank you for your
6 comments.

7 (Applause.)
8 MR. FRIEDMAN: Duncan MacKenzie.
9 MR. DUNCAN MacKENZIE: Good evening. My
20:58:47 10 name is Duncan MacKenzie. D-U-N-C-A-N,
11 M-A-C-K-E-N-Z-I-E.

PM6-79

12 In the DEIS on page 2-23 is a discussion
13 of support facilities associated with the LNG
14 terminal, notably, the nitrogen system and the
20:58:59 15 pipeline associated above-ground facilities in
16 2 1.4. The applicant's resource reports one,
17 11, and 13 note that the nitrogen system will
18 produce nitrogen gas for purging pipes,
19 processing equipment, and vessels only.
20:59:14 20 However, nowhere in the DEIS nor the publicly
21 available resources or materials reviewed is
22 any mention of the need or method to be used to
23 adjust the higher heating value of the imported
24 gas to meet transmission specifications for

Public Meetings

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PM6-79 The Commission issued its *Policy Statement on Provisions Governing Gas Quality and Interchangeability in Interstate Natural Gas Company Tariffs* (Policy Statement, PL04-3-000) in 2006. Consistent with the Policy Statement, NorthernStar must ensure that the regasified LNG it delivers to interconnecting pipelines meets the gas quality and interchangeability standards of the interconnecting pipelines' tariffs.

Public Meetings

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PM6-79

cont'd

PM6 RN-110807-FERCpm.txt
 required interstate gas line transmission. 108

20:59:27 25

20:59:29 1 The only statement found as to the
 2 applicant's position with regard to this issue
 3 was summed up in a 25 July 2006 application by
 4 lawyers on page 24 and 25 as follows: Bradwood

20:59:39 5 Landing recognizes the importance of
 6 interchange ability, but submits that this
 7 concern does not require resolution prior to
 8 the approval of authorization it seeks.
 9 With the exception of Trinidad and Tobago,
 20:59:50 10 LNG produced around the world has an HHV value
 11 much higher than the natural gas as a source.
 12 The federal supply market facility would not
 13 seem to provide LNG at sufficiently low HHV to
 14 accomplish intact blending. Furthermore, there
 21:00:04 15 is a tendency for the HHV values to increase
 16 during the transport and delivery cycles as
 17 boil-off of the lighter hydrocarbons occurs.
 18 While liquified natural gas can be
 19 supplied with an adjusted HHV by the supplier,
 21:00:18 20 it is costly and decreases the flexibility of
 21 the shipper to supply a wide market.
 22 Currently, the Northwest Pipeline, Williams
 23 Pipeline transmission specifications do not
 24 appear to have a maximum HHV value, nor are a
 21:00:32 25 maximum or minimal Wobbe Index values given as 109

21:00:36 1 conditional supplies from Canada have been
 2 within acceptable ranges.
 3 This may account for the applicant's
 Page 91

Public Meetings

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PM6-79
cont'd

PM6 RN-110807-FERCpm.txt

4 apparent lack of address to this issue.

21:00:42 5 However, if the Natural Gas Council + Group

6 guidelines developed in anticipation of

7 increasing West Coast LNG ports are adopted,

8 then the HHV will be limited to a maximum of

9 1110 BTUs a standard cubic foot and the Wobbe

21:00:58 10 Index will be required to be 4 percent of

11 historical values.

12 There are two aspects of this issue,

13 which, despite the applicant's protestations

14 noted above, would appear to require resolution

21:01:08 15 prior to approval or authorization. First, as

16 found on lines 30 through 36 of the submerged

17 combustible vaporizer data sheet and the air

18 contaminant discharge permit, the composition

19 of this fuel and the HHV value of 1068 BTUs per

21:01:27 20 standard cubic foot is found.

21 However, in the absence of the design

22 information or mention of how the manner of HHV

23 adjustment will be accomplished, how is the

24 applicant capable of assuring the Oregon

21:01:36 25 Department of Environmental Quality that the 110

21:01:38 1 stated fuel composition and HHV are correct and

2 are being held to the values stated? If these

3 values cannot be substantiated, the air

4 modeling quality and the emissions data might

21:01:49 5 be called into question.

PM6-80

6 Additionally, has the attendant noise and

7 potential cooling water demand of an air

8 separation unit for sufficient capacity for

Page 92

PM6-80 See our response to comment PM1-42. All significant noise sources were included in the acoustical model and are listed in table 4.10.2-4.

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PM6-80
cont'd

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9 nitrogen injection or compressor capacity for
 21:01:59 10 air injection adequately been accounted for in
 11 the applicant's submissions? As noted in the
 12 operation equipment list associated noise data
 13 found in the applicant's resource report nine
 14 and also in the DEIS, no air separation unit or
 21:02:17 15 compressors are noted.
 16 MR. FRIEDMAN: Duncan, wrap it up please.
 17 MR. DUNCAN MacKENZIE: Yep.
 18 It is requested that FERC recommend that
 19 the applicant address the manner in which HHV
 21:02:25 20 adjustment will be accomplished to equal a
 21 suitable Wobbe Index and to ensure that the
 22 anticipated emissions will conform to the
 23 submitted data contained in the air quality
 24 discharge permit and the FEIS; also, that the
 21:02:38 25 applicant review the application as to noise
 111

21:02:40 1 and water resources for their inclusion in the
 2 DEIS.
 3 Thank you for your time.
 4 MR. FRIEDMAN: Thank you for your
 21:02:46 5 comments.
 6 Next, Steve Dragich.
 7 MR. STEVE DRAGICH: Mr. Dragich, Dragich
 8 Trust. D-R-A-G-I-C-H. I have four items to
 9 submit tonight, and I'm also submitting my
 21:03:11 10 comments on the total DEIS.
 PM6-81 11 Item one: In September 7, 2005, an
 12 original list of 512 landowners was submitted
 13 to FERC by NorthernStar Energy Limited
 Page 93

PM6-81 See our response to comment PM1-17.

Public Meetings

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PM6 RN-110807-FERCpm.txt

PM6-81
cont'd

14 Liability Corporation, legal representative
21:03:27 15 VanNess & Feldman, Washington, D.C. Copies
16 were sent to FERC and contractor Natural
17 Resources Group. At that time no CEII,
18 standing for critical energy infrastructure
19 information, was proclaimed; no privacy claim
21:03:44 20 invoked. All future requests from that date,
21 September 7, 2005, for landowner lists and
22 pipeline route maps were denied.

PM6-82

23 Item two: December 14, 2006, biological
24 assessment meeting on the Bradwood proposal
21:04:03 25 itself. No notification was given to 112
□

21:04:05 1 intervenors, and intervenors who were present
2 were denied attendance and no reasons as to why
3 they were denied attendance. In reference to
4 are ex parte communication, it is noted on the
21:04:16 5 meeting roster that FERC kept that John
6 Buchovecky, NorthernStar legal representative,
7 and Gary Coppedge, NorthernStar vice president,
8 were in attendance.

PM6-83

9 Item three: In the FERC manual title,
21:04:32 10 ideas for better stakeholder involvement, page
11 9, industry options, chapter title, Make route
12 information easy and understandable,
13 NorthernStar either has claimed exemption under
14 item four of the Freedom of Information Act or
21:04:49 15 CEII exemption under FERC rules 630.

PM6-84

16 One final comment: Since the end of World
17 War II, my family has helped provide security
18 for the lower Columbia, specifically river mile
Page 94

PM6-82 The referenced meeting was exempt from the FERC's ex-parte rules under §385.2201(e)(1)(vii) because it related to preparation of documentation under the NEPA. The Commission issued an Order to clarify this situation on February 16, 2007.

PM6-83 See our response to comment PM1-18.

PM6-84 See our response to comment PM6-20.

Public Meetings

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PM6-84
cont'd

PM6 RN-110807-FERCpm.txt

19 50 to river mile 60. To give you an example of
21:05:07 20 how bad a plan can go, I refer to December 8th,
21 1941, which my family was involved in the
22 security after the attack on Pearl Harbor.
23 Specifically, my family, or my father and his
24 brothers, specifically his brothers, were part
21:05:24 25 of the United States Army, manned a machine gun 113
□

21:05:28 1 post on the peak of the Rainier bridge between
2 Longview, Washington, and Rainier, Oregon.
3 There was a general blackout in effect,
4 and their duty at that time was to provide
21:05:40 5 river security. A freighter approached upriver
6 in a blackout condition. Recognition signals
7 were misidentified. At the time they were
8 manning a 30-caliber machine gun post, which
9 they opened fire. Luckily, if you want to
21:06:05 10 extrapolate, just think what you could do with
11 a 30-caliber machine gun and an LNG tanker.
12 MR. FRIEDMAN: Thank you for your
13 comments.
14 John -- it's not working.
21:06:30 15 Okay. John Koehler. John?
16 MR. JOHN KOEHLER: Koehler?
17 MR. FRIEDMAN: Koehler, yes.
18 MR. JOHN KOEHLER: My name's John Koehler.
19 K-O-E-H-L-E-R. I live in the proximity of
21:06:47 20 where the rail head is going to be located in
21 Cowlitz County.
22 Since testifying last night, I talked with
23 NorthStar and found out that they are moving
Page 95

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PM6-85

24 the drill head location. They don't know where
 21:07:01 25 it is. So we're guessing somewhat, but I want 114
 21:07:07 1 it to be brought to your attention so that you
 2 can consider it when you're doing all your
 3 work, that some of that wetlands that Marjie
 4 Castle was referring to is my wetlands, and
 21:07:17 5 that on my property is a major spring. It
 6 provides approximately half the water flow of
 7 that unnamed creek she was referring to that it
 8 feeds down into, Coal Creek -- or into Mill
 9 Creek, which is a major salmon spawning ground.
 21:07:36 10 If they are locating their drill head in
 11 that area, you need to be aware -- you need to
 12 get someone out there, locate my spring and
 13 assess, with your expertise, the impact that
 14 that drilling may have on that spring, and that
 21:07:52 15 if they damage the spring, the impact it would
 16 have on the salmon.
 17 So, thank you.
 18 MR. FRIEDMAN: Thank you for your
 19 comments.

21:07:59 20 Next is Vance Fraser.

21 MR. VANCE FRASER: Hello. I'm Vance

22 Fraser. That's F-R-A-S-E-R.

23 As requested, let's look at some more

PM6-86

24 errors and deficiencies of the DEIS. Section
 21:08:24 25 1.1, purpose and need. The project is designed 115
 21:08:30 1 to provide up to 1.3 billion cubic feet per day

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Public Meetings

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PM6-85 NorthernStar would work with property owners to identify wells and springs within and adjacent to the construction right-of-way and implement measures to protect such springs and wells as appropriate.

PM6-86 There is no evidence that the project would cause significant adverse impacts on the shipping or fishing industries of the lower Columbia River. See sections 4.7.1.4 and 4.8.1.7. It is possible that, if authorized and built, the Bradwood Landing Project may be under-utilized during certain periods, and would not always deliver up to its maximum capacity. Existing LNG import terminals on the East and Gulf Coasts of the United States on occasion operate at about 40 percent of capacity.

PM6-86

cont'd

2 PM6 RN-110807-FERCpm.txt
to the Pacific Northwest. Apparently, lessons
3 learned from the advertising industry are
4 necessary to justify this project. Provide gas
21:08:44 5 up to 1.3 BCFD. So that "up to" can mean
6 almost zero, with the rest going elsewhere, and
7 the risk and damage to the fishing industry and
8 shipping industry remain here.

PM6-87

9 The DEIS continues on about delivery of
21:08:58 10 gas to Wauna and the Beaver power plant. There
11 is no reason to believe that these plants will
12 not have energy without LNG. They are fully
13 supplied right now.

14 Now, it, the DEIS, goes on about
21:09:14 15 connecting to Northwest Natural and Williams
16 pipeline, but no real and actual demand, just
17 magical future demand described in the industry
18 self-serving Northwest Gas Association
19 projections, which fall apart compared to the
21:09:30 20 less biased Energy Information Agency
21 projections.

22 With electrical generation and industrial
23 use of the gas far exceeding other uses in this
24 region, and with the trend of industry leaning
21:09:46 25 to be China and elsewhere, where is this big
□ 116

21:09:49 1 need and demand coming from? Well, electrical
2 generation. And let's see exactly what, where,
3 and how much that will be going in the DEIS,
4 please.

PM6-88

21:10:02 5 Still, in section 1.1 it states that
6 imported LNG will contribute to gas price

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PM6-87 The Bradwood Landing Project would provide an alternative source of natural gas for the Wauna Mill and Beaver Power Plant.

PM6-88 The comparison is not accurate because oil has previously been imported and the United States receives the majority of its oil from domestic or Canadian sources. However, the United States is currently experiencing more demand for natural gas than it can adequately produce domestically or import via the existing natural gas transmission pipeline infrastructure.

PM6-88

cont'd

7 PM6 RN-110807-FERCpm.txt
 8 stabilization. We have seen how well that has
 9 worked for other foreign imported energy, which
 10 arrives by ship. What is the price of crude
 21:10:19 11 oil today? You can strike that one from the
 12 justification.

PM6-89

12 The DEIS goes on to state that there has
 13 been and will continue to be increasing demand
 14 for natural gas in U.S. and in the Pacific
 21:10:34 15 Northwest. This is purely speculative
 16 conjecture. As soon as a cheaper or a more
 17 attractive alternative comes along, we will be
 18 stuck with this big piece of crap and this
 19 pipeline unless FERC requires a reasonable
 21:10:50 20 abandonment plan.

21 The DEIS cites the Northwest Gas
 22 Association -- Association that the Northwest
 23 will fall short of peak demand under a
 24 high-growth-demand scenario or under a
 21:11:05 25 base-case scenario with extreme cold weather

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21:11:10 1 conditions. Now, since many Californians have
 2 got tired of the rain, where is this
 3 high-growth demand going to come from? And
 4 since Al Gore has assured me of global warming,
 21:11:22 5 just exactly what temperature and for how long
 6 does extreme cold weather mean?

7 Thank you.
 8 MR. FRIEDMAN: Thank you for your
 9 comments.

21:11:35 10 Gayle Kiser.

11 MS. GAYLE KISER: Nice to see you all

Public Meetings

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PM6-89 Section 1.1 includes a revised discussion of the purpose and need of the proposed project. Section 2.9 has been revised to include a discussion of NorthernStar's decommissioning plan that was submitted to Clatsop County and the State of Oregon.

PM6-90 12 PM6 RN-110807-FERCpm.txt
 13 again. Gayle Kiser. G-A-Y-L-E, K-I-S-E-R.
 14 I'd like to come to the defense of
 15 Dr. Havens. I have here some statements by
 21:11:57 16 Richard Kuprewicz, who's a member of the
 17 Washington State Commission on Pipeline Safety
 18 and also the Pipeline Safety Trust. He talks
 19 about a serious fatal flaw in FERC's siting
 20 process, concerning LNG marine facility siting.
 21:12:13 21 Some serious deceptions representative of very
 22 poor, even reckless, risk management that I
 23 have observed in the siting process, quote, for
 24 LNG marine receiving as well as gas
 25 transmission pipelines.
 21:12:26 26 For LNG facilities, watch out for 118
 21:12:29 1 misinformation indicating, quote, the
 2 worst-case release will be a pool release, end
 3 quote. Experienced hazard analysis teams call
 4 this phenomena "stacking the deck." By
 21:12:42 5 constraining the review to the very restricted
 6 limited boundary case, real possible events are
 7 not properly analyzed, scrutinized, or properly
 8 engineered, and risks are those seriously
 9 understated. This isn't a new phenomena; talk
 21:12:58 10 to the Three Mile Island designers.
 PM6-91 11 And also, reverting back to the DEIS, on
 12 pages 4-443 and 4-444, we're discussing the
 13 causes of pipeline failure. On table 4.11.9-3,
 14 it says that earth movement accounts for 13.3
 21:13:23 15 percent of the failures. Those are nationwide
 16 figures. In Cowlitz County, earth movement

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PM6-90 The modeling approach used by FERC employed during project review included the best available methods and in areas of uncertainty, used conservative assumptions. Also, the GAO Report (GAO 2007) presented a survey of experts who work in areas related to LNG risk, hazards, and consequence modeling. The report determined that the primary hazard to the public would be heat from a fire. A total of 11 of 15 experts were of the opinion that current methods for estimating LNG fire heat hazard distances are "about right" or too conservative.

PM6-91 For pipelines of this size we look at national risk rates for pipeline failure. We acknowledge that Cowlitz County has geologically unstable areas; however, this is an acceptable incremental risk.

PM6-91

cont'd

17 PM6 RN-110807-FERCpm.txt
accounts for 100 percent of pipeline failures.

18 This is going to be a 30-inch pipeline in

19 Cowlitz County, carrying 1280 pounds per square

21:13:39 20 inch. The blast zone will be 741 feet on

21 either side. That wipes out a quarter mile.

22 In 1995, the Williams pipeline blew in Castle

23 Rock. In 1997 the Williams pipeline blew in

24 Kalama. On December 13 of 2003 it blew up in

21:13:57 25 Toledo. Those were all due to land movement.

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PM6-92

21:14:01 1 In 2006 a 36-inch pipeline in Wyoming blew up

2 and sterilized 600 acres. Totally blew the

3 topsoil away.

4 The existing KB pipeline which traverses

21:14:15 5 Cowlitz County is above ground near my house.

6 The neighbor there had to move because of the

7 land movement. He had to move his home because

8 of land movement. So I have serious concerns

9 about locating this pipeline in Cowlitz County,

21:14:29 10 and I hope FERC takes the geologic hazard

11 report very seriously.

12 Thank you.

13 MR. FRIEDMAN: Thank you for your

14 comments.

21:14:39 15 At this time we've gone through the list

16 of everyone who wanted to speak. Frans, go

17 ahead.

18 MR. FRANS EYKEL: Mr. Friedman, I have to

19 catch the ferry, so I'll be very quick. My

21:14:48 20 name is Frans Eykel. E-Y-K-E-L. Good evening

21 again.

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PM6-92

It is generally standard practice to collocate new natural gas pipelines with existing utilities. However, in the case of the KB pipeline, NorthernStar recognizes that some areas of the route cross geologically unstable areas. Therefore, the Bradwood Landing pipeline would avoid the unstable areas, or in some cases, potential landslide areas would be crossed using the HDD method.

PM6-93

22 PM6 RN-110807-FERCpm.txt
I have two -- three comments here. I'd
23 like to comment on a statement from a gentleman
24 here earlier this evening. He stated that LNG
21:15:07 25 cannot explode. LNG can explode, due to rapid
□

120

21:15:13 1 expansion. When -- LNG is built in water, it
2 will explode with an equivalent of a couple of
3 pounds of TNT. That is well-known in the
4 industry.

21:15:27 5 Secondly, the personal attack on
6 Dr. Havens' credibility, I was appalled and he
7 requires an apology.

PM6-94

8 Third, should FERC not stop all the
9 activity on this permit application until all
21:15:47 10 the documents are compiled and can put
11 everything into the draft EIS so we can read
12 only one book instead of 20 or 30 different
13 documents that still need to be filed, like
14 corrections on the biological assessment and
21:16:08 15 thermal mixing, the filter for the water
16 intake, which is stopped secret because they
17 don't even know how to do it yet, and so many
18 other things. If you start -- if you permit
19 someone to do something, it should be all up
21:16:28 20 front, not through the back door.

21 That's all I got. Have a nice day, Paul.

22 MR. FRIEDMAN: Thank you, and have a safe
23 ferry trip.

24 Is there someone else who wants to speak?

21:16:39 25 Please come up to the front, state your name,
□

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PM6-93

See section 4.11.1 for a discussion of a rapid phase transition (RPT) that can occur when LNG is spilled onto water.

PM6-94

Detailed studies do not need to be completed before we issue the EIS, or before the Commission makes a decision about the project. There are some studies, like archaeological surveys and geotechnical investigations, that cannot be done until after a Certificate is issued and NorthernStar could obtain access to parcels previously denied. Therefore, we have made numerous recommendations that require detailed studies, designs, and other extensive coordination efforts to be completed after the FERC Order, but before we allow construction to begin. The EIS discloses what information may be lacking, how we would account for potential project impacts on specific resources in those situations, and general conceptual measures that would be finalized later to mitigate impacts. Also, mitigation measures would be required by other agencies with permitting or regulatory authorities, such as the BOs to be issued by the FWS and NMFS, and wetlands permit to be issued by the COE.

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21:16:41 1 and spell your last name for the record.
 2 MR. MARVIN KING: (Indicating.)
 3 MR. FRIEDMAN: Well, she doesn't remember.
 4 MR. MARVIN KING: My name is Marvin King,
 21:16:47 5 and I'm against this for myself and the rest of
 6 my future generation and everything else.
 7 Anybody that's for this project should
 8 have to live on the pipeline or buy property
 9 right next to the pipeline. I didn't hear
 21:17:00 10 anybody in favor that said -- one person that
 11 said they were going to be affected by it.
 12 There are so many problems with the
 13 proposed site that one doesn't really know
 14 where to begin. Let's start with the DEIS.
 PM6-95 21:17:09 15 Oh, wait, it's incomplete and won't be able to
 16 changed until after all public comments and
 17 reviews have been made. I would like to take
 18 this time to ask FERC for an additional 120-day
 19 comment period until after a complete DEIS has
 21:17:24 20 been submitted.
 PM6-96 21 I guess safety should be at the top of
 22 list. NorthernStar has gone to great lengths
 23 to assure all of us that we are out of harm's
 24 way. This could not be further from the truth.
 21:17:34 25 The double-tank design was found to be
 □ 122
 21:17:36 1 inadequate by our own Pentagon. L. Hunter
 2 Lovins on energy security concluded, and I
 3 quote: Proneness to brittle fracture implies
 4 that relatively small disruptions by sabotage,
 21:17:42 5 earthquake, objects flung at the tank, et
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PM6-95 See our response to comment PM4-20 and PM5-26.

PM6-96 As discussed in section 4.11.3, the LNG storage tanks would be full containment tanks. The inner tank would be constructed of 9 percent nickel steel and the outer tank would be constructed of pre-stressed concrete. Both of those materials are designed to withstand cryogenic temperatures and are not prone to brittle fractures. constructed with pre-stressed concrete

PM6 RN-110807-FERCpm.txt

PM6-96

cont'd

6 cetera, could well cause immediate, massive
 7 failure of an above-grade LNG tank. A General
 8 Accounting Office study similarly concluded
 9 that tanks afford limited protection even
 10 against non-military small arms projectiles.

PM6-97

11 There are hundreds, if not thousands of
 12 locations that a one-eyed, one-armed, uneducated
 13 terrorist could destroy a tank from. Maybe we
 14 should all have to have a background check to
 15 go into the woods or stay at the Cannery Pier
 16 Hotel at Astoria. These ships will go within
 17 100 yards of this hotel, where a terrorist
 18 could rent a room at.

19 How about the Astoria Megler bridge? How
 20 many times will it be shut down while LNG is
 21 going underneath? I can just picture the
 22 terrorists laughing as they pull the pin from
 23 the grenade as they throw it from the bridge.
 24 "Oh, FERC, they made it so easy for us."

21:18:40 25 The terrible thing is an LNG tanker

123

21:18:43 1 carries 700 tons of TNT, or 5500 times the
 2 atomic bomb that destroyed Hiroshima. That's
 3 disturbing. An LNG explosion in Cleveland in
 4 1944, which left 128 dead and over 200 injured,

21:18:58 5 contained only 5 percent of the volume of
 6 today's tankers. Why does the government and
 7 FERC have to wait until catastrophic failure
 8 and death to realize this?

PM6-98

9 The FERC relies heavily on independent
 10 studies which are inaccurate and misleading.
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PM6-97

Based on an analysis of risk and site specific conditions, the Coast Guard determined that closure of the Astoria-Megler Bridge during transit of an LNG vessel would not be necessary. Section 4.11.8 presents a discussion of terrorism and security issues. The 1944 Cleveland incident was directly related to flaws in the LNG tank design, not the volume of LNG.

PM6-98

A discussion of the hazards, along with site-specific modeling, associated with a release of LNG from the storage tanks or LNG carriers is presented in section 4.11. Hazard distances are based on site specific modeling, which is dependent on a number of factors, including the size of the spill. A generic statement saying that for all credible spills, the danger zone for humans extends almost 2 miles is inaccurate.

PM6-98
cont'd

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11 Quest of Oklahoma concluded after the September
12 11th attacks that the immediate dangers to
13 humans and life from an LNG carrier, only 470
14 feet. Dr. James Fay, scientist from MIT,
21:19:22 15 disputes these findings were never subject of a
16 peer review or submitted to a scientific
17 journal. Dr. Fay says, and I quote: For all
18 credible spills, including terrorist attacks on
19 the storage tank and/or LNG tanker, the danger
21:19:36 20 zone for humans extends nearly two miles, end
21 quote. This is significantly different than
22 the Quest findings.
23 After doing minimal research, one can
24 learn of the LFL, or low flammability level, of
21:19:50 25 this particular gas. Because of its LFL, 124
□

21:19:53 1 studies have shown the release of 125,000 cubic
2 meters could create a vapor cloud of up to 30
3 miles before ignition. How can FERC ignore and
4 deny all of these studies done by our own
21:20:06 5 government of the dangers and effects of LNG to
6 humans and the environment I will never
7 understand.

PM6-99

8 Oregon and Washington have millions of
9 acres of secluded forests and unpopulated
21:20:18 10 areas. If FERC is going to allow these plants
11 to be built, they should not come within 50
12 miles of any population whatsoever.
13 MR. FRIEDMAN: Sir, please wrap it up.
14 MR. MARVIN KING: I would love to tell you
21:20:28 15 of every single LNG accident and explosion in
Page 104

Public Meetings

6

PM6-99 Section 3 of the Natural Gas Act does not preclude siting an LNG terminal in a populated area and an LNG terminal requires proximity to a deep navigation channel for LNG ship access. Also see our response to comment PM5-8.

Public Meetings

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16 the world, but FERC has put the quality of all
 17 of our lives into a three-minute speech. Go
 18 figure.
 19 MR. FRIEDMAN: Thank you for your
 21:20:40 20 comments.
 21 (Applause.)
 22 MR. FRIEDMAN: Is there anyone else that
 23 wishes to speak? If not, at this time --
 24 MS. CHERYL JOHNSON: I'm coming.
 21:20:52 25 MR. FRIEDMAN: Three minutes, Cheryl.
 □ 125

21:20:54 1 MS. CHERYL JOHNSON: Cheryl Johnson,
 2 Astoria.
 3 I would like to take this opportunity to
 4 thank Congressman Wu, who repeatedly and
 21:21:00 5 persistently requested from FERC to extend the
 6 comment period for this draft Environmental
 7 Impact Statement. If it were not for his
 8 persistence, this would all have been finished
 9 a long time ago. His first request was denied,
 21:21:12 10 second request was denied, and he continued to
 11 be persistent. He was finally successful and
 12 it extended from 45 days to 120. We would like
 13 to thank Congressman Wu for speaking up on
 14 behalf of the citizens of Oregon.
 21:21:27 15 MR. FRIEDMAN: Thank you.
 16 This is not working. I'll have to speak
 17 loud.
 18 On behalf of the FERC, I want to thank you
 19 all for being here tonight, providing comments
 21:21:39 20 on the DEIS for the Bradwood Landing LNG
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21 project. Let the record show that this meeting
 22 was concluded at approximately 9:25 p.m. Thank
 23 you.

24 (MEETING ADJOURNED AT 9:25 P.M.)

21:21:51 25 * * * 126
 □

21:21:51	1	TESTIMONY INDEX	
	2		Page
	3	Testimony by Mr. John Dunzer	18
	4	Testimony by Ms. Debbie Twombly	21
21:21:51	5	Testimony by Mr. Ned Heavenrich	24
	6	Testimony by Mr. Ted Messing	25
	7	Testimony by Ms. Georgia Marincovich	28
	8	Testimony by Mr. Jack Marincovich	30
	9	Testimony by Mr. Brent Foster	34
21:21:51	10	Testimony by Dr. Jerry Havens	38
	11	Testimony by Carolyn Eady	43
	12	Testimony by Mr. Robert Boehm	46
	13	Testimony by Ms. Cheryl Johnson	48
	14	Testimony by Mr. James Kodama	52
21:21:51	15	Testimony by Ms. Lori Durheim	56
	16	Testimony by Mr. Erie Johnson	57
	17	Testimony by Ms. Becky Read	59
	18	Testimony by Mr. Richard Parker	60
	19	Testimony by Ms. Jean Dominey	61
21:21:51	20	Testimony by Ms. Elizabeth Mannarino	64
	21	Testimony by MR. CARL DOMINEY	67
	22	Testimony by Mr. Roger Rocka	72
	23	Testimony by Ms. Jan Mitchell	74
	24	Testimony by Mr. Dale Treusdell	77
21:21:51	25	Testimony by Ms. Jeanette Nachbar	78
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21:21:51	1	TESTIMONY INDEX (Continued)	
	2		Page
	3	Testimony by Mr. Frank Aquesto	80
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21:21:51	5	Testimony by Mr. David Ambrose	85
	6	Testimony by Mr. Jimmy Beckwith	88
	7	Testimony by Mr. Jay Kiddle	92
	8	Testimony by Mr. Murray Stanley	99
	9	Testimony by Ms. Laurie Caplan	101
21:21:51	10	Testimony by Ms. Marjie Castle	103
	11	Testimony by Mr. Duncan MacKenzie	107
	12	Testimony by Mr. Steve Dragich	111
	13	Testimony by Mr. Vance Fraser	114
	14	Testimony by Ms. Gayle Kiser	117
21:21:51	15	Testimony by Mr. Frans Eykel	119
	16	Testimony by Mr. Marvin King	121
	17	Testimony by Ms. Cheryl Johnson	125
	18	* * *	
	19		
	20		
	21		
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21:21:51	1	CERTIFICATE
	2	I, Robin L. Nodland, a Washington
	3	Certified Shorthand Reporter, an Oregon
		Page 107

Public Meetings

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PM6 RN-110807-FERCpm.txt
4 Certified Shorthand Reporter, a Registered
21:21:51 5 Diplomat Reporter, and a Certified Realtime
6 Reporter, do hereby certify that I reported in
7 stenotype the proceedings had upon the hearing
8 of this matter, previously captioned herein;
9 that I transcribed my stenotype notes through
21:21:51 10 computer-aided transcription; and that the
11 foregoing transcript constitutes a full, true
12 and accurate record of all proceedings had
13 during the hearing of said matter, and of the
14 whole thereof.
21:21:51 15 Witness my hand at Portland, Oregon, this
16 30th day of November, 2007.
17
18
19
21:21:51 20 _____
21 Washington CSR No. 2530
22 Oregon CSR No. 90-0056
23
24
25
□

ORIGINAL



United States Department of the Interior
Bureau of Indian Affairs
Northwest Regional Office
911 NE 11th Avenue
Portland, Oregon 97232-4169



In Reply Refer To:
Environmental Services

SEP 07 2007

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

SUBJECT: OEP/DG2E/Gas 3, Bradwood Landing LLC, NorthernStar Energy LLC, Docket No. CP06-365-000, CP06-366-00, FERC/EIS - 0214D, et al.

Dear Ms. Bose:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement (DEIS) for the above listed project.

- FA1-1 From the information contained in the DEIS there appears to have been a lack of active "government-to-government" consultation with all affected tribal governments. This lack of effective communication has led to the DEIS not fully addressing significant concerns of affected tribal governments, including protection of tribal trust assets and related mitigation measures.
- FA1-2 Based upon the Bureau of Indian Affairs (BIA) knowledge of the Project area, the DEIS does not adequately represent the significant concerns of the affected minority (Native American) and low income community in the Project area. Additionally, the cumulative impact of the planned full build out of the "Bradwood" Project and its connection with future power plants (gas and coal fired) needs additional analysis.
- FA1-3
- FA1-4 The DEIS is somewhat confusing in that it makes statements that NorthernStar "would implement" or "could implement" certain actions and in other parts of the DEIS suggests actions NorthernStar should take. For clarity, the DEIS should affirmatively state actions NorthernStar agrees to take and will be held responsible for completing.
- FA1-5 To get the information needed for a Final Environmental Impact Statement (FEIS), it is recommended that FERC provide "government-to-government" consultation meetings with the affected tribal governments listed on page 4-363 of the DEIS and the additional affected tribal governments: Quinault, Colville, and the Kootenai Tribe of Idaho (addresses listed below).

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- FA1-1 Section 4.9.3 of the EIS documents government-to-government consultations between the FERC and Indian tribes that may have an interest in the project. The FERC sent its NOI to appropriate Indian tribal governments. Only the Nez Perce Tribe and the Confederated Tribes of the Warm Springs Reservation requested direct consultations with the FERC. Staff made presentations to the CRITFC on November 17, 2005, and to the Warm Springs Tribal Council on January 24, 2006. Members of the Nez Perce Tribal Council were in attendance during our presentation to the CRITFC. In addition, representatives from the CRITFC and the Nez Perce Tribe attended interagency and public meetings held for this project.
- FA1-2 Based on our analysis of the regional population, the project would not disproportionately impact minorities, including Native Americans, or low income communities (see section 4.8).
- FA1-3 The EIS discusses NorthernStar's intent to connect with the Beaver Power Plant. If the LNG terminal is expanded in the future (i.e., a third tank added) another assessment of environmental impacts related to that action would be required. Cumulative impacts are discussed in section 4.12.
- FA1-4 The FERC's environmental staff makes recommendations in the EIS using the phrasing "should." If the project is approved by the Commission, these recommendations would become conditions of the FERC's authorization for the LNG terminal and the certification for the pipeline. All of our recommended mitigation measures are summarized in section 5.2. Our recommendations are not the same as future actions that NorthernStar has committed to doing in their application and supplemental filings, which we describe using the phrasing "would." See response to comment PM1-2.
- FA1-5 To our knowledge, the Quinault, Colville, and Kootenai Tribe of Idaho did not prehistorically or historically occupy or utilize the project area (see Wayne Suttles, vol. ed., 1980, Northwest Coast, Handbook of North American Indians, Vol. 7, Smithsonian Institution, Washington, DC). Nor does it appear that these particular tribes have treaty rights extending over the lower Columbia River basin. Bands forming the Quinault tribe occupied the Queets, Clearwater, Quinsalt, and Copalis River drainages in the southwestern corner of the Olympic peninsula in west-central Washington state. The bands of Confederated Tribes of the Colville Indian Reservation occupied the upper Columbia River valley in central and eastern Washington. Kootenai bands occupied a territory in southeastern British Columbia, northwestern Montana, and northern Idaho. The Oregon and Washington SHPOs, the Legislative Commission on Indian Affairs for Oregon, and the Washington Governor's Office of Indian Affairs did not identify the Quinault, Colville, or Kootenai as tribes that we should contact. Although our NOI for this project was sent to regional agencies and Native American organizations, including the Affiliated Tribes of Northwest Indians, Northwest Indian Fisheries Commission, CRIFC, and the BIA, none of those organizations or agencies responded to the NOI with a request that the FERC should consult with the Quinault, Colville, or Kootenai tribes. Information regarding the Bradwood Landing Project has been available in the regional press for years. None of these three tribes have provided comments or contacted the FERC about the project.

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FA1-5 cont'd To facilitate collaborative communication with tribal governments, it is suggested that you request the tribes designate a staff member as the official contact person to receive meeting notices and information regarding the project. It is also suggested that tribal technical staff be invited to meetings involving technical issues. Additionally, as courtesy, tribal leaders should receive duplicate copies of all information sent to the staff contact person. For scheduling purposes, tribal leaders and staff need notice of meetings as early as possible.

The above listed tribal governments have co-management responsibility over the natural resources in the Project area and must be involved in deliberation and planning on issues that impact tribal treaty resources. As such, their authority over resource allocation, river operation requirements, environmental quality, including air and water quality issues, etc., should be noted in the FEIS.

FA1-6 For your general information, because tribal governments are just that - governments, merely sending one Notice of Intent to Prepare an Environmental Impact Statement (NOI) to a tribal government does not necessarily mean a response will be made on the NOI. Because of tight budgets and staffing issues, unless a "government-to-government" meeting is specifically requested, tribal governments tend to wait to see the published DEIS and then make comments as necessary.

The following are further DEIS related comments:

FA1-7 • Safety and security zones for LNG vessels may have an adverse impact on tribal treaty rights. Mitigation measures should be addressed.

FA1-8 • The DEIS states that the geology of the project area "can be characterized as a "High" hazard area relative to earthquake potential" and "... is susceptible to soil liquefaction." See 5.1.1 Geology 5.1. The Project expects to fix these problems with "engineered fill." More information is needed concerning what materials will be used as "engineered fill."

FA1-9 • Under 5.1.2 Soils and Sediments, what is planned for the remaining 300,000 cubic yards of dredge material? "Beach nourishment" material could have an adverse impact on fish and wildlife and reduce harvesting opportunities. Mitigation measures should be addressed.

FA1-10 • What amount of the dredge material is expected to be placed back in the river? Because the Project wants to remove additional dredge material, "about 80,000 cubic yards of dredge material ... approximately every 2 to 4 years," what environmental review is anticipated for this activity?

FA1-11 • The DEIS states that "[i]f trace amounts of some contaminants were found in the sediment samples." 5.1.2 Soils and Sediments. Discussion is needed concerning the concentration of the "contaminants" caused by stockpiling the dredged material and the potential adverse impacts to the "beach nourishment" and water quality. More analysis is needed and mitigation measures addressed.

FA1-12 • Under 5.1.3 Water Resources, the Project is expected to use up to "60 million gallons of water from the Columbia River for hydrostatic testing of LNG storage tanks" and then release/discharge the water directly back into the Columbia River "approximately 300 feet offshore." Because of possible contaminants in the storage tanks and pipeline

Federal Agencies

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FA1-6 See section 4.9.3 of the EIS.

FA1-7 We do not believe that other river users would be adversely impacted by the safety and security zones for the LNG carriers (see sections 4.7.1.4, 4.8.1.7, and 4.8.1.8). Fishing boats may need to temporarily move out of the way for several minutes as an LNG carrier passes.

FA1-8 Section 4.1.3.3 describes mitigation for soil liquefaction at the LNG terminal in greater detail than section 5.1.1. The currently proposed mitigation technique for soil liquefaction is soil densification using vibroflotation. Silts and clays within the top 25 feet would be replaced with compacted engineered fill. It is standard construction practice to replace fine grained soils with granular soils (e.g., sand or pea gravel) that can meet engineering specifications for compaction (i.e., "engineered fill"), regardless of the potential for soil liquefaction. Section 5.1.1 has been reworded for greater clarity relative to this issue.

FA1-9 The dredged material that is used for beach nourishment would replace sand that has eroded from an existing beach area at the Wahkiakum County Sand Pit site. This would be a beneficial use of the dredged sand to mitigate ongoing erosion caused by the presence of upstream dams which have removed sediment from the river's natural system. Dredged material has previously been placed at the Wahkiakum County Sand Pit site to counteract the effects of shoreline erosion (see section 3.1.9.2). Impacts of the dredged material placement on aquatic resources are discussed in section 4.5 and impacts on wildlife (streaked horned lark) are discussed in section 4.6.2.2.

FA1-10 With the exception of approximately 20,000 cubic yards, dredged material that is placed at the Wahkiakum County Sand Pit site for beach nourishment would essentially be placed in the Columbia River. This includes the material removed for maintenance dredging. Permits for maintenance dredging cover a 5-year period. The environmental assessment for the first permit is included in the EIS, which will be considered by the COE along with the Joint Permit Application submitted by NorthernStar for permits under section 404. Subsequent maintenance permits would require a separate environmental review by the COE.

FA1-11 The concentrations of contaminants detected in the sediments to be dredged are described in detail in section 4.2.2.2. Because the concentrations were very low, and in most cases are consistent with background levels, no mitigation is necessary.

FA1-12 Because the tanks and pipeline would be constructed of new materials, contaminants are not expected to be introduced to the hydrostatic test water during testing. However, all batches of hydrostatic test water would be sampled and analyzed before discharge and treated as necessary to enable safe discharge to the river. Hydrostatic test discharges would meet ODEQ standards and NPDES permit requirements.

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- FA1-13 system, the water released back into the Columbia River should be filtered.
- FA1-13 • Withdrawals from the Columbia River of "approximately 13.7 million gallons per year for weekly fire suppression system testing" appear to have the potential for adverse impacts to fish and wildlife. More analysis is needed and mitigation measures addressed.
 - FA1-14 • Under 5.1.3 Water Resources, "[d]uring operation of the LNG terminal, the SCVs would generate about 160 gpm that would be discharged into the Columbia River under an NPDES permit following pH adjustment." Description of the potential content of the discharge water is needed and mitigation measures addressed. To identify possible water quality issues as early as possible, all water that leaves the Project site should be under a water quality monitor program.
 - FA1-15 • All studies cited in the DEIS should have a footnote concerning location where the document can be reviewed and the specific page in the Appendices to obtain the full citation of any particular study.
 - FA1-16 • Under 5.1.3 Water Resources, "SCV discharge water would be generally warmer than ambient water temperatures...." How much warmer? Explain how and why the water temperature will "not exceed" 68 degrees F? If the temperature goes above 68 degrees F, what protection measures will happen and how will notice happen?
 - FA1-17 • Under 5.1.3 Water Resources, along the proposed 36.3 miles long pipeline route there are "94 waterbody crossings" planned and a bridge over Hunt Creek to be replaced. More analysis is needed concerning impacts to fish and wildlife. Mitigation measures need to be addressed.
 - FA1-18 • Under 5.1.4 Wetlands and Terrestrial Vegetation, mitigation needs to be addressed concerning both the loss of 13 acres of wetlands and for the temporary loss of wetlands.
 - FA1-19 • Under 5.1.4 Wetlands and Terrestrial Vegetation, a better or more complete justification is need to justify a 100-ft right of way rather than just a statement of "we believe" it necessary.
 - FA1-20 • Under 5.1.4 Wetlands and Terrestrial Vegetation, the DEIS refers to a draft "Mitigation Plan." Impacted tribal governments should receive a copy of this draft plan and in the Mitigation process be consulted on a "government-to-government" basis.
 - FA1-21 • Concerning contaminant concentrations within the dredge material, there is a conflict between 5.1.2 Soils and Sediments, 5-3 and 5.1.5 Wildlife and Aquatic Resources, 5-6. On page 5-3 there were contaminant concentrations and on 5-6 there "are not" contaminant concentrations. This needs to be clarified and mitigation measures addressed.
 - FA1-22 • The Environmental Justice Act analysis is lacking and needs more work. The DEIS does not adequately address the disproportionately high and adverse environmental effects on the minority (Native Americans) and low income communities in the Project area.
 - FA1-23 • There is a need for additional analysis of impacts to estuarine functions during construction and operation. Proposed mitigation measures need to be addressed.
 - FA1-24 • Dredging of 700,000 cubic yards of sediment for the ship berth and maneuvering area appear to have the potential for adverse impacts to fish and wildlife. More analysis is needed and mitigation measures addressed.
 - FA1-25 • Under 5.1.5 Wildlife and Aquatic Resources, 5-7, talks about \$50 million over the "life of the project." For clarification purposes, the life of the Project should be stated.
 - FA1-26 • Under 5.1.9 Cultural Resources, the Project area does have religious, cultural, and sacred sites, including burial sites. This section is not complete and needs additional

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- FA1-13 As described in section 4.3.2.3, the water withdrawn for fire suppression system testing would be cycled through the system piping and discharged back to the river without any other use. No adverse impacts on water quality or scouring of the river bottom would occur. The firewater intakes at the LNG terminal that withdraw water from the Columbia River would be screened to minimize the likelihood of entrainment and impingement of juvenile fish in accordance with the ODFW and NMFS regulations and fish design criteria. The screen designs proposed by NorthernStar have been reviewed and approved by the NMFS. Therefore, no impacts on fish and wildlife are expected and no mitigation would be necessary.
- FA1-14 The SCV discharge would be monitored in accordance with the NPDES permit issued by the ODEQ. Further discussion of the SCV discharge, as described in a technical memorandum titled Mixing Zone Analysis of Bradwood Landing Point Source Discharges – NorthernStar Natural Gas, has been added to section 4.3.2.3. NorthernStar filed its Mixing Zone Analysis for Bradwood Landing Point Source Discharges – NorthernStar Natural Gas with the FERC on October 15, 2007. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range. Constituents that would be present in the SCV discharge are listed in this technical memorandum, which is included as comment A4.
- FA1-15 Complete citations for all references cited in the EIS are provided in Appendix H. In addition, we have provided footnotes for certain key documents that are available on the FERC's internet website.
- FA1-16 A detailed discussion of the temperature of the SCV discharge relative to the ambient temperature of the Columbia River is provided in section 4.3.2.3. The SCV discharge is not expected to exceed 68 °F because it is part of a controlled, engineered process, and an alarm would sound in the control room if the temperature were to exceed 68 °F so corrective action could be taken. The temperature of the SCV discharge would be monitored and reported to the ODEQ as part of the NPDES permit requirements.
- FA1-17 Sections 4.5 and 4.6 contain detailed discussions of potential impacts on fish and wildlife associated with waterbody crossings and the new Hunt Creek Bridge. As discussed in section 2.1.5, NorthernStar's revised Compensatory Mitigation Plan will be included in the FERC's revised BA and EFH Assessment. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.
- FA1-18 Compensatory mitigation for wetlands is discussed in section 4.4.1.2 for the terminal site and in section 4.4.1.3 for the pipeline. Mitigation for temporary impacts on wetlands is not required.

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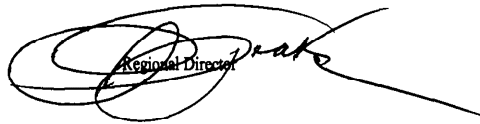
1

- FA1-19 NorthernStar's request for a wider right-of-way in wetlands is necessary and justified for seven reasons, as described in section 4.4.1.3.
- FA1-20 NorthernStar submitted its Mitigation Plan – 3rd Revision for the Bradwood Landing Terminal and Pipeline to the FERC on August 3, 2007. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11. NorthernStar is currently revising its Compensatory Mitigation Plan, which will be included in the FERC's revised BA and EFH Assessment. NorthernStar is developing its mitigation plan in consultation with the NMFS, FWS, and state agencies. The Compensatory Mitigation Plan is not a FERC proposal. See also our response to FA1-1.
- FA1-21 Section 5.1.2 states that trace amounts of some contaminants were detected in sediments but none exceeded threshold levels that would have an adverse impact on aquatic species and section 5.1.5 states that sampling and analysis did not detect any elevated contaminant concentrations that could adversely affect aquatic species. These statements are consistent and, furthermore, indicate that mitigation measures are not needed. Section 4.2.2.2 describes the sediment sampling and analysis results in detail.
- FA1-22 As discussed in section 4.8, we do not agree that the project would have disproportionately high and adverse impacts on minority and low income communities in the project area.
- FA1-23 Section 4.4.1.1 and 4.4.1.2 contain detailed discussions of potential impacts on estuarine function due to construction and operation of the project. As discussed in section 2.1.5, NorthernStar's revised Compensatory Mitigation Plan will be included in the FERC's revised BA and EFH Assessment. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.
- FA1-24 Sections 4.5 and 4.6 contain detailed discussions of potential impacts on fish and wildlife associated with the removal of 700,000 cubic yards of sediment for the maneuvering area and ship berth. NorthernStar will develop a revised Compensatory Mitigation Plan to mitigate for impacts on fish and wildlife. As discussed in section 2.1.5, NorthernStar's revised Compensatory Mitigation Plan will be included in the FERC's revised BA and EFH Assessment.
- FA1-25 The phrase "(i.e., 40 years)" has been added to the statement for clarification.
- FA1-26 See section 4.9.4 of the EIS. No traditional cultural properties, including religious or sacred sites important to Indian tribes, have been identified within the area of potential effect. We have not yet completed compliance with the NHPA, and have recommended a condition that would require the completion of cultural resources studies prior to construction being allowed to begin.

- FA1-27 | "government-to-government" consultation with the tribes.
- FA1-28 | • There is a need for additional analysis and proposed mitigation measures for construction of the dock facilities and pipe laying/ground disturbing activities.
- There is a need for additional analysis of how fish and wildlife will be protected from entrainment and/or impingement in the operation of the ships taking on ballast water.

If you have any questions or need assistance in setting up government-to-government meetings, please contact Dr. B.J. Howerton, Northwest Regional Office, Environmental Services at (503) 231-6749.

Sincerely,



Regional Director

cc:
Donald Sutherland, DC/BIA/DOI
FERC, Gas Branch 3, PJ11.3

Quinault Indian Nation
Fawn Sharp, President
P.O. Box 189
Taholah, Washington 98587-0189

Confederated Tribes of the Colville Reservation
Mike Marchand, Chairman
P.O. Box 150, Nespelem, Washington 99155-0150

Kootenai Tribe of Idaho
Jennifer Porter, Chairperson
P.O. Box 1269, Bonners Ferry, Idaho 83805-1269

Columbia Intertribal Fish Commission
Confederated Tribes of the Warm Springs Reservation
Northwest Indian Fish Commission
Affiliated Tribes of Northwest Indians
Confederated Tribes of the Grand Ronde Reservation
Confederated Tribes of the Siletz Reservation

Federal Agencies

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FA1-27 Sections 4.5 and 4.6 contain detailed discussions of potential impacts on fish and wildlife associated with the construction of the LNG terminal, including the jetty, and other ground disturbing activities. As discussed in section 2.1.5, NorthernStar's revised Compensatory Mitigation Plan will be included in the FERC's revised BA and EFH Assessment.

FA1-28 All intake screen designs have been reviewed and approved by the NMFS and comply with ODFW and NMFS regulations and fish design criteria.

As is typical for all large cargo vessels, water would be appropriated by LNG carriers during unloading as ballast and to cool the engines generating power for the offloading pumps and other onboard systems. To minimize entrainment and impingement of juvenile fish during ballast and cooling water intake, NorthernStar would construct a system capable of delivering filtered water to the LNG carrier. NorthernStar would offer contract incentives to the LNG suppliers to retrofit LNG carriers to connect with the filtered water supply system. Since issuance of the draft EIS, NorthernStar has stated it may not be feasible to require that all carriers utilize the system. We conducted additional analysis of entrainment by LNG carriers at the wharf without the use of the filtered water supply system and NMFS-approved screens. Due to the potential impacts on sensitive aquatic resources at the terminal, we are recommending in section 4.5.2.1 that NorthernStar develop a plan to deliver screened water to LNG carriers at the terminal. We are also recommending that NorthernStar conduct post-installation tests of all intake screens at the terminal, and develop a monitoring and reporting program to assess the efficacy of the screened water supply system at minimizing entrainment and impingement. We will incorporate NorthernStar's screening plan into our revised BA and EFH Assessment. The NMFS will review our BA and EFH Assessment during formal consultation under section 7 of the ESA, and prepare a BO determining whether or not the federal actions associated with this project would likely jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat. The FERC will not allow construction to proceed until after we have concluded formal consultation with the NMFS and FWS.

K-344

Confederated Tribes of the Umatilla Reservation
Cowlitz Indian Tribe
Chinook Nation
Confederated Tribes of the Chehalis Reservation
Nisqually Tribe
Shoalwater Bay Tribe
Yakama Nation
Nez Perce Tribe

Federal Agencies

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Federal Agencies

2



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

VIA ELECTRONIC FILING

DEC 17 2007

Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, D.C. 20426

Re: Draft Environmental Impact Statement for the Bradwood Landing Liquefied Natural Gas Terminal and Pipeline Project (Docket No. CP06-365-000, *et al.*)

Dear Ms. Bose:

The National Oceanic and Atmospheric Administration (NOAA) is pleased to provide comments on the Draft Environmental Impact Statement (DEIS) for the Bradwood Landing Liquefied Natural Gas Terminal and Pipeline Project (CP06-365-000, *et al.*), dated August 2007, from the Federal Energy Regulatory Commission (FERC), the lead federal agency. According to the DEIS, Bradwood Landing LLC and NorthernStar LLC are proposing to construct and operate a liquefied natural gas (LNG) import terminal located along the Columbia River at river mile 38. Components of the terminal include: 58-acre ship maneuvering area, ship berth and unloading facilities, two LNG storage tanks, vaporization and vapor handling systems, support facilities, 36.3-mile sendout pipeline, and interconnections to three lateral pipelines. The proposed project would have the capability of mooring LNG transport vessels with cargo capacities ranging from 100,000 to 200,000 m³. Revaporization of the LNG would use a submerged combustion vaporizer.

In May 2007, NOAA's National Marine Fisheries Service (NMFS) provided detailed comments on the proposed project under the Endangered Species Act and Magnuson-Stevens Fishery Conservation and Management Act.¹ Numerous comments in NMFS' May 2007 letter are applicable to the EIS and have not been addressed adequately in the DEIS. FERC should review those comments and incorporate information from subsequent discussions into the Final Environmental Impact Statement (FEIS), as appropriate.

In addition to those previously provided comments, NMFS has enclosed comments specific to the DEIS. The comments are based on NMFS' special expertise and responsibility to manage, conserve, and protect marine and coastal living resources as provided under the Endangered Species Act, the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, and the Fish and Wildlife Coordination Act. In all cases, the comments are relevant, either directly or indirectly, to NMFS' responsibilities under the aforementioned statutes and are consistent with the agency's regulatory obligation to its trust resources. However, FERC should not interpret these comments as satisfying its obligation to consult under the Endangered Species Act or Magnuson-Stevens Fishery Conservation and Management Act.

¹ Letter from Michael Tehan (NMFS) to Lonnie Lister (FERC) regarding a request for additional information related to the Endangered Species Act and Essential Fish Habitat consultations for the Bradwood Landing LNG terminal and pipeline (May 11, 2007).



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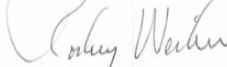
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In licensing and regulatory matters, decisions and judgments are based on the best scientific data available at that time. Where data are abundant, precise requirements may be in order. Where available scientific data are not comprehensive, precision is not always possible, and more projections and judgments are used. While NOAA has certain scientific data relevant to the effects of the operation of the proposed facility on marine and anadromous species and their habitats, they are not necessarily comprehensive on all matters related to the projected effects of the facility operation. In certain areas the available scientific data are quite sparse.

NOAA believes substantial work remains to complete the EIS to ensure the impacts to the environment are described, analyzed, and mitigated adequately. The enclosed comments highlight NMFS' remaining concerns as they pertain to the proposed action's potential for significant effects to the aquatic environment and areas in need of further consideration in the EIS. NOAA recommends FERC not issue the FEIS until the project design and mitigation and adaptive management plans are finalized.

NOAA appreciates the opportunity to comment at this time, and looks forward to continuing to provide FERC with assistance on the subject action. Please direct questions regarding this letter to Robert Markle, fishery biologist, or Bridgette Lohman, natural resource specialist, in the Habitat Conservation Division of NMFS Northwest Region at 503-230-5400.

Sincerely,



Rodney F. Weiher, Ph.D.
NOAA NEPA Coordinator
Office of Program Planning and Integration

Enclosures: DEIS comments
Certificate of Service

cc: SERVICE LIST

BRADWOOD LANDING LNG
DEIS COMMENTS

The National Marine Fisheries Service (NMFS) offers these comments specific to the Federal Energy Regulatory Commission's (FERC) Draft Environmental Impact Statement (DEIS) for the Bradwood Landing Liquefied Natural Gas (LNG) Terminal and Pipeline Project. These comments are in addition to those comments previously provided (May 11, 2007) on the biological assessment that may also have relevancy to the DEIS. The comments are based on NMFS' special expertise and responsibility to manage, conserve, and protect marine and coastal living resources as provided under the Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), Marine Mammal Protection Act (MMPA), and the Fish and Wildlife Coordination Act. In all cases, the comments have relevancy, either directly or indirectly, to NMFS' responsibilities under that legislation, and are consistent with the agency's regulatory obligation to its trust resources.

In certain instances comments include examples that are ancillary to the principal comment. These examples, which do not constitute a comprehensive list, are solely provided to assist FERC in better understanding the intent of the principal comment.

Alternatives Analysis

1. While the proposed Bradwood Landing LNG terminal footprint is smaller than other proposed or existing LNG import terminals, the proposed project still causes a permanent loss and modification of habitat essential for numerous salmonid species listed under the ESA and Magnuson-Stevens Act. Significant project effects include extensive dredging, filling of off-channel aquatic habitat and the 100-year floodplain, modification and chronic disturbance of nearshore habitat, and alteration of riparian and estuarine habitat. The applicant has stated, and the DEIS repeats, that the terminal footprint cannot be further reduced.² Therefore, according to FERC, it appears that environmental impacts on site cannot be further avoided.

Given this conclusion, the current presentation of alternatives in the DEIS does not consistently or equivalently analyze the impact to NMFS' trust species or the Columbia River Estuary. Based on the anticipated environmental effects of the applicant's proposed action, NMFS suggests FERC give serious consideration to reanalysis of alternatives to develop a more environmentally appropriate site considering the following:

- | | |
|-------|---|
| FA2-1 | a) In several instances only Oregon data are presented. As the stated objective is providing the Pacific Northwest with another natural gas source, it would appear additional data from the region is warranted. |
| FA2-2 | b) The duration and magnitude of impacts do not appear to have been fully considered in the alternatives analysis. Impacts that are permanent or chronic should be given significantly |

² Letter from Dave Glessner (Bradwood Landing LLC) to Mitch Rohse (Clatsop County) regarding Bradwood Landing's Clatsop County permit (July 31, 2007).

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FA2-1 Our analysis in section 3.1 discussed a range of alternatives over a wide geographic region, not just in Oregon. This includes potential LNG import terminals in British Columbia, Canada, northern Mexico, California, Washington, and Oregon; the conversion of existing LNG storage facilities in Idaho, Washington, and Oregon; and new pipeline system alternatives extending from Wyoming to Oregon.

FA2-2 Our EIS does consider the duration and magnitude of the proposed action. We describe impacts as being either temporary or long term. Alternatives that are similar in design to the Bradwood Landing Project, including alternative LNG terminals and pipelines, would have impacts on resources of similar duration. Therefore, none of those alternatives are considered to be environmentally superior to the proposed action. In some cases, where pipeline alternatives are longer than the proposed Bradwood Landing sendout pipeline, the magnitude of impacts for the alternatives would obviously be greater.

FA2-2
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greater weight than temporary or short-term impacts. For example, in most instances when appropriate conservation measures are successfully implemented (*e.g.*, HDD stream crossings), the impact of pipeline construction on aquatic systems can be avoided or be limited to temporary or short-term duration. In such instances the transitory nature of the impact likely limits the magnitude of the environmental effect. Conversely, impacts that are permanent (*e.g.*, aquatic and wetland filling, sequestration of dredged sediment) or chronic (*e.g.*, maintenance dredging, wake stranding of juvenile salmonids) are of considerable environmental concern and are more likely to have significant impacts on sensitive species. FERC needs to consider the duration and magnitude of likely impacts when determining whether environmental advantages exist between alternatives.

FA2-3

c) The sensitivity of a species or their habitat to change does not appear to have been factored into the alternatives analysis. An alternative that impacts only viable fish populations is preferable to one that impacts at-risk species. Similarly, an alternative that impacts few or no ESA-listed species is preferable to an alternative that impacts many ESA-listed species. FERC should analyze how, for example, endangered, threatened or sensitive species and their associated habitat could be impacted by each of the proposed alternatives. Moreover, NMFS believes that all of the alternatives should include measures to minimize and/or avoid impacts to threatened and endangered species and their critical habitat. This is consistent with the implementing regulations for NEPA, which state that both context and intensity must be considered when determining significance, and that the ESA-status of a species and their critical habitat are one consideration (40 CFR 1508.27). FERC needs to consider environmental impacts in terms of species and habitat sensitivity when evaluating project alternatives.

FA2-4

d) The DEIS indicates rough sea and weather conditions off the coast of the Pacific Northwest preclude the siting of offshore terminals. To those not readily familiar with the circumstances that differentiate proposed or existing terminals or other similar structures located in harsh environmental conditions elsewhere (*e.g.*, Calypso LNG terminal off the eastern coast of Florida, Troll Natural Gas Fields in the North Sea with depths of 1,100 feet), FERC should explain further why the placement of terminals offshore of Washington and Oregon are not feasible.

FA2-5

e) It remains unclear what weight FERC gives to financial costs. In multiple instances FERC appears to dismiss alternatives due to financial considerations without fully evaluating environmental or public safety impacts. FERC should develop and implement a more transparent cost/benefit decision matrix in the alternatives analysis. Furthermore, any financial costs analysis should be comprehensive and include costs associated with each alternative in its entirety (*e.g.*, increased shipping costs to river commerce due to traffic restrictions, impacts to fisheries, increased emergency response capacity).

FA2-6

f) It remains unclear what role site or capacity expansion plays in consideration of suitable alternatives to the proposed project. Section 3.1.6.2 discusses terminal expansion in terms of the proposed Bradwood Landing LNG terminal, but appears not to do the same for the alternatives. If expansion potential is a decision element, FERC should modify its selection criteria to clarify the weight given to expansion in the alternatives analysis.

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FA2-3

Our alternatives analysis was limited because a detailed analysis of most of the alternative sites is not feasible. We looked at factors that we were able to obtain data for and objectively compare among the sites. We did not identify any alternatives that would have significantly less impact on at-risk species. For example, based on currently available information, there is the potential for the Oregon LNG Project to impact federally listed threatened and endangered salmon species in the lower Columbia River estuary, and the sendout pipeline for the Jordan Cove LNG Project would cross old growth forest habitat occupied by marbled murrelet and northern spotted owl. All the LNG terminal alternatives would have to include similar measures to avoid or minimize impacts on federally-listed threatened and endangered species for the FERC to consider under the ESA.

FA2-4

We have revised section 3.1.4 of the EIS to better explain why the placement of an LNG terminal off the coast of Oregon or Washington would not be preferable to onshore locations. According to a report produced by ABSC (2006), LNG Receiving Terminal Offshore Oregon as an Alternative to the Land Based Bradwood Facility, which we summarize in the EIS, the seas offshore in the Pacific Northwest are significantly rougher than seas off the Gulf or Northeast coasts. Therefore, it is not feasible to develop an offshore terminal as an alternative to the Bradwood Landing Project, given the rough sea conditions in the ocean off the Oregon coast, and technologies that may be used for an offshore terminal.

FA2-5

Costs were used as one factor in comparing offshore alternatives to the proposed project. We also used economic feasibility in a qualitative sense when comparing the proposed site to other alternatives. However, not enough information is available at a sufficient level of detail for all sites to develop a quantitative comparison of the site alternatives based on costs.

FA2-6

Section 3.1.6.2 discusses alternative site layouts for the proposed LNG terminal, based on criteria NorthernStar indicated were necessary for the operation of its facility, including space for future expansion. However, we did not use the ability to expand as a critical factor in our consideration of alternatives. We disagree that this element should be a factor in evaluating alternative LNG terminal sites.

FA2-6 | Furthermore, if expansion potential is not a siting consideration, there appears no reason that reserving space for a third tank at Bradwood Landing should be considered necessary to the proposed project and the facility footprint should be reduced accordingly.

FA2-7 | g) FERC should clarify the project purpose. Is the purpose to provide a new source of LNG to the Pacific Northwest? Is the purpose to provide a new source of LNG for Wauna Mill, NW Natural, PGE, and Williams Pipeline? The pipeline alternatives analysis would appear to indicate the latter is true, which greatly constrains the alternatives that meet the project purpose and appears to increase the environmental impacts of other alternatives as they try to service the same potential customers.

Proposed Action and Environmental Impacts

FA2-8 | 2. The DEIS indicates the area of analysis related to LNG vessel traffic extends from the territorial seas boundary, 12 nautical miles from shore, up the Columbia River to the proposed LNG terminal site at river mile 38. NMFS is unclear why the analysis area does not extend out to the 200 nautical mile boundary of the Exclusive Economic Zone, which is the area analyzed in the ESA and Essential Fish Habitat assessments. The analysis area should be expanded out to the Exclusive Economic Zone boundary in the Final Environmental Impact Statement (FEIS), or the FEIS should explain why there is a discrepancy between the EIS and the biological assessment.

FA2-9 | 3. The applicant's proposed action has changed significantly since the DEIS was issued and aspects of the proposed action remain poorly defined. Consequently, the environmental analysis lacks accuracy and the needed level of detail. Improvements to Clifton Road, delineation of offshore vessel routes, stream crossing methodology for the pipeline, proposed mitigation, and the waterbody mitigation plan are some of the project aspects that have been modified and are not analyzed or inadequately analyzed. For actions that appear to remain the same as originally proposed, many are poorly defined (*e.g.*, lack of 60 percent or greater engineered design plans for fish screens at water withdrawals including ballast water/engine cooling water plans, ability to dispose of dredge material at the proposed Wahkiakum County Sand Pit without necessary permits). The change in proposed action or lack of specificity causes the impacts analysis to remain inadequate (*e.g.*, juvenile salmonid wake stranding analysis, shoreline erosion from vessel transits, terminal lighting impacts, vegetation management at the terminal, noise from pile driving activities).

FA2-10 | 4. The mitigation plan included in the DEIS appears inadequate and incomplete. The preferred alternative³ does not contain any mitigation for several adverse impacts on NMFS' trust resources, including listed species under the ESA. Sediment sequestration and wake stranding of juvenile salmonids are areas of particular concern. Where mitigation is proposed at Svensen Island, the description of the action has changed and is inadequate for assessment of beneficial effects to NMFS' trust resources that are impacted by the proposed project. For example, not all of the island is currently within the applicant's ownership or subject to the applicant's right to make modifications. Thus, FERC should not issue the

³ NorthernStar's proposed action, as modified by the FERC's recommended mitigation measures, is the preferred alternative.

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FA2-7 | As indicated in sections 1.1 and 3.1, the primary objective of the Bradwood Landing Project is to provide a new source of natural gas to the Pacific Northwest through the importation of LNG. In order to accomplish that objective, NorthernStar would need to interconnect with the existing Williams Northwest jurisdictional interstate system, and the existing system of Northwest Natural, which is the nonjurisdictional LDC for northern Oregon and southern Washington. Related to that objective would be the ability to directly serve industrial customers in the Pacific Northwest, such as the Georgia-Pacific paper mill at Wauna, Oregon and the PGE Beaver Power Plant at Port Westward, Oregon,

FA2-8 | The geographic scope of the EIS was established to coincide with the regulatory jurisdiction of the FERC and cooperating agencies (*i.e.*, COE, and Coast Guard).

FA2-9 | We disagree that the proposed action has changed significantly since the draft EIS. Certain engineering details have been revised and plans have become more detailed based on continued consultations by NorthernStar with various agencies and further refinement of engineering plans. We have updated the final EIS as appropriate based on new information and based on comments received on the draft EIS. Our revised BA and EFH Assessment will continue to reflect any new updates and will contain a complete impacts analysis.

FA2-10 | Since the issuance of the draft EIS for the Bradwood Landing Project, numerous discussions have occurred between the FERC, NMFS, FWS, and NorthernStar regarding the Compensatory Mitigation Plan as it relates to the BA and EFH Assessment. As a result of these discussions, NorthernStar is currently revising its Compensatory Mitigation Plan. The revised Compensatory Mitigation Plan will be filed with the FERC upon completion and will be included in the FERC's revised BA and EFH Assessment. Section 2.1.5 has been revised to reflect this information.

As described in section 4.4.1.2, because NorthernStar's Compensatory Mitigation Plan has not been finalized, we have recommended that NorthernStar continue to consult with the COE, FWS, NMFS, ODFW, ODSL, WDE, and other appropriate resource agencies to finalize its Compensatory Mitigation Plan. The FERC would not issue a Notice to Proceed to NorthernStar until the final Compensatory Mitigation Plan, along with agency comments and appropriate approvals, has been filed with the Secretary. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.

FA2-10
cont'd

FEIS until the applicant's ability to secure the necessary interests in land have been clearly articulated in the proposed mitigation plan. In addition, FERC needs to clearly articulate how the benefits provided at Svensen Island for salmonids adequately compensate for the decrease in habitat and habitat quality 14 river miles upstream and for on-going operational impacts that affect the viability of the affected populations. Furthermore, because the terminal would be operated for 40 years, a monitoring and adaptive management plan needs to be developed by the applicant, in consultation with NMFS that assures continued benefit to the target species over the lifetime of the project, and beyond if the affected habitat is not restored.

FA2-11

5. The DEIS states hydrodynamic modeling indicated minor changes would likely result from the proposed project, but it does not appear to evaluate the model results in terms of a long time horizon or impacts other than those originally identified. For example:
- a) Modeling indicated that NMFS' original concerns of Clifton Channel becoming the primary channel are unlikely to occur. However, the DEIS does not evaluate whether the "minor" increase in sediment deposition in the channel would accumulate over the long term (*e.g.*, ≥ 100 years); nor whether such deposition would appreciably reduce flow in Clifton Channel and alter the channel's biological function and value.
 - b) Modeling indicated that bed elevation changes north of the Lewis and Clark National Wildlife Refuge near the main navigation channel would be minor (0.05 to -0.05 feet) after 90 days of 50 percent exceedance discharge, but "the change would be more pronounced within the Columbia River near the navigation channel." FERC should clarify the spatial and temporal considerations of these statements.

FA2-12

6. The applicant submitted differing proposed actions to the local, state, and federal permitting agencies with regards to whether two or three tanks would be built. The DEIS states that the applicant has not committed to expanding the terminal, however if they wish to expand by way of a third tank, the terminal layout accounts for this. It remains unclear how storage capacity factors into the project's purpose and need, in addition to FERC's alternatives analysis as previously discussed. The applicant's own statements have indicated that storage capacity does not determine throughput (sendout) capacity.⁴ Therefore, the need to accommodate and reserve space for a future third tank appears questionable since the terminal is already designed to accommodate a peak sendout capacity of 1.3 billion cubic feet per day (Bcfd). As such, the subject of whether the project footprint has been minimized to the greatest degree practicable remains in question. The FEIS should clarify this topic and provide supporting rationale on how the project footprint has been minimized, perhaps through modeling various operating scenarios.

FA2-13

7. The factors that influence the volume of LNG vessel traffic remain unclear. Originally, during conversations with the applicant, it was stated that the addition of a third tank on site would likely correspond with an approximate 50 percent increase in LNG vessel traffic. More recently, the applicant has linked LNG vessel traffic to an average 40 percent operating

⁴ Letter from Dave Glessner (Bradwood Landing LLC) to Mitch Rohse (Clatsop County) regarding Bradwood Landing's Clatsop County permit (July 31, 2007).

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FA2-11

After the lifetime of the project, the maneuvering basin would be expected to fill in and downstream areas gradually return to general pre-project conditions over the long-term. Additional details regarding the hydrodynamic modeling can be found in Hydrodynamic and Sediment Transport Assessment, Bradwood Landing Liquefied Natural Gas Import Terminal Project by West Consultants, Inc. 2006, available on the FERC's eLibrary. This document is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (*i.e.*, CP06-365), and putting in the proper date range. As discussed in section 4.5.2.1, impacts on aquatic resources attributed to sediment transport and deposition may occur as a result of the proposed project. Additional analysis of potential impacts on salmonids from alterations of sediment transport and deposition will be included in the revised BA and EFH assessment.

FA2-12

See our response to PM1-27. Space for the third tank would be needed if the facility were to expand its sendout capacity beyond the currently proposed 1.3 Bcfd. We believe our discussion regarding minimization of the facility footprint is sufficient and modeling of various operating scenarios is not warranted.

FA2-13

The maximum number of annual LNG carrier trips proposed for the project is 125.

FA2-13
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capacity and throughput (sendout) capacity.⁵ First, an average has little meaning without identifying the range and period of measure. More importantly, limiting the volume of LNG delivered to the terminal and the amount of natural gas sent out from the terminal based on a 40 percent operating capacity seems unreasonable and contrary to the economic principles of a free market economy, which seek to maximize investor profits. Moreover, the proposed connection of the Palomar Pipeline to the Bradwood Landing LNG terminal would increase the terminal's sendout potential and is likely to result in an increase in sendout capacity. Therefore, it appears reasonable that LNG vessel traffic associated with the proposed terminal would increase above the 125 vessels per year stated in the DEIS. This fact should be accounted for in the FEIS.

FA2-14

8. In a related matter, FERC should clarify whether any increase in sendout or throughput capacity at any future point during terminal operations would likely require a corresponding increase in vaporizers and discharge of condensate. The DEIS indicates the terminal's nominal sendout rate is 1.0 Bcfd, and that the pipeline and vaporizers are sized to accommodate a peak sendout rate of 1.5 Bcfd and 1.3 Bcfd, respectively. The applicant has indicated that the existing proposed terminal footprint cannot be further reduced because all areas within the terminal are required for current operations.⁶ Given that comment, the FEIS needs to discuss where additional vaporizers would be accommodated on site to provide for an increase in the nominal or peak sendout rate above what is currently proposed and whether there are any environmental impacts associated with such an expansion.

FA2-15

9. FERC's Notice of Intent for the Palomar Pipeline project (PF07-13) indicates the proposed pipeline would terminate at NorthernStar Energy LLC's Bradwood Landing pipeline near Wauna, Oregon. But for the construction of the Bradwood Landing LNG import terminal, the Palomar project apparently would not be constructed as proposed (see DEIS 2.1.6). At a minimum, segment 2 of the Palomar project would appear interdependent on the Bradwood Landing LNG project. The 50 CFR 402.02, regulations which implement the ESA, define interrelated and interdependent effects. Interrelated actions are those that are "part of a larger action and depend on the larger action for their justification." Interdependent actions are those that "have no independent utility apart from the action under consideration." Segment 1 would achieve connection to NW Natural's regional distribution system and provide another natural gas source to the Portland Metro area. Extension of the pipeline to Bradwood Landing would have no utility independent of the proposed action. Extension of a bi-directional pipeline to the Mist Storage Facility would provide indirect access to Bradwood Landing LNG via a proposed lateral pipeline from NorthernStar's pipeline to Mist. Implementation of segment 2 fundamentally alters the Palomar Pipeline's operations from a LNG source for the Portland Metro area to a West Coast distribution network for Bradwood Landing LNG. FERC should include anticipated impacts of segment 2 of the Palomar Pipeline project in the FEIS.

10. FERC has attempted to address inadequacies in the applicant's proposed action and impact analysis by recommending in the DEIS that certain actions be taken by the applicant prior to various steps in the authorization or construction process. In several instances NMFS

⁵ *Ibid.*

⁶ *Ibid.*

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FA2-14

Any future expansion of the Bradwood Landing LNG terminal would require a separate authorization from the FERC along with the associated environmental review required under the NEPA. Any plans for future expansion are speculative. We are not considering the environmental impacts of a future expansion in this EIS.

FA2-15

We disagree that the Palomar pipeline is an interrelated action of the Bradwood Landing Project. The segment of the Palomar pipeline that would go to the Bradwood Landing LNG terminal is a small part of the project and its environmental impacts are being evaluated under the EIS for the Palomar pipeline. Furthermore, as described in comment letter CO4 by Northwest Natural, it is not possible for a new pipeline to directly connect to the Mist storage field. Our discussion of the Palomar pipeline has been revised in section 3.1.2.2.

believes these recommendations address critical information that must be provided before FERC's environmental impact analysis can be finalized and in some instances does not require the appropriate information. For example:

- FA2-16 a) The DEIS indicates that the applicant should continue to consult with the state and federal agencies to finalize the compensatory mitigation plan before beginning construction. NMFS views project mitigation as part of the applicant's proposed action. Consequently the impacts (beneficial and detrimental) of mitigation need to be analyzed in the EIS along with the impacts of other aspects of the proposed action. The FEIS should not be issued until the mitigation plan is complete.
- FA2-17 b) The DEIS indicates that the applicant should continue to develop a waterbody mitigation plan and that "the plan, including agency comments on the plan, should be filed with FERC for review and written approval by the Director of OEP [Office of Energy Projects] prior to the end of the draft EIS comment period." While NMFS has discussed this plan (in part) with the applicant during the DEIS comment period,⁷ NMFS is unaware of any coordination with other state and federal agencies on this topic. The applicant should present a final plan to the reviewing agencies and request written comment following adequate time for agency review before FERC issues the FEIS.
- FA2-18 c) The DEIS notes that the proposed terminal site may contain contaminated soils and recommends the applicant prepare a contaminated materials management plan (CMMP) prior to construction. While NMFS supports the development of a CMMP, FERC should also require a contaminant detection plan be developed and implemented prior to the FEIS to provide more definitive information about site contamination and allow FERC to evaluate the contaminant risk of project implementation. For example, would driving micro-piles for the LNG storage tank foundations result in soil contamination from puncturing a subsurface oil tank, or would vibro-floatation and increasing the overburden on site facilitate migration of existing soil contaminants to surface waters?
- FA2-19 d) The DEIS indicates that wake stranding of small fish is likely to result from LNG vessels transiting the lower Columbia River to Bradwood Landing and that FERC will provide additional analysis in the revised biological assessment. NMFS appreciates that FERC recognizes the DEIS analysis for this topic is inadequate and needs to be thoroughly assessed before formal consultation can be initiated. NMFS assumes FERC similarly recognizes the importance of including such impacts associated with the proposed project in the FEIS environmental and alternatives analyses.
- FA2-20 11. Under section 1.3.5 the DEIS neglects to acknowledge FERC and the other action agencies' ESA responsibilities and provides an overly narrow characterization of the U.S. Fish and Wildlife Service and NMFS' responsibility. NMFS suggests the following revisions: 1) Cite section 7(a)(1) of the Endangered Species Act to clarify the action agencies' responsibilities, and 2) revise text to read "...authorizing the Bradwood Landing Project may jeopardize the continued existence of or result in the destruction or adverse modification of designated critical habitat for any ESA-listed species" to clarify the purpose of the biological opinion.

⁷ The Waterbody Mitigation Plan was discussed during the November 5, 2007, conference call with NorthernStar and FERC, but the meeting time expired before NMFS could provide all its comments.

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- FA2-16 See our response to comment FA2-10. NorthernStar's Compensatory Mitigation Plan was not finalized in sufficient time for inclusion in this document. We believe the impacts from the mitigation plan will receive appropriate review through the recommended consultation process with federal and state resource agencies and through the course of the ESA formal consultation process. The NMFS request that the final EIS not be issued until the mitigation plan is complete is inconsistent with our statutory mandate of expeditious completion of FERC LNG project review.
- FA2-17 NorthernStar filed its Waterbody and Wetland Construction and Mitigation Procedures Plan with the FERC on December 21, 2007. This document is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e. CP06-365), and putting in the proper date range. However, the plan is currently being revised by NorthernStar based on discussions with the NMFS related to the BA and EFH Assessment for the project. Therefore, we have recommended in section 4.3.2.4 that NorthernStar continue to consult with the COE, NMFS, FWS, and other appropriate federal and state agencies to finalize its Waterbody and Wetland Construction and Mitigation Procedures Plan.
- FA2-18 Based on discussions between NMFS, the FERC, and NorthernStar related to the BA and EFH assessment, it is our understanding that NorthernStar is pursuing this issue further.
- FA2-19 Section 4.5.2.1 has been modified to include data from Entrix (2008), which used a process model approach for the Port of Vancouver in a wake stranding analysis to describe physical characteristics related to wake stranding such as bathymetry, LNG carrier size, carrier distance to shore, beach slope, and berm characteristics.
- According to the CEQ Guidelines for the preparation of an EIS, the level of effort in addressing potential impacts from project activities should be commensurate with the expected level of impact. Because the best available science does not currently provide a guideline for determining the number of fish which could be impacted, we believe that by recognizing LNG carriers transiting the lower Columbia River over the operation life of the LNG terminal are likely to result in the stranding of some sub-yearling fish, we have met this requirement.
- Further analysis and discussion of possible impacts on salmonids due to wake stranding will be in the revised BA and EFH Assessment.
- FA2-20 Section 1.3.5 of the final EIS has been modified in response to this comment.

- FA2-21** 12. The DEIS indicates the U.S. Coast Guard's issuance of a Letter of Recommendation would be based, in part, on the environmental impacts of LNG vessels transiting from open water to the terminal facility. NMFS believes these should include wake stranding of juvenile salmonids, bank erosion, introduction of invasive species through hull fouling, effective minimization of entrainment of juvenile salmonids from ballast water uptake, and impacts to water temperature from the discharge of engine cooling water. NMFS has repeatedly requested information on these potential impacts. This information is needed to allow an informed analysis of impacts to be completed for the preferred alternative. All analyses of this information should be included in the FEIS.

Coordination with natural resource agencies

- FA2-22** 13. In general, while the applicant and FERC have met regularly with NMFS since late August regarding NMFS' additional information letter for the biological assessment (May 11, 2007), coordination with state and federal natural resource agencies has been inconsistent and infrequent. This failure to utilize local expertise on such matters as fish distribution and stream habitat characteristics constitutes a failure to use the best available information in determining the environmental impacts of the preferred alternative. Since several aspects of the applicant's proposed action remain in development (*e.g.*, pipeline stream crossings, mitigation), better coordination with the resource agencies is needed before the FEIS is issued. Where coordination has occurred with NMFS, NMFS expects that the FEIS will reflect those discussions.
- FA2-23** 14. Section 2.8.2.2 indicates an emergency response plan (ERP) would be developed to address procedures to follow in the event of an emergency along the pipeline and section 4.12.5 states "... NorthernStar has agreed to develop, maintain, and continually improve an ERP in consultation with the U.S. Coast Guard and state and local agencies." Where implementation would not increase risk to life and property, the ERP should include response measures to minimize environmental impacts. These measures should be developed in consultation with NOAA staff³ and be incorporated prior to operation of the terminal.
- FA2-24** 15. In the Conclusions and Recommendations section, a statement indicates that "construction should not be allowed until after FERC has completed formal consultations under the ESA." This statement warrants clarification. NMFS expects consultation to be completed before FERC signs the record of decision for the preferred alternative. If this is not FERC's understanding of the Federal action under consultation, the agencies need to discuss this subject.

Fisheries

16. The EIS needs to more clearly describe how safety and security zones would impact traditional recreational and commercial fisheries in the project area. For example:

³ NOAA has specialized staff experienced in spill response and damage assessment.

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- FA2-21** Wake stranding is discussed in the response to comment FA2-19.

Section 4.5.1.1 has been revised to include additional information on shoreline erosion. Further analysis will be included in the revised BA and EFH Assessment.

Section 4.5.1.1 has been revised to include additional information on the potential for introduction of aquatic species to the lower Columbia River system.

Minimization measures to prevent entrainment of juvenile salmonids are discussed in the response to comment FA1-28.

- FA2-22** We disagree that the final EIS should not be issued before completion of the coordination process. We have had frequent consultations with federal and state natural resource agencies. Section 1.4 documents agency consultations. As shown in table 1.4-1, FERC staff met with various representatives of Oregon state natural resources agencies on 11 occasions between March 2005 and December 2006. In addition, Oregon state natural resource agencies have filed numerous comments in the record of this proceeding. We believe that there are ample requirements in place with the proposed mitigation measures and our additional recommended certificate conditions to ensure that all recovery coordination efforts are carried out to the satisfaction of all regulatory and designated advisory agencies prior to construction and/or operation of the facility if the Commission approves the project.

- FA2-23** See our response to comment PM1-1.

- FA2-24** See our responses to comments PM3-46 and PM6-94. The FERC intends to revise its BA after the final EIS is issued. We have recommended that the Commission Order include a condition that construction cannot begin until we have concluded formal consultations with the FWS and NMFS, and complied with section 7 of the ESA.

FA2-25 a) During the Buoy 10 fishing season (August-December) would fishers be required to modify their actions to honor safety and security zones? Previously, the applicant has stated it would limit inbound LNG vessel traffic to after-dark hours to reduce impact on the fishery, but the DEIS appears not to mention this measure.

FA2-26 b) Would ingress and egress of fishers from Clifton Channel be prevented or controlled due to the 200-yard fixed security zone at the terminal while the LNG vessel is moored? A figure illustrating the 200-yard security zone on a bathometric chart would aid in illustrating whether access issues exist.

Marine Mammal Protection Act

FA2-27a 17. FERC, through the DEIS, recommends that the applicant obtain an Incidental Harassment Authorization (IHA) from NMFS under the MMPA due to impacts on pinnipeds from terminal construction activities. In order to issue an IHA, NMFS will need to ensure that its NEPA responsibilities are met. NMFS may develop its own NEPA document or it may adopt another federal agency's NEPA analysis or portion thereof provided that the statement or portion thereof meets the standards for an adequate statement (40 C.F.R. 1506.3(a); see generally, section 1506.3 for the adoption process). In this particular case, it would appear that NMFS could, if and when it begins the MMPA process, rely on the FERC EIS if the document adequately: 1) Addressed NMFS' concerns with respect to marine mammals, 2) considered the scope of the MMPA process, and 3) addressed potential mitigation and monitoring measures. To facilitate the MMPA permitting process, should it be needed, NMFS recommends the FEIS provide a robust analysis related to the impacts on marine mammals and incorporate, to the extent possible, the information addressed in NMFS' regulations for IHA applications (50 C.F.R. § 216.104). FERC is encouraged to coordinate closely with NMFS on this matter prior to issuance of the FEIS. The following recommendations apply:

FA2-27b a) NMFS expects that the FEIS will reflect discussions between the agencies on the topic of marine mammals. Particularly, those topics raised during the September 25, 2007, conference call on marine mammals, which included delineation of the action area, acceptable methodologies for predicting the occurrence of marine mammal vessel strikes, and the impact of construction noise on pinnipeds.⁹

FA2-28 b) NMFS recommends FERC and applicant work with NMFS to develop a marine mammal monitoring plan that will satisfy NMFS' IHA needs. In part, the monitoring plan needs to address the qualifications of marine mammal observers, acceptable sighting conditions, and start-up and shut-down procedures. Note that interrupting pile driving to reduce marine mammal harassment may not be desirable for minimizing impacts to ESA-listed salmonids (e.g., increased exposure due to more total strikes).

FA2-29 c) NMFS recommends marine mammal avoidance measures associated with vessel operation be made a requirement.

⁹ Refer to notes of conference call at www.ferc.gov. Search docket number CP-06-365 for "Issuance 20071022-0138" filed October 18, 2007.

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FA2-25 The LNG ship traffic is expected to have impacts similar to other ship traffic relative to recreational and commercial fishing. The safety/security zone is an area to establish Coast Guard authority and should not be viewed as an area of exclusion. As such, restricting LNG ship transit to nighttime hours would not be necessary to reduce impacts during the Buoy 10 fishing season.

FA2-26 The 200-yard security zone at the LNG terminal while LNG ships are unloading would not block access to Clifton Channel for fishing. We have added a new figure to the EIS (see figure 4.8.1-7) that depicts the extent of the security zone at the LNG terminal.

FA2-27a Section 4.6.2 has been revised to include the additional information that has been developed through continuing coordination with the NMFS and NorthernStar relating to marine mammals. NorthernStar submitted additional information with the FERC relating to potential impacts on marine mammals on April 17, 2007. However, this information was not submitted at a date that allowed sufficient time for independent verification by FERC staff prior to inclusion in this document. Therefore, the final EIS does not contain the information addressed in the NMFS's regulations for IHA applications (50 CFR 216.104) and it will be generated as part of a separate NEPA process.

FA2-27b Sections 4.6.2.1 and 4.6.2.2 have been revised to reflect the September 25, 2007 conference call between the FERC and its third-party contractor, Coast Guard, NMFS, and NorthernStar.

FA2-28 NorthernStar has stated that it will consult with the NMFS and apply for an Incidental Harassment Authorization under the Marine Mammal Protection Act. We believe that the development of a mammal monitoring plan would be included as a requirement of the IHA application.

FA2-29 A recommendation has been added to section 4.6.2.1 that NorthernStar coordinate with the NMFS to determine appropriate speed and seasonal restrictions, or other applicable measures, to avoid or minimize impacts on whales.

Cumulative Impacts

FA2-30 18. As with several aspects of the DEIS, the Cumulative Impacts section makes poorly supported or unsupported statements and conclusions. For example, section 4.12.5 states that the “impacts on shipping associated with the safety and security zones for the LNG vessels would increase; however, these impacts would still be relatively minor.” First, this statement is in need of greater consideration and supporting information, particularly in terms of the other actions listed that would further increase vessel traffic in the affected waterway. Since this section addresses socioeconomic factors it would seem that a more robust economic assessment is warranted in the FEIS. Furthermore, to what does “relatively” refer and to what degree is this the appropriate approach to analyze the impacts of the preferred alternative and the action(s) identified in Table 4.12-1? The “historic” vessel traffic volume is not the appropriate context and does not provide any biological evaluation of impacts.

FA2-31 19. The cumulative impacts analysis on aquatic resources (*i.e.*, anadromous fish) is a single paragraph. This seems overly abbreviated. In the FEIS, FERC should include a more robust analysis that includes, for example, the cumulative impacts of increases in vessel traffic on wake stranding of juvenile salmonids, introduction of invasive species from hull fouling and ballast water discharge, and entrainment and impingement of biota by ballast/cooling water withdrawals.

General Comments

FA2-32 20. The proposed pipeline would terminate at the existing Williams Northwest Pipeline near Ostrander, Washington. NMFS did not note anywhere in the DEIS whether the Williams Northwest Pipeline Corporation has indicated they have available capacity to accommodate natural gas from the proposed NorthernStar pipeline without any modifications to their infrastructure. The FEIS should clearly address this topic, and consider any necessary modification to the Williams Northwest Pipeline in the Interrelated Activities section.

FA2-33 21. The status of government-to-government consultations or staff-to-staff discussions with potentially affected Tribes is unclear. NMFS is required to meet with the potentially affected tribes in the course of ESA section 7 consultation and the development of the biological opinion. A clear description in the FEIS of such consultations and meetings would assist NMFS in meeting its obligations to the tribes. NMFS is prepared to participate in such meetings to the degree the agency and tribes agree, and is appropriate.

FA2-34 22. NMFS recommends the applicant be required to hold a bond to ensure habitat impacts are fully restored or mitigated in the event of bankruptcy or abandonment. The NMFS wants assurance that in the event the applicant is unable or unwilling to complete the project as proposed, including full implementation of the mitigation plan in perpetuity, that the habitat lost at the terminal site would be restored (and enhanced to account for temporal inequity) or that mitigation would be fully implemented. Both restoration and mitigation would require significant funds to implement. A bond would ensure that the applicant would not walk

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FA2-30 We have revised section 4.12.5 relating to River Traffic, clarifying that even if both the Bradwood Landing and Oregon LNG were authorized, built, and operated, combined LNG carrier traffic in the waterway would only represent an increase of about 14 percent above current levels of commercial ship traffic, but would still not approach historic highs in past commercial ship traffic on the Columbia River.

FA2-31 There would be a very low likelihood that this project, combined with other LNG projects, would introduce invasive species from ballast water discharges because LNG carriers would not discharge ballast water in the waterway or at berth at the proposed terminals. There may be impacts on aquatic species resulting from ballast water intake, and we discuss NorthernStar's approach to this issue in section 4.5.2.1 of this EIS. We discuss the potential for wake stranding in section 4.5.1.1. Section 4.12.3 discusses cumulative impacts on aquatic species.

FA2-32 Section 1.0 has been revised to include a discussion of the Williams Northwest pipeline capacity to accommodate the natural gas from the Bradwood Landing pipeline without modifications to its infrastructure.

FA2-33 The status of government-to-government consultations between the FERC and appropriate Indian tribes is provided in section 4.9.3. See our response to comment FA1-1.

FA2-34 It is not FERC's practice to require posting of performance bonds as conditions in the EIS process. However, other regulatory bodies at the federal, state, and local levels could, if deemed necessary and appropriate, include performance bonds as conditions to their permits. NorthernStar has committed to Clatsop County that it would provide financial assurances in the form of a surety bond or letter of credit for an amount appropriate to cover the reasonable costs of decommissioning the facility.

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FA2-34 | away and leave the affected biota to continue to bear the burden of unmitigated impacts and
cont'd | the public to potentially bear the financial costs of restoration.

FA2-35 | 23. NMFS recommends the applicant be required to hold a bond to ensure adequate financial
resources are available to address environmental impacts resultant from a catastrophic event.
Large industrial facilities that handle hazardous materials and that operate for long periods of
time have a significant risk of experiencing a catastrophic event (*e.g.*, significant flood, fire,
hazardous material spill, vessel accident, pipeline leak). While FERC indicates the
possibility of a catastrophic event is small, the risk has been judged by FERC sufficiently
possible to warrant developing emergency response plans and the U.S. Coast Guard to
recommend additional emergency response capabilities be implemented. Often responses to
environmental damage are delayed while responsibility and funding are determined. A bond
would ensure that any environmental damage that may result from a catastrophic event due to
FERC's authorization of the proposed terminal and pipeline will be restored/mitigated
without delay.

FA2-35 | See our response to comment FA2-34.

K-357

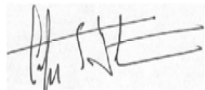
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Bradwood Landing LLC	)	FERC Project No. CP06-365-000
)	
NorthernStar Energy LLC	)	FERC Project Nos. CP06-366-000
	)	CP06-376-000
	)	CP06-377-000
)	
Application for Certificate	)	(Bradwood Landing Liquefied
	)	Natural Gas Terminal and
	)	Pipeline Project)
)	

CERTIFICATE OF SERVICE

I hereby certify that I have this day served, by electronic mail, a letter to Kimberly D. Bose, Federal Energy Regulatory Commission, from the National Oceanic and Atmospheric Administration regarding our response to the Commission's request for comments on the Draft Environmental Impact Statement and this Certificate of Service has been served by electronic mail or first class mail to each person designated on the official service list compiled by the Commission in the above-captioned proceeding.

Dated this 17th day of December, 2007.



Cathryn E. Tortorici, Branch Chief
Oregon Coast/Lower Columbia River
Oregon State Habitat Office
National Marine Fisheries Service
National Oceanic and Atmospheric Administration

Federal Agencies



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

December 19, 2007

Reply To
Attn Of: ETPA-088

Ref: 07-038-FRC

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St., NE, Room 1A
Washington, DC 20426

Docket No. CP06-365-000

Dear Ms. Bose:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the Bradwood Landing Project (CEQ No. 20070362). Our review has been conducted in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act.

The DEIS details the NorthernStar Energy, LLC proposal to construct and operate an LNG import terminal and storage facility, and an associated natural gas sendout pipeline. The facility would be located at the former townsite of Bradwood, Oregon, which is situated at Rivermile 38 on the Columbia River. Specific components of the project include a one berth marine facility capable of handling 125 LNG carrier ships per year; interconnecting facilities including piping, electrical, and control systems; two LNG storage tanks with a capacity of 160,000 cubic meters; vapor handling, re-gasification and sendout systems; utilities and other support systems, associated buildings and enclosures, and a 36-mile-long, 30 to 36-inch-diameter natural gas pipeline extending from the LNG terminal to the interconnection with the Williams Northwest Pipeline system north of Kelso, Washington.

The project would be located in an area of key ecological significance. The Lower Columbia River is a federally designated estuary of national significance under the Clean Water Act's National Estuary Program and the Columbia River was designated in 2006 as one of EPA's Priority Large Aquatic Ecosystems (one of seven in the country). This makes the Columbia River a national priority for addressing watershed health. In this context, EPA has identified concerns with the proposed project related to wetlands impacts and mitigation, impacts to air from diesel emissions, dredging, invasive species, ballast water intake, and horizontal directional drilling. In addition, we raise questions and offer recommendations relative to the DEIS development process. These comments focus on the alternatives analysis and incomplete information about interrelated projects. We have discussed these comments in detail in the enclosed attachment.

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In light of the concerns raised, we have given a rating of EC-2 (Environmental Concerns, Insufficient Information) to the DEIS. A copy of the rating system used in conducting our review is enclosed for your reference. EPA appreciates the opportunity to submit comments on the DEIS and we commend FERC for adopting an extended comment period on this project. EPA welcomes the chance to continue working with FERC as it completes the final EIS. If I can provide additional explanation of our comments please contact me at 206-553-1601, or Teresa Kubo of my staff at 503-326-2859.

Sincerely,

Christine B. Reichgott, Manager
NEPA Review Unit

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**EPA Region 10 Detailed Comments
Bradwood Landing Project
Draft Environmental Impact Statement**

Wetlands

FA3-1 The Bradwood Landing Mitigation Plan (August 1, 2007) indicates that construction of the LNG terminal facilities would result in permanent loss of about 12.8 acres of wetlands, while construction and operation of the pipeline would result in permanent impacts to 25.7 acres of wetland in Oregon (Table 3-1) and .25 acres of forested wetland in Washington (p. 81). In addition, project construction would permanently impact 1.8 acres of aquatic (nearshore and stream) habitat (Table 3-1). It should be noted that the number of wetland acres identified as potentially impacted in Table 3-1 are different from those identified elsewhere in the mitigation plan, and different from those numbers presented in the DEIS. It is not clear why this discrepancy exists, or why the permanent wetland impacts identified in Table 3-1 of the mitigation plan were not considered in the assessment of permanent impacts and compensatory mitigation credits (Table 2-15 of the mitigation plan).

FA3-2 The mitigation plan proposes to compensate for permanent wetland and waterway impacts (tidal and nontidal) by restoring tidal influence to 62 acres of diked pasture wetland on Middle Svensen Island. Due to the discrepancy in acreage totals noted above, EPA is concerned that while this project would add some ecological benefit to the overall system, it may not provide adequate compensation for all of the aquatic resources expected to be adversely affected by this project. If we apply the proposed ratio of three acres of enhancement to mitigate one acre of impact (p. 74 of the mitigation plan) to the acreage totals from Table 3-1, it would appear that a total of 122 acres should be enhanced. This would indicate that proposed mitigation on Middle Svensen Island falls nearly 60 acres short of overall restoration goals. We recommend that this discrepancy be addressed in the final EIS. If restoration goals are not met, we recommend that in-kind mitigation opportunities be explored within the watershed, or alternative off-site restoration or enhancement options be considered.

FA3-3 We recognize that NorthernStar also proposes to protect existing wetlands and habitat on Lower Svensen Island (170 acres) and Hunt Creek (61 acres). However, according to the wetland functional assessment performed on these sites, they are already functioning at a high level for a number of important wetland parameters. Because there is no indication that there are any potential threats to either Lower Svensen Island or the Hunt Creek estuary from additional development or future impairments under current land use restrictions, it is not clear that utilizing protection as a primary means for compensatory mitigation is warranted. While these sites are suitable conservation areas, there is limited restoration or enhancement potential to gain the necessary ecological lift that this project may require.

Air Quality

FA3-4 The DEIS states that emissions from the marine vessels are not expected to have significant air impacts since traffic would be periodic and transient. However, there may be impacts to local air quality that could be reduced with additional mitigation. Ships are anticipated to deliver LNG to the proposed terminal approximately 125 times per year, with each delivery lasting up to 24 hours. Hotelling emissions associated with on-board generators would be continuous during this period. This level of diesel particulate matter release could have adverse local effects. We recommend that the FEIS give additional consideration to the risks

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FA3-1 Permanent wetland impact calculations have been revised in sections 4.4.1.2 and 4.4.1.3.

As described in section 4.4.1.2, because NorthernStar's Compensatory Mitigation Plan has not been finalized, we have recommended that NorthernStar continue to consult with the COE, FWS, NMFS, ODSL, WDE, and other appropriate resource agencies to finalize its Compensatory Mitigation Plan. FERC will not issue the Notice to Proceed to NorthernStar until the final Compensatory Mitigation Plan, along with agency approvals, have been filed with the Secretary. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.

FA3-2 See our response to comment FA2-10.

FA3-3 NorthernStar described in its preliminary Mitigation Plan (filed August 3, 2007) that although protection and conservation are documented in regulations as an available tool for compensatory mitigation, this has not been accepted as a form of mitigation to date. Further, NorthernStar stated that the agencies advised not to pursue protection and conservation as a form of mitigation at this time. However, protection and conservation of existing functional high quality aquatic habitat areas is one of the highest recommended management actions (prioritized over habitat restoration) in the NMFS's Interim Regional Recovery Plan, as is the case in most species recovery plans.

Therefore, NorthernStar elected to include the lower Svensen Island and Hunt Creek Mitigation Sites in its Compensatory Mitigation Plan despite the fact that they are currently functioning at a high level for a number of important wetland parameters. NorthernStar indicated in its preliminary Mitigation Plan that despite the reduced compensatory credit it would receive for the lower Svensen Island and Hunt Creek Mitigation Sites, these sites would continue to provide mitigation in the general sense, as agreed to by the ODSL for impacts on "other waters." Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.

FA3-4 As documented in table 4.10.1.4 in the final EIS, the annual particulate matter estimated to be emitted from the hotelling LNG carriers is approximately 0.5 tons per year. Mitigation measures, such as cold ironing were evaluated and were found to not be technically practicable due to limitations in the electrical distribution grid. In addition, internationally flagged LNG carriers in general are not designed to accept shore power and would have to be specially built or retrofitted to accept it.

The diesel engines used during the construction would comply with all state and federal regulations, including the use of cleaner fuels. Additional measures would be employed such as requesting that idling be limited to short durations.

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FA3-4 posed by diesel particulate matter resulting from the project, and adopt measures to mitigate these emissions. Mitigation measures might include the use of shore-side electrical power (i.e. cold-ironing) for LNG vessels hotelling at the Port, use of cleaner fuels on all diesel engines, installing retrofit devices on all diesel engines, and reducing idling for all diesel engines at the facility during construction or operation.

FA3-5 Also, the emissions inventory for LNG ships, tugs, and security vessels (Table 4.10.1-4) raises a number of questions: (1) It is not clear what the period of record is for the air quality data reported; (2) it is not clear where the air quality measurements were recorded; and (3) it is not clear whether the air quality measurements presented in the table are representative of the conditions along the transit route and the terminal area. In order to demonstrate that the data used in the analysis is current, relevant and representative, we recommend that these questions be addressed in the FEIS.

FA3-6 In addition, we recommend that Table 4.10.1-4 include additional information to clarify potential impacts from SO₂. In particular, it is not clear if the emissions reported are one-way or round trip; and it is not clear whether the table represents the full possible spectrum of SO₂ emissions. According to the table, fuel has an assumed sulfur content of 2.7 weight percent (or approximately 27,000 parts per million - ppm). If fuels at other sulfur contents (lower or higher) are likely to be used, we recommend also including these results. The international sulfur limit for fuel oil used in ships is 45,000 ppm, which can emit large amounts of particle pollution when used.

FA3-7 Finally, we note that LNG contains small amounts of heavier hydrocarbons (propane, ethane and butane) which may need to be removed in order to meet the British Thermal Unit (BTU) and gas quality specifications of receiving entities. We recognize that the Bradwood facility would have systems in place to handle these "boil-off" gasses, but we also note that even though the imported gas may meet local specifications when distributed, the BTU content of that gas may still be greater than the BTU content of natural gas currently utilized throughout Oregon. Natural gas with a higher BTU content and/or higher Wobbe Index has the potential to increase NO_x, carbon monoxide (CO) and unburned hydrocarbon emissions. We therefore recommend that the FEIS include a discussion of the current BTU content normally found in Oregon's natural gas supply, and existing specifications. We also recommend that the FEIS discuss the potential impacts of increasing the BTU content of the gas supply, and address the applicant's commitment to provide a supply of natural gas within a specific quality range.

Dredging

FA3-8 NorthernStar proposes to pump up to about 350,000 cubic yards of dredged material to an existing upland settling basin at the Wahkiakum County Sand Pit site during construction. Dredge spoils from maintenance dredging (estimated at 80,000 cubic yards every two to four years) would also be placed at this site. Once drained, the sand would be moved from the settling basin and distributed by earthmoving equipment along the shoreline. As noted on page 3-57, the shoreline in this area is subject to a combination of ship wakes, wind, and tidal effects that are currently eroding sand from the river beach at a rapid rate. EPA is, therefore, concerned that these conditions may increase suspended sediments and turbidity in the vicinity of the dredged material placement site. The DEIS makes the assumption that because the dredged sediments would be of coarse grain size, the materials would rapidly settle out of the water (p. 4-71). However, the DEIS does not include a modeling run to verify this conclusion nor a monitoring

FA3-5 Table 4.10.1-4 documenting the emissions inventory for the marine vessels supporting the project has been updated and included in the final EIS. The emissions presented in the table represent total emissions from vessels (round trip) for 125 LNG carriers per year. It shows the annual emissions from the mouth of the Columbia River to the proposed terminal location and includes the emissions during LNG carrier transit as well as LNG offloading.

FA3-6 Emissions of SO₂ from the LNG carriers shown in table 4.10.1-4 have been updated to reflect a fuel sulfur content of 4.5 weight percent, the international sulfur limit, for ship main engines and generators in transit. In addition, clarifying information documenting the basis for the emissions estimates has been added to table 4.10.1-4.

FA3-7 The end use of the natural gas that would be transported from the Bradwood Landing Project is outside the scope of the project and, consequently, is outside the scope of this EIS.

The Commission issued its Policy Statement on Provisions Governing Gas Quality and Interchangeability in Interstate Natural Gas Company Tariffs (Policy Statement, PL04-3-000) in 2006. Consistent with the Policy Statement, NorthernStar must ensure that the regasified LNG it delivers to interconnecting pipelines meets the gas quality and interchangeability standards of the interconnecting pipelines' tariffs.

FA3-8 The Wahkiakum County Sand Pit site has previously been used successfully for dredge disposal and beach nourishment by the COE. It is an area of known erosion. Therefore we do not believe a modeling study is necessary for the EIS.

FA3-8 | plan to evaluate sediment grain size. Further, the fate and transport of this material is not known, and it is possible that the dredged material would be eroded and deposited in the navigation channel, resulting in an increased need for maintenance dredging. We recommend that modeling be done to evaluate potential turbidity and suspended sediment, that erosion potential be evaluated, that a monitoring plan be developed that includes grain size analysis, and that this information be included in the FEIS.

FA3-9 | In addition, we note that according to a 2006 estimate (p. 3-58), the Sand Pit site has capacity to accept 700,000 cubic yards of dredged material. If NorthernStar initially deposits up to 350,000 cubic yards of dredged material at this location during construction the LNG terminal, only 350,000 cubic yards of capacity would remain to accept materials generated through maintenance dredging. Assuming each maintenance cycle would generate 80,000 cubic yards, that capacity could be exceeded within four dredging cycles. We are concerned, therefore, that the proposed disposal site may not be able to accommodate all of the dredged material generated by the project over time. We recommend that the FEIS conduct the analysis necessary to identify a backup disposal site should one be required.

Invasive species

FA3-10 | Several species of highly aggressive noxious weeds occur in the project area, including Scotch broom, Himalayan blackberry, reed canary-grass, and purple loosestrife (p. 4-91). The DEIS indicates that these invasive species will be removed on the LNG facility site (p. 4-112), the Lower and Middle Svensen island mitigation site (p. 4-151), the Hunt Creek/Clifton Channel mitigation site (p. 4-153) and along the pipeline route (p. 4-117). We note, however, that removal methods are not discussed either in the DEIS, or the "Noxious Weeds and Soil-borne Plant Disease Control Plan" referenced on page 4-117. Page 4-112 indicates that invasive species affecting installed vegetation will be removed by hand, but this is clearly not a tenable solution at the project scale. The DEIS should clarify the applicant's intent in terms of addressing invasive species on the proposed construction and mitigation sites, and identify the control and eradication methods to be used. These methods should be analyzed in terms of their potential ecological impact, and ultimately incorporated into the referenced control plan (and included as an appendix to the FEIS).

FA3-11 | Aquatic invasive species are also of concern. Invasive species appear to be on the rise in the lower Columbia River. Recent reports indicate that 81 organisms, including fish, aquatic plants, crustaceans and worms have been introduced into the lower Columbia River since the mid 1880s (LCREP 2005). We recognize that no ballast water will be discharged into the Columbia River, however, some species can travel on the infrastructure of the vessel or can be discharged from other waste streams. It is unlikely that the rinsing of anchors and chains at the port of origin alone will be sufficient to adequately mitigate the risk caused by the transport and introduction of non-native species. We recommend that the EIS consider, discuss, and require further mitigation measures to adequately prevent the spread of invasive species to and from the Columbia River Estuary. We also recommend that the FEIS include an analysis comparing the physical environment (salinity, temperature) of the likely ports of origin with similar data for the Lower Columbia. If conditions are similar, the potential for impacts is greater. This comparison would assist the applicant in determining if there is any potential for introduction of new species.

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FA3-9 | Based on new information regarding the capacity of the Wahkiakum County Sand Pit site, it is no longer being considered as the only disposal option for maintenance dredging. However, an alternative site has not yet been identified.

FA3-10 | We agree that weed control methods proposed by NorthernStar should be identified. Therefore, we have included a recommendation in section 4.4.2.3 that NorthernStar continue to consult with the COE, FWS, NMFS Oregon and Washington Departments of Agriculture, and other appropriate resource agencies to revise its Noxious Weeds and Soil-borne Plant Disease Control Plan. The final Noxious Weeds and Soil-borne Disease Control Plan should be filed along with agency comments with the Secretary prior to pipeline construction. Noxious weed control methods will be analyzed in terms of their potential ecological impact in the revised BA and EFH Assessment. Directions for accessing NorthernStar's Noxious Weeds and Soil-borne Plant Disease Control Plan via the eLibrary can be found in the response to comment PM6-60.

FA3-11 | Additional information on the potential for the introduction of invasive species to the lower Columbia River through hull fouling has been added to section 4.5.1.1.

Ballast water screening

- FA3-12** The DEIS notes on page 4-66 that in any given year of operation, up to 6.3 billion gallons of water would be withdrawn from the Columbia River for LNG ship ballast and engine cooling while at the Bradwood Landing LNG terminal berth. Because this represents a significant entrainment and impingement risk to juvenile fish, NorthernStar proposes construct a system capable of delivering filtered water to the LNG ships. We applaud this measure, but note that use of this system currently would be completely voluntary. NorthernStar would offer contract incentives to the LNG suppliers to retrofit their vessels to connect with the wharf filtered water supply, but no indication is given as to how successful such incentives might be (or if such incentives have been used successfully in the past). This is a point of concern, particularly if LNG is to be purchased off the "spot market". The "spot market" is generally serviced by uncommitted ships (i.e. those not committed to long-term trades), which are unlikely to see any advantage to retrofitting. We recommend a licensing term that stipulates all carriers servicing the Bradwood Landing LNG terminal will have appropriate screening technology in place within five years.

Frac-Out Contingency Planning

- FA3-13** NorthernStar included a horizontal directional drill (HDD) Contingency Plan (Frac-out Plan) as part of its Application for Certificate of Public Convenience. EPA supports the response measures listed in the document, but we find that the plan lacks detail. Specifically, we recommend that the contingency plan address potential modes of failure and mitigation measures for each phase of the drilling process (pilot hole installation, reaming and swabbing, and pullback), as well as mitigation for frac-outs. This includes mitigation for frac-outs to water, marsh, and uplands. In addition, the contingency plan should identify design and construction measures that will be implemented to prevent frac-outs, and monitoring measures that will occur during drilling. EPA can provide working examples of detailed HDD contingency plans if this would be helpful. Finally, we recommend that the revised HDD Contingency Plan be included as an appendix to the FEIS.

Alternative Analysis - Siting Criteria

- FA3-14** Section 3.1.3 the DEIS examines proposed siting alternatives. In reviewing this section we are concerned that siting alternatives appear to be dismissed based on qualitative observations such as pipeline length. It would be beneficial to provide robust, quantitative siting criteria presented in comparative form that can be objectively evaluated. We recommend that the FEIS provide a more thorough and objective evaluation of the alternative facility locations based on a set of siting criteria including such factors as navigation security risk, environmental impact, zoning restrictions, local support, berth distance to people, berth distance to channel, access (channel depth, width), dredging requirements and visual impact.

Interrelated Activities - Palomar

- FA3-15** In section 2.2, the DEIS identifies nonjurisdictional facilities and interrelated activities. These include electric transmission facilities and three lateral pipelines. The document goes on to correctly note that although these facilities are not regulated by the FERC, they are related to the project and their potential environmental impacts should be considered in this EIS. Since the publication of the DEIS, a fourth potential lateral pipeline has been proposed. The Palomar pipeline is proposing to interconnect with the Bradwood Landing pipeline near Wauna. Because this pipeline, similar to the other three lateral pipelines, would be an interrelated activity, its environmental impacts should be considered, and included in the FEIS.

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- FA3-12** See our response to comment PM1-31.

- FA3-13** NorthernStar's HDD Contingency Plan is too voluminous to include as an appendix to the final EIS, but was filed as part of its Application for Public Convenience and Necessity (Application). NorthernStar included its revised HDD Contingency Plan (Frac-out Plan) as Attachment B of its Waterbody and Wetland Construction and Mitigation Procedures Plan. Directions for accessing NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan via the eLibrary can be found in the response to comment FA2-17.

NorthernStar's HDD Contingency Plan adequately addresses potential modes of failure for each phase of the drilling process as well as mitigation measures for frac-outs to waterbodies and wetlands. However, mitigation measures for frac-outs to uplands are not addressed by the HDD Contingency Plan. Therefore, we have added a recommendation in section 4.3.2.4 that NorthernStar revise its HDD Contingency Plan to include mitigation measures for frac-outs to uplands. Nonetheless, the FERC staff, and surely NorthernStar as well, would be interested in reviewing the EPA's "working examples of detailed HDD contingency plans." Please send copies of the referenced plans to the FERC staff and NorthernStar.

- FA3-14** We consider pipeline length to be a quantitative factor not qualitative and generally a reasonable predictor of environmental impacts, among other factors. Typically, for any given physiographic terrain the longer the pipeline, the more impacts are expected. Section 3.1.5.3 provides a list of the criteria we used during our evaluation process, including navigation in the waterway, population density, special interest areas, dredging, site availability, terminal size, land use, and other factors. The FERC does not choose the "best" environmental site from among competing regional locations, but rather analyzes each filed project individually on its own merits. See also our responses to comments PM2-23, PM2-27, PM2-29, and PM2-31.

- FA3-15** See our response to comment FA2-15.



United States Department of the Interior

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ER07/736

Electronically Filed

December 21, 2007

Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

Subject: COMMENTS – Review of the Draft Environmental Impact Statement for the
Proposed Bradwood Landing LNG Terminal and Pipeline Project, FERC No.
CP06-365-000 et al., Clatsop and Columbia Counties, Oregon and Cowlitz
County, Washington

Dear Ms. Bose:

The Department of the Interior (Department) has reviewed the Federal Energy Regulatory Commission's (Commission) Draft Environmental Impact Statement (DEIS) for the proposed Bradwood Landing Project (Project). The Department offers the following comments for use in developing the Final Environmental Impact Statement (FEIS) for the project.

GENERAL COMMENTS

FA4-1

The proposed Project is one of several LNG terminals and pipelines being proposed simultaneously in Oregon. These projects include the proposed Palomar Pipeline Project (FERC Docket No. PF07-13-000), the proposed Oregon Liquefied Natural Gas Terminal and Pipeline Project (FERC Docket No. PF07-10-000), and the proposed Jordan Cove Liquefied Natural Gas Terminal and Pacific Connector Gas Pipeline (FERC No. CP07-441-000 and CP07-444-000). Each of the proposed LNG and pipeline projects is being developed and evaluated by the Commission through separate but simultaneous regulatory review and permitting processes. The Department is concerned that the Commission is proceeding with the certification of multiple projects without an adequate assessment of the regional demand for LNG and natural gas supplies, and a determination whether that demand is sufficient to justify the need to construct all of the LNG terminals and associated pipelines that are currently proposed for the State of Oregon. Rather than proceeding piecemeal, the Commission should

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FA4-1

See our response to comment PM2-32. The issue of regional planning was also raised by Governor Kulongoski in a letter to the FERC dated February 14, 2008, that Chairman Kelliher responded to on April 2, 2008. The Chairman's letter read in part: "The Commission's policy is to ensure that all proposed projects are environmentally sound and consistent with public safety, and then leave it to the market to determine which projects are constructed. To protect the environment and ensure safety, each individual project must be evaluated on the basis of its site-specific impacts. We therefore review applications for gas projects as they are filed, based on their individual merits." Section 1.1 offers a brief summary about the project purpose and need. The Commission would make its determination of project need in its Order.

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FA4-1 | conduct a comprehensive review of all the current proposals with the intent of identifying the one project or projects most capable of meeting the regional demand with the least socioeconomic and environmental damage. At the very least, the Commission's environmental review should address comprehensively all of the terminal and pipeline proposals that are clearly interrelated and dependent on one another.

FA4-2 | For example, recent applications and the Commission filings related to the Palomar Pipeline Project (FERC Docket No. PF07-13-000) clearly demonstrate that the Palomar Pipeline Project is related to the Bradwood Landing Project. In addition, on June 26, 2007, the Gas Transmission Northwest (GTN) submitted a right-of-way application to the Bureau of Land Management (BLM) for the construction, operation, maintenance, and termination of a 220-mile 36-inch pipeline over public land in the Prineville and Salem BLM districts and the Mt. Hood National Forest. This application, titled the Palomar Pipeline Project, identified the pipeline terminus as a proposed Liquefied Natural Gas terminal near Bradwood, Oregon. The Bradwood Landing DEIS currently under review variously describes the Palomar Pipeline Project as "would potentially connect with the proposed Bradwood Landing Liquefied Natural Gas Terminal" (pg 4-446) and "would bring Canadian and Rocky Mountain gas to the Portland metropolitan area" (pg 5-17). According to the DEIS, only two LNG storage tanks would be constructed at Bradwood Landing; however, all of the figures of the LNG terminal and site presented in the DEIS display three LNG storage tanks. The Palomar Pipeline Project, with its increased natural gas sendout capacity, necessitates the third storage tank. Based on the above information the third tank depicted in the DEIS d clearly demonstrates that the Palomar Pipeline Project is a connected action and must be analyzed in conjunction with the Bradwood Landing Project. At a minimum In assessing the larger, interconnected Bradwood Landing and Palomar projects, the Commission should consider the cumulative impacts of construction and operation of three LNG storage tanks, closely evaluate how increased shipping traffic would affect the aquatic and shoreline environment in the Columbia River and estuary, and include an assessment of impacts along the 200+ mile Palomar Pipeline alignment, including impacts to high quality old growth forest habitat.

FA4-3 | Recent filings with FERC and the Notice of Intent to Prepare an Environmental Assessment for the Proposed Oregon Liquefied Natural Gas Terminal and Pipeline Project and the Jordan Cove Liquefied Natural Gas Terminal and Pacific Connector Gas Pipeline should also be considered. Both of these projects are noted by the Bradwood Landing DEIS but not considered in detail as viable alternatives based on the unsupported conclusion that "on initial consideration they do not appear to be environmentally superior to the Bradwood Landing Project because of the greater length of the sendout pipelines." The Department believes that this conclusion is not warranted without more substantive analysis.

The proposed pipeline route the Oregon Liquefied Natural Gas Project, closely parallels the proposed route for the Palomar Pipeline Project from the four corners intersection of Clatsop, Columbia, Tillamook, and Washington Counties to Molalla, Oregon. Based on this information Oregon Liquefied Natural Gas meets the same purpose and need as the Palomar Pipeline Project for a portion of the project; thus, it must be considered a reasonable alternative for transmission of gas across the Willamette Valley to the Williams Pipeline near Molalla, Oregon.

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FA4-2 See our responses to comments PM1-24 and PM2-15. The outline of a third LNG storage tank is depicted in site maps for the LNG terminal but, as clearly described in the text, only two LNG storage tanks are proposed at this time. Space for a third tank was included in the terminal design to allow for possible expansion in the future, which would require a separate environmental review and approval process.

FA4-3 The Oregon LNG Project and Jordan Cove LNG Project are discussed in section 3.1.3.4. These projects have proposed sendout pipelines that are much longer than the proposed Bradwood Landing pipeline, with associated environmental impacts.

FA4-3 | As demonstrated by the above information and other publicly available information, the proposed Palomar Pipeline Project and proposed Oregon Liquefied Natural Gas Terminal and Pipeline Project cannot reasonably be deemed speculative and must be included in the analysis of the Bradwood Landing Liquefied Natural Gas Terminal and Pipeline as reasonably foreseeable and interconnected activities. FERC reliance on independent environmental reviews of these projects prevents comprehensive decision making on energy policy in the region. Decision making is best served by analyzing these three projects in light of each other given that they meet similar and overlapping purposes and needs.

cont'd

Wildlife Resources

FA4-4 | The Project LNG terminal would be constructed at Columbia River RM 38, and LNG vessels would traverse the Columbia River estuary and lower river to access the LNG terminal. The Julia Butler Hansen National Wildlife Refuge (JBHNR) and the Lewis and Clark National Wildlife Refuge (LCNWR) have lands in the vicinity of the proposed Project and along the LNG vessel transport routes. The JBHNR extends from approximately RM 33.5 to RM 39 along the Columbia River, and includes the Hunting Islands and Price Island in Washington, and Tenasillahe Island, portions of Crims Island, Wallace Island, and several other small mainland parcels in Oregon. The JBHNR was established in 1972, specifically to protect and manage the federally-listed endangered Columbian White-Tailed Deer (CWTD), and now encompasses approximately 6,100 acres. The JBHNR staff actively seeks to lead CWTD recovery efforts, within the JBHNR, as well as on private lands along the lower Columbia River.

The LCNWR was established in 1971 to preserve wetland habitats in the lower Columbia River estuary and serve as a wintering area for migratory waterfowl and shorebirds. The LCNWR boundary encompasses 35,000 acres of tidelands and open water, including 8,313 acres of islands and sandbars between RMs 18.5 and 35 in the Columbia River. Both Refuges are part of the Willapa National Wildlife Refuge Complex. The Project, including the terminal, pipeline, and LNG vessel route, clearly is located within or adjacent to these Refuge lands, and could negatively influence Refuge management and recovery activities on Refuge and adjacent private lands.

FA4-5 | The proposed pipeline (DEIS Appendix B) would pass through approximately 15 miles of CWTD habitat (from pipeline mile 4 to mile 19). There would be considerable disturbance to the CWTD during pipeline and terminal construction. It is likely that CWTD would temporarily abandon areas within about 1,000 feet of active work sites. Abandonment of project work areas by CWTD during the fawning season of June 1 to July 15 is likely to cause adverse effects to any fawns occurring within that zone. During the first 2-4 weeks of life, fawns rely entirely on remaining motionless and hidden to avoid predators. Thus, they are vulnerable to being crushed by construction vehicles. Further, CWTD fawns need to nurse 5-6 times per day. Fawns hidden near project construction sites would not likely be nursed for the entire length of time each day that construction activities occurred, negatively affecting CWTD fawn survival. The DEIS states that the construction period for the pipeline would be March to September, with the caveat that ground-disturbing activities in suitable CWTD habitat would be scheduled outside the fawning season, "where possible". The pipeline route between mile 4 and

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FA4-4 Additional analysis of potential impacts on the JBHNR and LCNWR due to the transit of LNG vessels along the waterway has been added to section 4.5.1.3. In addition, impacts on the JBHNR and LCNWR due to construction and operation of the LNG terminal are discussed in section 4.5.1.6.

FA4-5 Section 4.6.2.3 has been revised to include additional discussion of the potential impacts on Columbian white-tailed deer from construction of the proposed pipeline. In addition, a condition has been added stating that pipeline construction activities should not occur within potential habitat for Columbian white-tailed deer (MPs 4 to 19) between June 1 and July 15.

FA4-5 | mile 19 is all suitable CWT habitat. The Department recommends that pipeline construction activities of any kind not occur between mile 4 and mile 19 during the period June 1 – July 15. This should be included in the FEIS.

FA4-6 | The Bradwood Landing terminal and storage tanks would occupy the narrow strip of bottomland habitat that separates the Columbia River from the conifer-forested hills of the Coast Range. This narrow strip is CWT habitat and likely serves as a travel corridor for deer moving from the Wauna/Westport area to Tenasillahe Island and/or Brownsmead, and vice versa. Deer moving between Tenasillahe and Puget Islands might also use this corridor. Such movements between subpopulations may be infrequent but are important in maintaining gene flow in the population. Each existing CWT subpopulation is small (<200 individuals) and at risk of inbreeding depression unless there is occasional genetic exchange with other CWT subpopulations. It is likely that during the three-year construction phase, CWT migration in this corridor would be completely excluded from the terminal area due to the high level of human disturbance expected with a large, industrial construction project. Operation of the Bradwood Landing terminal facility, with its surrounding fences and round-the-clock activities, may block or interfere with CWT movements between CWT subpopulations. This could have serious long-term consequences for the genetic fitness of the affected CWT subpopulations, especially the Tenasillahe Island subpopulation. For the above reasons, as proposed, the Project is likely to adversely affect the CWT. On that basis, the Commission needs to request formal consultation on this proposed action in accordance with the requirements of section 7 of the Endangered Species Act (ESA).

FA4-7 | Further, the DEIS states (page 4-329, first paragraph) that a 200-yard fixed security zone would be established when an LNG vessel is moored at the Bradwood Landing Terminal. The Bradwood Landing terminal is adjacent to the Clifton Channel, which is also the access point that JBHNR personnel and barged equipment must use to travel back and forth to the JBHNR's Tenasillahe Island southern docking facility. Although the paragraph goes on to say that non-LNG vessels would be routinely allowed to transit the safety/security zone based on a case-by-case assessment conducted on scene, it is unclear from the description whether the security zone would encompass the entire Clifton channel or only a portion of the channel, or whether the main Columbia River ship channel would be included in the safety/security zone restrictions. Because Tenasillahe Island contains one of only three secure subpopulations of the federally endangered CWT, and active management of CWT is a main priority for JBHNR, it is imperative that overwater access to Tenasillahe Island not be restricted.

FA4-8 | Project-related impacts are generally identified and analyzed only for areas within the project's physical footprint. However, project-related impacts to the aquatic and terrestrial environment would extend out from the project footprint. For instance, aquatic impacts at stream crossings would not be limited to the footprint of the crossing only, but would occur both up-and-downstream from the site and into the riparian/terrestrial habitats adjacent to the stream crossing. Additionally, pipeline construction activities will have impacts to habitats that occur adjacent to and beyond the pipeline construction corridor. These impacts include loss of large wood, loss of thermal shading, modification of surface and sub-surface hydrology, and sediment transport and erosion. Within forested habitat, the pipeline corridor would create permanent

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FA4-6 Additional information relating to the potential impacts on Columbian white-tailed deer movement and gene flow due to construction and operation of the LNG terminal has been added to section 4.6.2.2. In compliance with section 7 of the ESA and the MSA, the FERC staff prepared a BA and EFH Assessment for the Bradwood Landing Project and submitted it to the FWS and NMFS in March 2007. Based on comments from the FWS and NMFS, the FERC staff is currently revising the BA and EFH Assessment and will resubmit the BA and EFH Assessment to the agencies with a request to initiate formal consultation.

FA4-7 Overwater access to Tenasillahe Island would not be restricted. We have added a new figure to the EIS (see figure 4.8.1-1) that depicts the extent of the security zone at the LNG terminal.

FA4-8 We believe that the impacts of the project, both direct and indirect are adequately addressed in the EIS. Assurance of mitigation for project impacts is discussed in the response to comment FA2-10.

FA4-8 | edge habitat and reduce the amount of interior habitat. The impact of “edge effects” on habitat quality would extend approximately 200 feet or more, depending on the habitat affected.

cont’d

Accordingly, the FEIS should include additional analysis of all Project construction sites (pipeline, access roads, temporary extra workspaces, etc.) to determine where riparian and aquatic habitats occur within approximately 200 feet of pipeline construction activities. The FERC should assess the amount of adjacent habitat directly and indirectly affected by construction activities, include this acreage when considering appropriate mitigation requirements, and ensure that all adverse effects from construction activities are fully mitigated.

FA4-9 | The Project mitigation plan should include compensation for impacts to individuals of ESA listed and non-listed terrestrial and aquatic species, and their future offspring, from project construction and operations effects. An example of how to assess and compensate for project-related direct and indirect impacts to individuals of a species is the Habitat Equivalency Analysis, widely used in Natural Resource Damage Assessment.

FA4-10 | Should blasting be required during construction of the terminal or the pipeline, species-specific work windows should be observed. Any additional disturbance-related effects from blasting should be further analyzed and potential impacts to trust resources, particularly threatened and endangered species, should be considered. Blasting can have adverse effects up to one mile from the blast site. The potential effects to listed species from blasting will need to be evaluated and considered in the Commission’s biological assessment and final environmental document.

FA4-11 | In addition the JBHNR and LCNWR are of vital interest to the National Park Service (NPS) as they further the mission of the Lewis and Clark National Historic Trail to preserve and maintain the visual, educational, natural, and recreational resources along the Lewis and Clark National Historic Trail.

Fish Resources

FA4-12 | As currently described in the DEIS (pages 4-242 to 4-246), the proposed Salmon Enhancement Initiative (SEI) lacks the level of specificity required to adequately evaluate its potential effectiveness. With no specific details about the nature of future SEI projects, it is extremely difficult to assess project benefits or impacts. Further, because the DEIS indicates that FERC has no authority to implement the SEI; there are no assurances that the SEI would be implemented. It is therefore unclear how to evaluate the SEI in either the context of the National Environmental Protection Act (NEPA) or the ESA.

As described on Pages 2-32 and 4-242, the SEI, would be...”entirely voluntary, but in addition to other mitigation measures used to avoid, minimize, rectify, reduce, and/or compensate for environmental impacts that are required by the regulations.” Page 2-32 additionally indicates “The long-term implementation of this voluntary SEI *is outside of FERC’s regulatory authority*” (emphasis added). The final environmental impact statement should identify the authority, including the specific language, which controls the Commission’s inability to implement a voluntary conservation program, such as the SEI, as part of an LNG certification. On Page 4-243, the DEIS states “The primary purpose of SEI projects would be the recovery of

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FA4-9 | See our response to comment FA2-10.

FA4-10 | Section 4.5.2.3 has been revised to include a recommendation that NorthernStar consult with the NMFS, FWS, ODFW, and other appropriate agencies while developing its Blasting Management Plan, which should be filed with the Secretary prior to construction.

FA4-11 | The LCNHP is discussed in sections 4.7.1.4 and 4.9.1 of the EIS. Two elements of the LCNHP, Cape Disappointment State Park (including the Lewis and Clark Interpretive Center) and Fort Stevens State Park are overlapped by the Zones of Concern for LNG marine traffic in the waterway to the Bradwood Landing terminal (see figure 4.7.1.1). Station Camp, Dismal Nitch, Fort Columbia, Fort Clatsop, Netul Landing, and the other elements that comprise the LCNHP are located outside of the Zones of Concern and would not be affected by the project. As stated in the EIS, given the measures to be implemented by NorthernStar and the Coast Guard under the conditions of its WSR, we believe there is little potential for an LNG spill that could have an adverse effect on the LCNHP. Nor do we believe that the project would have any significant adverse visual impacts on the LCNHP and visitors to the park elements. LNG carriers traversing along the waterway to and from the Bradwood Landing LNG terminal would represent only a 7 percent increase in commercial ship traffic on the lower Columbia River. The LNG carriers would be visible to users of the various elements of the LCNHP along the shore of the waterway for several minutes at a time.

FA4-12 | NorthernStar’s SEI is not a part of the compensatory mitigation for unavoidable impacts associated with the project. The SEI is being offered over and above the regulatory requirements from multiple agencies to provide mitigation (including measures to avoid, minimize, and compensate) for impacts on salmonids and their habitats as a result of the Bradwood Landing Project.

While voluntary, NorthernStar considers the SEI an integral part of the project proposal. NorthernStar indicated that multiple agencies would make the SEI a required component of the project through their permits. Furthermore, NorthernStar stated that it is developing a memorandum of agreement addressing the binding nature of the SEI.

FA4-12 cont'd ESA-listed salmon and steelhead stocks as well as the general ecological enhancement of the lower Columbia River ecosystem.” This statement is very consistent with Section 7(a)(1) of the ESA, which directs *all* Federal agencies to utilize their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of species listed pursuant to the ESA. The Department supports the development of programs to conserve listed species, and recommends that in both the final environmental impact statement and any pending biological assessment that the SEI be proposed by the Commission as part of the Project Description, and that the Commission clearly retain discretion to ensure successful implementation of the SEI. Recreation and Aesthetic Resources

FA4-13 Potential impacts on essential fish habitat (EFH), especially for salmonids, may occur from a number of activities during construction and operation of the Project. These include habitat modification or loss from dredging, placement of fill, bank stabilization, removal of shoreline vegetation, waterway crossings for pipelines and conduits, removal of riparian vegetation, channel realignment, and construction of docks and piers. In particular, converting 46.1 acres from an Aquatic Conservation Zone (AC-2) to Aquatic Development (AD) to permit dredging for a turning basin may eliminate EFH not readily replaced in the same reach of the Columbia River. It is also in conflict with an Oregon state-wide planning goal to protect estuarine resources. Actions within AC-2 zones should conserve, protect, maintain or enhance natural resources, and not cause major alterations to the estuary. Habitat enhancement at river sites some distance from Bradwood Landing, and offered as mitigation, are not sufficient mitigation measures for dredging in a conservation zone. Impacts to EFH, due to construction activities, need to be comprehensively analyzed in the FEIS. Additional mitigation for impacts due to dredging in the conservation zone should also be included in the FEIS.

Water Resources

FA4-14 The DEIS states (page 4-131, paragraphs two and three under the JBHNWR and LCNWR) that “potential impacts resulting from LNG marine traffic associated with the proposed project would be limited to increased shoreline erosion and an accidental or intentional release of LNG during transit of the LNG vessels.” While erosion of undiked islands of the LCNWR is a concern, erosion of dikes on the mainland and Tenasillahe Island Units of the JBHNWR, which protect sensitive CWTd habitat from the adjacent river flooding, could potentially cause serious problems to JBHNWR habitat over time. In light of this, the Department recommends additional analysis to determine what the extent of the erosion problem could be from LNG tankers to the JBHNWR dikes, and identify mitigation measures to be instituted to stop the erosion should the problem become serious enough. If an accidental or intentional release of LNG were to occur, it could cause serious impacts to the habitat and wildlife of JBHNWR and LCNWR, with Tenasillahe Island and the Mainland Refuge Unit being especially vulnerable to adverse effects. An LNG release and subsequent fire could potentially cause the loss of an entire sub-population of CWTd

FA4-15

FA4-16 The DEIS does not adequately evaluate the impacts associated with annually withdrawing 6.3 billion gallons of water from the Columbia River for LNG vessel ballast and engine cooling water. For instance, the applicant proposes contract incentives to LNG ships outfitted with

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FA4-13 Potential impacts on EFH are summarized in sections 4.5.1.2, 4.5.2.2, and 4.5.3.2. In addition, sections 4.5.1.1, 4.5.2.1, and 4.5.3.1 discuss the potential impacts of the proposed project on aquatic resources (which include EFH). Because the EIS is a summary document, we feel that the analysis provided on EFH adequately meets NEPA requirements. However, a comprehensive analysis of potential impacts on EFH due to the Bradwood Landing Project will be included in the revised BA and EFH Assessment.

The adequacy of the Compensatory Mitigation Plan is discussed in the response to comment FA2-10. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.

FA4-14 As discussed in section 4.1.2.3, the potential impacts of LNG carriers on shoreline erosion along the LNG marine waterway are undergoing review and will be addressed in further detail in the BA.

FA4-15 Section 4.5.1.3 has been revised to reflect potential impacts on the JBHNWR and LCNWR due to an accidental or intentional release of LNG along the waterway for LNG marine traffic.

FA4-16 Potential impacts on aquatic resources due to water intake for ballast and engine cooling are discussed in section 4.5.2.1. See also our response to PM1-31. Section 4.5.2.1 has been revised to include a discussion of the potential impacts on aquatic resources in the event that the screened water supply system would not be functional or would not be used for a period of time at the LNG terminal. Additional information on the potential for the introduction of invasive species to the lower Columbia River through hull fouling has been added to section 4.5.1.1.

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FA4-16 appropriate screening to ensure fish and other aquatic organisms are not entrained into an LNG vessel, or unwanted organisms are not introduced from ballast water outflow. There are no assurances, however, that appropriate ballast water management, including screening, would be a requirement for LNG ships berthing at the Bradwood Landing facility. The FERC should evaluate the potential impact to the aquatic environment, particularly to anadromous salmonids and lamprey species that would occur absent the screening system, as well as the potential for the introduction of nuisance species from ballast water from LNG vessels, and from nonnative species associated with vessel fouling.

FA4-17 To minimize the potential of spreading noxious weeds, the applicant should be required to power-wash all construction equipment at a self-contained site before being transported to and/or from the construction right-of-way. This should be further analyzed in the FEIS.

FA4-18 Lewis and Clark National Historical Park (Lewis and Clark NHP) is located within the lower Columbia River Estuary and has lands within the Young's Bay watershed, along the Oregon Coast south of the south jetty, and along the headlands of the southern Washington Coast near the north jetty. The NPS is concerned about the increased potential for spills with the significantly additional vessel traffic, and the tremendous ecological effects that could occur with a spill. Analysis of this increased threat from oil spills and appropriate mitigation should be included in the FEIS.

Recreation Resources

Lewis and Clark National Historic Trail

Background

The Lewis and Clark National Historic Trail (NHT), defined as the outbound and return route of the 1804-1806 Corps of Discovery Expedition, was authorized in a 1978 amendment to the National Historic Trails Act, with administrative responsibility assigned to the NPS. In authorizing the NHT, NPS was not given ownership of lands along the route. Rather, administrative responsibilities are carried out through partnerships with federal, state and local agencies, as well as private or non-profit entities that own and manage lands that contribute to the NHT mission. As part of this collaborative approach, the NPS trail administrators might advocate on the behalf of partners in issues that may adversely affect cultural, natural, recreational, educational or visual resources on or adjacent to the NHT, or in actions that may adversely affect human health and safety proximate to the NHT.

In western Oregon and Washington, the NHT follows both the historic and contemporary course of the Columbia River, and related terrestrial sites used by the Corps of Discovery during fall and winter 1805-1806. In Clatsop County, Oregon and Wahkiakum County, Washington, partners with missions and responsibilities that support or enhance the public's enjoyment of the NHT include Lewis and Clark National Historical Park, U.S. Fish and Wildlife Service Lewis and Clark Wildlife Refuge and Julie Baker Hanson Refuge for the Columbian Whitetail Deer, and Clatsop State Forest. In particular, Lewis and Clark National Historical Park includes NPS sites at Station Camp and Dismal Nitch on the Washington shore, in addition to Fort Clatsop

FA4-17 See our response to comment FA3-10.

FA4-18 As discussed in section 4.3.2.2, fuel on each ship is protected by the vessel's double hull. Furthermore, each LNG ship would maintain a SOPEP as required by international convention. The SOPEP would comply with MARPOL [marine pollution] 73/78 Consolidated Edition 2002 Annex 1 Regulation 26, which requires every oil tanker of 150 tons gross and above, and every ship of 400 tons gross and above to carry an approved SOPEP.

and Neutel Landing in Oregon. This national park now also administratively subsumes the state park areas bordering the Columbia River Estuary, specifically Fort Stevens (Oregon), Cape Disappointment (Washington) and Fort Columbia (Washington) State Parks. Please note that Fort Columbia and Cape Disappointment State Parks also receive separate protection under the Land and Water Conservation Fund Act (see below).

As units of the National Park System, the Lewis and Clark National Historic Trail and Lewis and Clark National Historical Park are held to the standards set in the 1916 Organic Act to: "...conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." (16 U.S.C. § 1)

It is the goal of the NHT administration to maintain the visual, educational, natural, recreational and cultural resources along the NHT in the conditions observed by the Corps of Discovery 200 years ago. Clearly, many sections of the NHT have already been greatly altered by modern development. This does not mean that further development and use in these sections are acceptable without carefully considering the impacts and alternatives. There are several aspects of the proposed Bradwood Landing Project that have the potential to adversely impact resources important to the integrity, use and enjoyment of the NHT.

FA4-19 Under the Outdoor Recreation Act of 1963, the Secretary of the Interior is directed to provide technical assistance to states, local governments and private interests to promote the conservation and utilization of recreation resources. The NPS provided community assistance to the Lower Columbia River Water Trail—a 146-mile water trail from Bonneville Dam to the Pacific Ocean that people in non-motorized boats can safely travel for day or overnight explorations. There are multiple launch points and campsites along the river. We are concerned with the direct and indirect impacts that heavy shipping traffic and the terminal site will have on the water trail's recreational experience.

FA4-20 The DEIS (page 4-277 under the heading of the Julia Butler Hansen National Wildlife Refuge) states that "JBHNWR has no developed recreational facilities." That statement is incorrect. The Refuge has several public use facilities. The closest facility to the proposed LNG terminal is the Tenasillahe Island dike which is open to the public, allowing JBHNWR visitors to access the periphery of the island for wildlife viewing opportunities. This dike includes areas directly adjacent to the Clifton Channel and the Columbia River shipping channel, where LNG vessels would travel. In addition, public recreational facilities are located at the JBHNWR headquarters off of Steamboat Slough Road, at the Highway 4 viewing site, and along the mainland dike road surrounding JBHNWR. The mainland dike road is used extensively by the public for fishing and wildlife viewing opportunities, and includes access by vehicle traffic to areas directly adjacent to the Columbia River shipping channel, where LNG vessels will travel.

FA4-21 Reduction in fish populations, with related reduction recreational fisheries, is counteractive to NPS goals to preserve wildlife and provide appropriate recreational opportunities. Marine traffic associated with LNG operation will further impact recreational use of the Columbia River due to the safety zone requirements for the tankers. This unavoidable situation will be a significant adverse impact on recreational use of river portions of the NHT.

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FA4-19 We have revised applicable portions of section 4.7 to discuss the Lower Columbia River Water Trail.

FA4-20 Sections 4.7.1.4 and 4.7.2.6 have been revised to include information regarding the developed recreational facilities at the JBHNWR.

FA4-21 As discussed in section 4.7.1.4, we do not believe that LNG marine traffic in the waterway to the proposed Bradwood Landing LNG terminal would have any significant impacts on recreational users of the lower Columbia River.

FA4-22 Based on our comments the Department believes that a more comprehensive analysis of recreational impacts, as identified above, should be included in the FEIS. Further, there is no indication that any direct contact was made with the NPS, even though the Lewis and Clark National Historic Trail was identified as a national resource that would be adversely affected by the construction and operation of the Bradwood Landing LNG depot. FERC and the applicant should contact NPS prior to the development of the FEIS. The appropriate point of contact for NPS can be found at the end of this letter.

Visual and Aesthetic Resources

FA4-23 The construction of the two (or three) LNG storage tanks will adversely impact the landscape scene from the NHT and from roadways adjacent to the shore. Structures the height of 14-story buildings set against the backdrop of state forest lands will be particularly noticeable due to the contrast in materials and reflectance. This is of particular concern since National Heritage Area status is being sought for the Lower Columbia Basin, which would complement the mission of the Lewis and Clark NHT. There was no mitigation in the DEIS that addressed this impact.

Lighting of the industrial installation would adversely impact the visual scene as experienced by Lewis and Clark 200 years ago by reducing nighttime dark sky conditions. The lighting plan for the Bradwood Landing facility was not available at the time of the DEIS review, so we could not determine if this issue was sufficiently considered and adequate mitigation proposed.

A more comprehensive analysis of visual and aesthetic resources and appropriate mitigation should be included in the FEIS

Human Health and Safety

FA4-24 Much of the public debate over the Bradwood Landing LNG facility focused on the perceived threats to human health and safety by leaks from or attacks on tanker ships or the regassification facility. This issue is of concern because NPS units are charged with providing for human safety first and foremost. For the NHT administration, this means that NPS promotes actions and services that provide the highest level of safety along the trail corridor. Based on models that predict a two-mile area of impact should a one-meter breach occur, adequate safety personnel are not available in Clatsop and Wahkiakum Counties to respond to the incident. Even if sufficient personnel and equipment were added to local resources, the impact of such an event would be devastating to the local population and visitors in the area, in terms of loss of life or injury, loss of property, and economic loss. A more comprehensive analysis of human health and safety impacts as well as emergency response procedures should be included in the FEIS.

Land and Water Conservation Fund Act

In addition to units of the National Park System, the NPS also has oversight of property protected by Section 6(f) of the Land and Water Conservation Fund (LWCF) Act. Under Section 6(f) and 36 C.F.R. Chapter I, Part 59, when a conversion of an LWCF-protected site

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FA4-22 Section 4.9 of this EIS was revised to reflect the fact that staff did contact representatives of the NPS regarding the LCNHT. Our analysis found that the project would not have any adverse effects on the LCNHT, and the Oregon SHPO concurs with that finding.

FA4-23 The EIS contains a rigorous analysis of potential visual impacts, including computer simulations. As discussed in section 4.7.2.7, the LNG terminal structures would be painted to reduce visual impacts. Local planners would be consulted for color tones and hue selections. Colors of building materials suitable for the facility purpose would be chosen to blend into the existing visual environment. From the river, the two LNG storage tanks would be seen against the backdrop of the forested basalt hills. Those forested hills would partially block views of the LNG terminal from the south, along Highway 30.

The proposed Bradwood Landing LNG terminal is located in an area surrounded by residential, commercial, and industrial facilities. The community of Clifton is to the west, the city of Cathlamet is to the north, and the Wauna mill is to the east. So night lighting sources already exist in the project area.

In addition, section 4.7.2.7 includes a discussion of potential impacts from lighting at the LNG terminal. NorthernStar would minimize the number and intensity of facility lighting whenever possible. Down-shielding lights would also be used whenever possible to reduce off-site light scatter and illuminating of facility structures. NorthernStar would work with local planners to minimize the impacts of nighttime lighting on surrounding areas through installation of appropriately focused lighting fixtures. Most of the lighting would be located in internal areas of the facility and would, therefore, not have a significant impact on surrounding areas (see section 4.5.2.1). Overall, lighting impacts would be less than those from other developed areas along the river.

The lower Columbia River has not yet been officially designated as a Natural Heritage Area. The LCNHT is discussed in sections 4.7 and 4.9.

FA4-24 We believe the analysis of human health and safety impacts in the EIS is adequate. As discussed in section 4.11.6, an Emergency Response Plan must be submitted for FERC review and approval before any final approval to begin construction and is therefore not required at this time. Also see the response to PM1-1.

occurs, replacement property of current fair market value and of reasonably equivalent usefulness and location must be provided. The Secretary of the Interior must approve any conversion. Section 6(f) protection applies to any property that received grant funding from stateside LWCF, regardless of whether it was an acquisition or development, and to any property that served as a conversion replacement site. The DEIS does not discuss Section 6(f) or the LWCF program, an important layer of federal protection beyond NPS and Fish and Wildlife Service lands.

FA4-25 | On the Washington side, the following LWCF sites appear to fall within the "zone of concern":

- Cape Disappointment State Park
- Various WDFW water access points along the Columbia River (potentially)
- Various WDFW water access points along the Elochoman River (potentially)
- Erickson Park in Cathlamet

The FEIS should include an analysis of impacts to LWCF resources and develop appropriate mitigation for those impacts. In order to do this the Recreation Conservation Office (RCO, formerly known as the Interagency Committee for Outdoor Recreation or IAC) administers LWCF sites in Washington and should be consulted regarding this project. The RCO contact for Washington state is:

Ms. Kaleen Cottingham
Director
Washington Recreation and Conservation Office
P.O. Box 40917
Olympia, WA 98504
kaleenc@reo.wa.gov

The State Liaison Officer for the LWCF program in Oregon is:

Mr. Tim Wood, Director
Oregon Parks and Recreation Department
725 Summer Street N.E., Suite C
Salem, OR 97301-1271
(503) 986-0729
Tim.Wood@state.or.us

[Specific Comments](#)

FA4-26 | There are errors on the list of recipients (Appendix A) of the DEIS. The list includes:

- Department of the Interior, National Park Service, Julia Butler Hansen National Wildlife Refuge, WA

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FA4-25 The EIS has collectively analyzed impacts to resources along the waterway that fall within the Zones of Concern in section 4.0. Mitigation measures are described in section 4.11.5.5 and in the Coast Guard's WSR (see Appendix H).

FA4-26 Appendix A has been updated.

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- Department of the Interior, National Park Service, Lewis and Clark National Wildlife Refuge, WA

National Wildlife Refuges are managed by the Department of the Interior, U.S. Fish and Wildlife Service.

Appendix I, References, pages I-39 and I-43

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USGS (2005a) and Whitehead (1994) both refer to the same report. USGS (2005a) is the online version of Whitehead (1994). Citing it with a 2005 publication date is inaccurate because to do so implies that the data and interpretations in the report are more recent than they really are. A more correct citation would be:

Whitehead, R. L., 1994, Ground Water Atlas of the United States - Idaho, Oregon, Washington: U.S. Geological Survey Hydrologic Atlas HA-730-H. Available on the internet at: http://capp.water.usgs.gov/gwa/ch_h/index.html

The Department appreciates the opportunity to comment on the DEIS for the proposed Bradwood Landing LNG Terminal and Pipeline Project. Questions or requests for clarification regarding any of the fish and wildlife comments may be directed to Mr. Kemper McMaster, State Supervisor, Oregon Fish and Wildlife Office, U.S. Fish and Wildlife Service, 2600 SE 98th Avenue, Suite 100, Portland, Oregon, 97266, telephone number (503) 231-6179. For questions regarding Lewis and Clark NHT, please contact Dan Wiley, Chief of Integrated Resources Stewardship, 601 Riverfront Drive, Omaha, Nebraska 68102, telephone number (402) 661-1830, or Suzanne Gucciardo, Natural Resource Specialist, at (402) 661-1874. For questions regarding LWCF, please contact Heather Ramsay, Project Manager, 909 First Avenue, Floor 5, Seattle, Washington, telephone (206) 220-4123. For questions regarding USGS comments, please contact Lloyd Woosley, Chief of the USGS Environmental Affairs Program, at (703) 648-5028 or at lwoosley@usgs.gov. If you have any additional questions, please contact me at (503) 231-6157.

Sincerely,



Preston A. Sleeper
Regional Environmental Officer

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The references section and citations in the text have been revised to address this comment

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Nez Perce

TRIBAL EXECUTIVE COMMITTEE

P.O. BOX 305 • LAPWAI, IDAHO 83540 • (208) 843-2253

December 21, 2007

VIA ELECTRONIC FILING

Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, D.C. 20426

Re: Draft Environmental Impact Statement for the Bradwood Landing Liquefied
Natural Gas Terminal and Pipeline Project (Docket No. CP06-365-000, *et al.*)

Dear Secretary Bose:

Thank you for the opportunity to comment on the Federal Energy Regulatory Commission's (FERC) August 2007 Draft Environmental Impact Statement (DEIS) for the Bradwood Landing Liquefied Natural Gas Terminal and Pipeline Project (CP06-365-000, *et al.*). The DEIS states that Bradwood Landing LLC and NorthernStar LLC are proposing to construct and operate several facilities located at the Bradwood Landing LNG terminal along the Columbia River at river mile 38, in Clatsop County, Oregon, as well as a proposed 36.3-mile-long pipeline in Columbia County, Oregon and Clatsop County, Washington.

As the Nez Perce Tribe (Tribe) communicated to FERC during early scoping in or around October 2005 and January 2006 the Tribe is not opposed to LNG development in general. While the Tribe supports sources of energy that decrease reliance on hydropower, the Tribe is skeptical of projects that may result in more harm to endangered and threatened aquatic wildlife. Therefore the Tribe has a paramount interest in the development and review of this project based on the high risk of significant and permanent injury to threatened and endangered salmon and steelhead that the project poses. The Tribe has devoted substantial time and resources to the recovery of these listed species, and any project with the potential to further degrade existing habitat is of critical concern to the Tribe.

The Columbia River Salmon are integral to the cultural, spiritual, and physical health of the Tribe. As such, the Tribe reveres the water and the fishery it supports. For thousands of years the Columbia River provided life and sustenance to the Nez Perce people. However, heavy development and poor management decisions have seriously degraded salmon and steelhead habitat in the Columbia River and its tributaries. The Columbia River estuary, which is within the geographic focus of the project, serves an essential function in the lifestages of migrating

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threatened spring, summer, and fall chinook salmon, as well as steelhead. Many of these fish come from hatcheries operated or managed by the Tribe. Thus, any activities that potentially threaten these very important resources are of great concern to the Tribe.

NA1-1 Despite clearly articulating several concerns to FERC about this project, the Tribe is troubled to see that the DEIS does not reflect any meaningful change in the project's posture or direction. This project, as described in the DEIS, will likely cause substantial and irreparable damage to listed salmonid species in the Columbia River and its tributaries to which the Tribe has a treaty-reserved right. Based on the Tribe's review of the DEIS and the comments provided by the Columbia River Inter-Tribal Fish Commission¹ (CRITFC), the project will unnecessarily expose 13 federally listed threatened or endangered salmonid species, several non-listed species, and critical designated habitat in the Lower Columbia River estuary to conditions likely resulting in severe and irreparable injury. The deleterious effects of this project on fish and wildlife productivity in the Columbia River Basin are not confined to the project area itself. Indeed, the project's deleterious effects on salmon and steelhead, and on the estuary that serves as critical habitat, will impact the abundance and productivity of these species throughout their life cycle as they migrate to and from their natal streams.

The Tribe concurs with and incorporates CRITFC's comments with this letter, and for the reasons articulated below, opposes the Bradwood Landing project as described in the DEIS because it presents an unacceptable risk of substantial and permanent harm to salmon and steelhead and to the critical estuarine habitat on which they depend, in turn adversely impacting the Tribe's treaty fishing rights counter to the United States' trust responsibility. Accordingly, the Tribe recommends at a minimum that FERC require the applicant NorthernStar LLC to conduct further studies and analysis before a final EIS is issued on the proposed project.

The Project Will Further Degrade the Columbia River Estuary

NA1-2 The sensitive Columbia River Estuary stands to be impacted in the short and long term with this project. First, the destruction of critical estuary habitat will occur as a direct result of the dredging and development of the project site. Particularly harmful impacts will result from the dredging in Clifton Channel to accommodate the massive LNG tankers. The dredging and related activities will impact both Cathlamet Bay, and the nearby Lewis and Clark Wildlife Refuge.

NA1-3 In the ongoing case of *National Wildlife Federation v. National Marine Fisheries Service*, the Oregon federal district court has repeatedly directed NOAA Fisheries to revise its

¹ In 1977, CRITFC was established by the four Columbia River treaty tribes: the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Yakama Nation. CRITFC functions to protect, promote, and enhance the Columbia River Basin's anadromous fish resources consistent with the treaty-secured interests of its member tribes by formulating a broad, general fisheries program, and providing technical and legal support.

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NA1-1 See our response to comment PM3-68.

We have modified section 4.9.3 to disclose that the Nez Perce Tribe has notified the FERC of its concerns about potential project impacts on federally-listed threatened and endangered salmon species and the lower Columbia River estuary. We have addressed the comments of the CRITFC elsewhere in this EIS (see our responses to letter NA2).

NA1-2 Sections 4.5.2 and 4.6.2.2 discuss both temporary and permanent impacts on aquatic and terrestrial wildlife as well as unique and sensitive wildlife habitats due to construction of the LNG terminal.

NA1-3 This is a reference to a case involving the NMFS for a different project.

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NA1-3
cont'd

Biological Opinion (BiOp) regarding the operations of the Federal Columbia River hydropower system (FCRPS) and work with resource managers to develop a plan that complies with the Endangered Species Act's mandates to ensure that actions do not jeopardize the survival and recovery of listed fish or adversely affect critical habitat.² The latest draft BiOp, released by NOAA Fisheries in 2007, continues to identify the Columbia River estuary as important to salmon recovery. The document notes that the success of the plan depends on a variety of factors, including "biological productivity in the estuary/near shore ocean environment." NOAA Fisheries Draft Supplemental CA, at 8-6. The document also states that "key limiting factors" for ESA-listed salmonids include the estuary. *See, e.g.,* NOAA Fisheries Draft Supplemental CA, § 8.2, at 8.2-4. NOAA Fisheries also notes that if "habitat actions" to improve quality and access are undertaken in the estuary, there is a survival benefit of approximately 9%, and recovering estuarine habitat would result in "positive effects" that "will be long-term". *Id.* at 8.2-4 to 8.2-5.

Although the remand process is still ongoing, NOAA Fisheries has expressed a firm commitment to restoring the Columbia River estuary to promote the recovery of listed salmonids. The DEIS fails, however, to address how the proposed project will accommodate or otherwise address the mitigation measures that NOAA Fisheries will implement following approval by the court.

The Treaty of 1855

The anadromous salmonid fish species that rear, transit and hold in the Columbia River Estuary have played a central role in the culture and livelihood of the Tribe since time immemorial. Over 150 years ago the Nez Tribe entered into a treaty with the United States. Treaty of June 11, 1855; 12 Stat. 957 (1855). Under the terms of the Treaty, the Tribe ceded vast tracts of land in what are now Idaho, Oregon and Washington in exchange, among other guarantees, for the United States' assurance that the Tribe will retain reserved fishing rights at all usual and accustomed places, and hunting, gathering and pasturing rights on open and unclaimed lands.

The Treaty of 1855 is the supreme law of the land. U.S. Const. Article VI, Clause 2. It is well-established as a matter of law that the Tribe has a treaty-protected right in the anadromous salmonids that spawn in the headwaters, tributaries and mainstream of the Columbia River and which pass through the Tribe's usual and accustomed fishing places on their journey to and from the ocean. Thus, any activities on the Columbia River or its tributaries that may impinge on the fish, and in turn the treaty right to take fish, are of paramount concern to the Tribe.

² *E.g., National Wildlife Federation v. National Marine Fisheries Service*, 2005 WL 1278878 (D. Or. 2006), *aff'd*, 481 F.3d 1224

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Consistent with the Tribe's treaty rights, the Tribe maintains a large Department of Fisheries Resource Management (DFRM), the largest tribal fisheries department in the country. The staff of DFRM manages a wide variety of programs, including numerous hatchery and production programs, harvest planning and regulation, and habitat protection and enhancement programs. Most of the DFRM resources are applied to programs devoted to rearing and protecting salmon and steelhead on their journey to and from the ocean. The proposal to build a LNG landing facility in the Columbia River Estuary, where all migrating salmon and steelhead spend time, could severely impact a wide variety of projects that the DFRM engages in. Thus, the Tribe is very concerned about this project, and its impact on the fishery resource, that in turn affects the Tribe's ability to exercise its treaty right to take fish at all usual and accustomed places.

The DEIS' Characterization of the Tribe's Treaty-Reserved Fishing Rights Is Erroneous

The Tribe strongly disagrees with FERC's assertion, stated below, maintaining that the proposed project will not adversely affect the Tribe's treaty-reserved rights:

Comments were received during scoping regarding potential impacts of the project on Indian treaty fishing rights. Four Indian tribes hold treaty fishing rights for ceremonial, subsistence, and commercial purposes in the Columbia River above Bonneville Dam. Although the court has approved the 2005-2007 Interim Management Agreement providing that the Treaty Tribes and the States of Oregon and Washington may agree to a fishery for the Treaty Tribes below the Bonneville Dam, no agreement has been negotiated that would authorize Indian treaty fishing in the area adjacent to the proposed site. No Indian treaty fishing sites have been identified along the waterway for LNG marine traffic. However, salmon migrating to and from sites above Bonneville Dam could be affected by the passage of LNG ships during operation of the proposed project. As discussed in section 4.5.1.1, NorthernStar would avoid, minimize, reduce, rectify, and compensate for impacts on fishery resources during construction and operation of the project. Therefore, no significant adverse impacts on Indian treaty fishing rights are anticipated as a result of the proposed project. In fact, implementation of NorthernStar's SEI is expected to result in a net benefit to fishery resources on the lower Columbia River.

NA1-4 FERC's interpretation mischaracterizes the scope and extent of the Tribe's treaty-reserved fishing rights. Most importantly, the nature and scope of the treaty fishing rights reserved by the Nez Perce Tribe (and the other CRITFC-member Tribes) is-by the language of the Treaty itself-the right to take fish at all usual and accustomed places. The 2005-2007 *US v. Oregon* Interim Management Agreement in no way alters the fundamental scope of the Tribe's treaty-reserved fishing rights, but simply institutes a procedure between the co-managers with respect to potential lower river Treaty fisheries. FERC may not rely on the procedure in the 2005-2007 Interim Management Agreement to mischaracterize-and limit-the nature and scope of the Tribe's fishing rights set forth in the Treaty of 1855. Nor may FERC avoid analyzing the impact of the project on the Tribe's treaty fishing rights over the entire life of the project.

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NA1-4 The reference of the Interim Management Agreement as the authority on the Four Tribes Treaty fishing rights was removed from section 4.8.1.7 of the EIS. Usual and accustomed fishing places were not identified in the vicinity of the project; therefore the project is not expected to have a direct affect on the Four Tribes' fishing access. The FERC staff asked an attorney for the Nez Perce Tribe to provide the Tribe's interpretation of its fishing rights related to the Bradwood Landing Project so we could clarify the text in the EIS, but no response to this request was received back to the FERC from the Tribe.

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NorthernStar LLC's Salmon Enhancement Initiation Is Voluntary

NA1-5

FERC's argument concluding that the proposed project will have no adverse effect on the Tribe's Treaty-reserved fishing rights is diminished further in light of FERC's reliance on NorthernStar's Salmon Enhancement Initiative (SEI). Although the Tribe appreciates NorthernStar's initiative in proposing efforts to restore listed species in the affected area, the Tribe is reluctant, based on years of dealing with undelivered promises, to place any meaningful reliance on *voluntary* restoration initiatives. SEI, if implemented correctly, *could* be beneficial to the recovery of salmonids. The Tribe, therefore, disagrees with FERC's assertion that the SEI "would potentially contribute significantly to the conservation and recovery of salmonids (and other species) protected under the ESA." (pg. 2-242).

The DEIS discusses the SEI several times, indicating throughout the document that it would be implemented throughout the life of the project (e.g., 4-151, 4-162, 4-453), and would be "above and beyond" the usual set of mitigation measures (2-32). At the same time, however, FERC states that the SEI is voluntary (e.g., 2-32, 4-271, 5-7) but notes that the SEI is an interrelated and interdependent action (e.g., 2-28). If the SEI is indeed as integral to the project's success as FERC suggests, then the Tribe recommends that FERC require implementation and funding of the SEI as a mitigation imperative.

The United States' Trust and Consultation Responsibilities to the Nez Perce Tribe

The United States, through all of its agencies including FERC, stands in a trust or fiduciary relationship to the Tribe. This independent obligation of the United States recognizes the United States' duty to protect tribal lands, tribal resources both on-Reservation and off-Reservation, and the tribal way of life. Federal courts have held that the United States' conduct in carrying out its trust responsibility should be "judged by the most exacting fiduciary standards." *Pyramid Lake Paiute Tribe of Indians v. Morton*, 354 F. Supp. 252 (D.D.C.), *modified on other grounds*, 360 F. Supp. 669 (D.D.C. 1973), *rev'd in part on other grounds*, 499 F. 2d 1095 (D.C. Cir. 1974), *cert denied*, 420 U.S. 962 (1975). The United States' trust responsibility imposes a substantive duty to protect tribal treaty-reserved rights "and the resources on which those rights depend." *Tribes v. U.S.*, No. 96-381-HA, 1996 WL 924509, at *8 (D. Or. Oct. 2 1996). The trust responsibility also imposes an affirmative duty upon a federal agency to use its particular expertise to protect tribal resources. *U.S. v. Mitchell*, 463 U.S. 206 (1983). This substantive trust responsibility that all federal agencies owe to tribes when dealing with tribal resources, counsels in favor of conservatism when taking action with the potential to harm salmon and its habitat.

In addition to the substantive duty to prevent harm to tribal resources, the United States' trust responsibility also imposes a procedural obligation to consult with tribes on a government-to-government basis. This duty to consult is based on statute, court decisions, and executive documents such as the Presidential Memorandum of April 29, 1994 and Executive Order 13175. The Nez Perce Tribe defines consultation as the formal process of negotiation, cooperation, and

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NA1-5

Please note that FERC is not relying on NorthernStar's SEI to make conclusions on the effect of the project on fishing rights. As described in section 4.5.2.1, additional analysis of project impacts on important fish species is being completed and will be included in the revised BA and EFH Assessment. Also, see our response to comment FA4-12.

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mutual decision-making between two sovereigns. Based on court decisions and the Executive Orders requiring consultation, FERC is required to engage in a dialogue with the Tribe concerning this decision during the deliberative process, before any decision is made.

Lack of Government-to-Government Consultation

NA1-6 Although members of the Nez Perce tribal leadership did attend a CRITFC meeting in or around November 2005 at which FERC staff presented information regarding the proposed project, and two interagency meetings in or around January 2006, the Tribe does not regard these limited interactions as a reasonable discharge of FERC's responsibility to engage in government-to-government consultation with the Tribe. As noted above, the Tribe defines consultation as the formal process of negotiation, cooperation and mutual decision-making between two sovereigns. The DEIS notes that the Nez Perce Tribe "expressed concerns that the project could affect fishery resources protected by tribal treaty rights." That much is correct. However, the Tribe's written response to the NOI also identifies other major concerns such as trust responsibilities, estuary degradation, dredging and fish contamination, and cultural resource protection. FERC does not acknowledge these concerns in the DEIS. The Tribe has co-management responsibility over the treaty resources within the project area, and therefore must be involved in deliberation and planning on issues that affect tribal treaty resources.

The Bureau of Indian Affairs echoed a similar concern regarding FERC's failure to consult on a government-to-government basis with tribes in its comments to the DEIS. The Tribe concurs with BIA's recommendation that FERC identify the appropriate Tribal staff liaison to receive meeting notices and information regarding the project, and be invited to meetings involving technical issues.

Impacts from Dredging Contaminated Sediment

NA1-7 The DEIS states that 700,000 cubic yards of sediment would be dredged to create the proposed ship maneuvering area in the Columbia River. The DEIS states further that "[a]lthough some contaminants were detected in samples of the material to be dredged, the concentrations were relatively low and none exceeded screening levels or threshold effects levels used to identify concentrations of concern." The Tribe remains concerned, nevertheless, that FERC did not consider the Tribe's previous request to account for tribal subsistence practices in assessing the tribal members' health risks of ingesting fish exposed to or containing contaminants. The DEIS provides no analysis or explanation addressing the potential effects of the project on Nez Perce Tribal fish consumption.

As the Tribe stated previously in response to FERC's NOI, based on the likelihood of human impacts caused by eating Columbia River salmon and steelhead, the Tribe requests that FERC use a fish consumption rate that accurately reflects actual fish consumption by Nez Perce Tribal members. A 1994 EPA funded study, "A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs Tribes of the Columbia River Basin" indicates a much higher tribal fish consumption rate than what is reflected in the national average. The prevalence of

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NA1-6 We have modified section 4.9.3 to acknowledge that the FERC has trust responsibilities to Indian tribes, as outlined in Order 635, our "Policy Statement on Consultations with Indian Tribes in Commission Proceedings," issued July 23, 2003. The EIS documents the FERC staff's consultations with the Tribe, and addresses potential impacts on cultural resources in section 4.9. The EIS also discusses project related impacts on the lower Columbia River estuary in section 4.3, and impacts on fish is also mentioned in sections 4.5 and 4.6. We address the concerns of the BIA in our responses to comment letter FA1. As an intervenor in this proceeding, the Nez Perce Tribe receives copies of all notices issued by the FERC. There are no meetings planned for the future.

NA1-7 The contaminants detected in the sediments to be dredged are very low and are generally characterized by low solubility. No measurable impact on water quality from contaminants is expected as a result of dredging and therefore, increased ingestion of contaminants by fish is highly unlikely.

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NA1-7
cont'd

chemical contaminants in Columbia River Basin fish (EPA PA 910/R-02-006) and the fish-centric subsistence practices of our tribal members (including our most susceptible populations of children, women of childbearing age, pregnant or nursing mothers and the elderly) creates an undue risk for cancer and non-cancer disease based on high levels of contaminants in fish and their food chain. As such, in assessing the impacts to Tribal members from contaminants being re-released by the dredging process, the Tribe requests that FERC use a fish consumption rate of *at least 65 grams/day*.

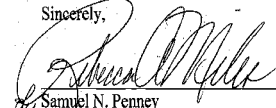
NA1-8

Moreover, there appears to be a discrepancy in the DEIS concerning concentrations within the dredge material. Under section 5.1.2 Soils and Sediments, contaminant concentrations are acknowledged, but in section 5.1.5 Wildlife and Aquatic Resources, contaminant concentrations are not acknowledged. The Tribe would like clarification regarding this discrepancy and mitigation measures addressed.

Conclusion

Thank you again for the opportunity to comment on this project. I look forward to working closely with your staff in addressing the many concerns that the Tribe has raised. I invite you to contact the Tribe to arrange a government-to-government consultation with the Nez Perce Tribe Executive Committee (NPTEC) so that our governments may initiate a dialogue regarding the proposed project. If you have any questions, please contact Michael Lopez, Nez Perce Tribe Office of Legal Counsel, at (208) 843-7355.

Sincerely,


Samuel N. Penney
Chairman

Native American Tribes

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NA1-8

Section 5.1.2 states, "trace amounts of some contaminants were found in the sediment samples, but none exceeded threshold levels that would be considered a threat to human health or would have an adverse effect on aquatic species." Section 5.1.5 states, "sediment sampling and analysis did not detect any elevated contaminant concentrations within the proposed dredged materials and leave surface that could adversely affect aquatic species." We do not believe these statements represent a discrepancy that requires clarification.

K-382

UNITED STATES OF AMERICA


FEDERAL ENERGY REGULATORY COMMISSION

Bradwood Landing LLC	)	FERC Project No. CP06-365-000
)	
NorthernStar Energy LLC	)	FERC Project Nos. CP06-366-000
	)	CP06-376-000
	)	CP06-377-000
)	
Application for Certificate	)	(Bradwood Landing Liquefied
	)	Natural Gas Terminal and
	)	Pipeline Project)
)	

CERTIFICATE OF SERVICE

I hereby certify that I have this day served, by electronic mail, a letter to Kimberly D. Bose, Federal Energy Regulatory Commission, from the Nez Perce Tribe regarding its response to the Commission's request for comments on the Draft Environmental Impact Statement and this Certificate of Service has been served by electronic mail or first class mail to each person designated on the official service list compiled by the Commission in the above-captioned proceeding.

Dated this 21st day of December, 2007.



Michael A. Lopez
Nez Perce Tribe Office of Legal Counsel

Native American Tribes

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K-383

Due to the length of the Columbia River Inter-tribal Fish Commission comment letter (comment letter NA2), we have summarized the issues raised and include them in the following table along with our responses. A copy of the complete letter follows the response table.

Comment Number	Comment (Summary)	Response
NA2-1	The draft EIS repeatedly lists consultation and permitting procedures that must be completed, instead of reasonably evaluating and disclosing the impacts of the project as it will be implemented.	Our recommendations are used for outstanding issues that cannot be resolved prior to completing the final EIS. These include certain permits and approvals, surveys that require property access, detailed project plans, and detailed engineering specifications and plans. If the project is approved, these recommendations become conditions of the authorization.
NA2-2	The SEI is not guaranteed to be completed. Much of the habitat used for mitigation is too far distant to be "replacement" habitat as much of it is located in a different ecological zone in the estuary. The loss of mainstem rearing area will not be compensated. Why does the SEI not fall under FERC's regulatory authority? Why is the SEI program not required as part of the conditions to the license?	The adequacy of NorthernStar's proposed Compensatory Mitigation and the commentor's concerns regarding the SEI are discussed in the responses to comments FA2-10 and FA4-12, respectively.
NA2-3	It is not clear what the anticipated life of the NorthernStar Project is expected to be or whether the \$50 million is calculated in terms of today's dollars.	The life of the project is anticipated to be 40 years. The cost of the project is in today's dollars.
NA2-4	The mitigation plan that is required by regulations amounts to little more than avoidance, minimization, and reduction of impacts. The draft EIS must completely and reasonably disclose the likely impacts based on the measures taken and their limited effectiveness.	The adequacy and effectiveness of NorthernStar's Compensatory Mitigation Plan is discussed in the response to comment FA2-10. In addition, the potential impacts on federally listed species due to implementation of NorthernStar's Compensatory Mitigation Plan will be included in the revised BA and EFH Assessment.
NA2-5	No information was present to reflect the similar salinities and tidal influence as stated in the Mitigation Plan (page 44).	Since the issuance of the draft EIS, the Compensatory Mitigation Plan has been revised and no longer includes the statement referred to by the commentor. However, the baseline conditions at the Middle Svensen Island Mitigation Site are described in section 2.1.5 of the plan. See also the response to comment FA2-10.
NA2-6	In the draft EIS much of what is proposed as mitigation is already functional habitat and would likely reestablish itself by passive means. Because restoration is voluntary, there is no assurance that mitigation would actually occur according to some benefit ratio relative to the value of the current habitat that would be lost. Boundaries for the estuary are crude and inaccurate. Svensen Island is a brackish zone while the area lost is a freshwater zone. No reference to the spatial, ecological analysis of the values of habitats to be destroyed and created to determine whether all biological functions and life cycles affected are mitigated in place and kind.	See the response to comment FA3-3.
NA2-7	There should be annual mitigation requirements for the existing and proposed maintenance dredging that are not addressed in the draft EIS.	Maintenance dredging requirements would be addressed in future section 404 permits issued by the COE.
NA2-8	It is essential to have tables describing the mitigation measures that would be applied for each location and type of detrimental action.	The EIS is a summary document and based on CEQ guidelines presents a full and fair discussion of significant environmental impacts in a manner that is concise, clear, and to the point (see 40 CFR 1502.1). Where appropriate, the EIS describes the mitigation measures that would be implemented to minimize

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NA2-9	All alternatives listed lack strengths and weaknesses, particularly the no action alternative. Most alternatives were discarded without full consideration required by NEPA and necessary to make a reasoned decision on this project.	potential impacts on environmental resources due to the proposed project. Therefore, we believe that the inclusion of additional tables to describe these measures is not warranted. We believe that our final EIS thoroughly examines alternatives, against the backdrop of the project's stated objectives. Please see the opening discussion in section 3.1.
NA2-10	The draft EIS analysis of dredging impacts on turbidity and suspended sediment is cursory and inadequate. The draft EIS failed to reasonably assess the likelihood and the effects of the use of other methods besides suction dredging for channel excavation.	We believe the potential direct and indirect impacts on water resources and aquatic resources as a result of dredging activities are adequately described in sections 4.3.2 and 4.5.2.1. Additional details on the extent and duration of the turbidity plume associated with dredging activities at the LNG terminal site are included in the Hydrodynamic and Sediment Transport Assessment conducted for the Bradwood Landing Project by WEST (2006). The EIS discussed the primary types of dredging in section 3.9.1.1. We agree that hydraulic cutterhead pipeline dredging is the most appropriate method for the placement sites of the LNG terminal and the Wahkiakum County Sand Pit site.
NA2-11	The draft EIS fails to note that initial and maintenance dredging will cause reduction of water surface profiles and shoreline riparian areas in and below the proposed project area. The draft EIS proposes an alternative that dumps dredge spoils back into the river. These impacts have not been thoroughly assessed.	Dredging of the berth and maneuvering area is not expected to cause significant change to water surface profiles and shoreline riparian areas. However, we have added text in section 4.1.3.3 that describes NorthernStar's Shoreline Monitoring Plan for the LNG terminal. This plan includes monitoring and proposed measures to reduce erosion of downstream banks should such erosion increase as a result of the dredging for the project. The Wahkiakum County Sand Pit site is a beach nourishment dredge material placement alternative. This site has been used previously by the COE for dredge material placement. All applicable permits and approvals would be obtained prior to use.
NA2-12	It appears highly likely that liquefaction of the loose fill at the facility site could occur and be mobilized by seismic activity.	Liquefaction would be unlikely to occur because the soils would be treated prior to construction by vibroflotation.
NA2-13	It is not clear how landslide hazards in steep terrain can be mitigated when there is a possibility of the pipeline being dislocated from a hill slope and spilling the contents into a local drainage. The Draft EIS includes no adequate analysis of the likely effects of pipeline construction and operation on sediment delivery to streams via mass failures.	Section 4.1.3.3 describes mitigation measures for unstable slopes, including avoidance and the use of HDD construction methods. Various slope stabilization and sediment control measures would be used to minimize sediment delivery to waterbodies, as detailed in the FERC staff's Plan and Procedures.
NA2-14	The potential environmental impacts from pipeline leaks caused by ground movement have not been thoroughly evaluated, nor has a means been explained to engineer the pipeline to safeguard it from rupture.	Risks to the pipeline from ground movement and mitigation are discussed in section 4.1.4.3.
NA2-15	It does not appear that any tests have been conducted on bed transportation relative to flow and bed disturbance in Clifton Channel.	Results of the Hydrodynamic and Sediment Transport Assessment conducted for the Bradwood Landing Project by WEST (2006) are discussed in section 4.2.2.2. As discussed in section 4.5.2.1, impacts on aquatic resources attributed to sediment transport and deposition may occur as a result of the

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NA2-16	Dredging will greatly affect the area. Sedimentation of Clifton Channel is a significant risk and there appears to be very few protections to fish.	proposed project. Additional analysis of potential impacts on salmonids from alterations of sediment transport and deposition will be included in the revised BA and EFH assessment. As discussed in section 4.5.2.1, impacts on aquatic resources attributed to dredging and sediment transport and deposition may occur as a result of the proposed project. Additional analysis of potential impacts on salmonids from alterations of sediment transport and deposition will be included in the revised BA and EFH assessment.
NA2-17	Sediment Delivery <ul style="list-style-type: none"> The draft EIS fails to provide any credible cumulative estimate of the magnitude and persistence of sediment delivery from these multiple activities on water quality and aquatic habitat in Hunt Creek. Elevated sediment delivery from the impact of multiple activities in the Hunt Creek watershed will elevate turbidity in Hunt Creek and the Columbia River. The final EIS should clearly and fully analyze and disclose the cumulative impacts of all project activities that are likely to combine to produce adverse cumulative effects. 	With the implementation of our Procedures and NorthernStar's ESC Plans, impacts on water quality and aquatic resources in the Hunt Creek watershed and Columbia River would be less than significant; therefore, we believe that our analysis of cumulative impacts as it relates to these topics is adequate. See also the response to comment NA2-83.
NA2-18	The draft EIS does not address the possibility of contaminants being re-suspended again and again from ship traffic and maintenance dredging. Monitoring and research accomplished after additional dredging would make it impossible to measure the changes in ecological response to new dredging, as the opportunity to establish the baseline before dredging would be lost.	As discussed in section 4.2.2.2, no significant concentrations of contaminants were detected in the sediments to be dredged.
NA2-19	Decreased bank stability contributes to both stream sedimentation and channel widening. The persistent loss of bank stability associated with pipeline construction and maintenance at waterbodies will cause persistently elevated sediment delivery.	To minimize impacts on stream banks, NorthernStar would implement its Waterbody and Wetland Construction and Mitigation Procedures Plan, pipeline ESC Plan for Oregon, and SWPPP for Washington as well as our Procedures.
NA2-20	The draft EIS fails to disclose the amount, type, and proximity of land-disturbing activities within a distance to streams that will strongly and persistently contribute to elevated sediment delivery to streams. Elevated sediment delivery causes the loss of pool frequency, quality, and volume, increased width-depth ratio, elevated levels of fine sediment.	Section 4.3.2.4 describes the impacts of pipeline construction activities on waterbodies. To minimize impacts on waterbodies, NorthernStar would implement its Waterbody and Wetland Construction and Mitigation Procedures Plan, pipeline ESC Plan for Oregon, and SWPPP for Washington as well as our Procedures.
NA2-21	The draft EIS fails to note the limits of the effectiveness of mitigation measures and BMPs based on available scientific information and literature, including applicable case studies.	BMPs are generally accepted standard procedures and many are established by state or other agencies. We do not believe it is unreasonable to assume they would be effective. We have recommended in sections 4.3.2.4 and 4.4.1.2 that NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan and final Compensatory Mitigation Plan, respectively, be filed, along with agency approvals, with the Secretary prior to

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NA2-22	It is speculative and irrelevant that the draft EIS states "...environmental inspectors could recommend restricting construction activities during unfavorable conditions (e.g., wet weather) to further reduce [soil] compaction and rutting." There is no requirement to restrict activities to limit such soil damage.	construction of the project. We do not believe that it is unreasonable to assume that agency-approved mitigation measures would be effective. Therefore, an analysis of the efficacy of the measures in the EIS is not warranted. As outlined in the FERC staff's Plan, one of the responsibilities of the environmental inspector is to advise the chief construction inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting. The environmental inspector also ensures compaction testing is performed to determine the need for corrective action. We have clarified the text in section 4.2.3.1.
NA2-23	The draft EIS fails to disclose the limited effectiveness of measures to control erosion and sediment delivery to streams from pipeline construction and operation. The final EIS must provide the limits of the measures' effectiveness, disclose these limits, and factor it into an analysis of the effect of pipeline construction and maintenance on sediment delivery and its consequent impacts.	We believe the measures to control erosion and sediment delivery to waterbodies in our Plan and Procedures are effective.
NA2-24	The draft EIS fails to disclose that significantly elevated erosion in logged areas typically persists for at least 5 years.	As discussed in section 4.4.2.3, similar to scrub-shrub communities, impacts on forested communities (i.e., coniferous, deciduous, mixed, early seral, and riparian forests) would be considered long term because of the time required to restore the woody vegetation to its preconstruction condition. Impacts associated with construction and operation would be greatest on these cover types due to the change in structure and environment caused by the removal of the large tree canopy over the width of the construction right-of-way. The clearing of trees from the construction right-of-way could also affect the remaining trees along the edge of the right-of-way. Trees located on the edge of the right-of-way may be subject to mechanical damage to trunks and branches and root impacts from soil disturbance and compaction, all of which may result in the decreased health and viability of the remaining edge trees. Edge trees that were located within a dense stand of trees before construction may lack stability following removal of adjacent supporting trees, which may result in increased tree failures.
NA2-25	The draft EIS fails to adequately disclose that seed mixes that will likely be used to mitigate for wetlands, generally contain noxious weed seeds, such as cheatgrass.	We have recommended in section 4.3.2.4 that NorthernStar continue to consult with the COE, NMFS, FWS, and other appropriate federal and state agencies to finalize its Waterbody and Wetland Construction and Mitigation Procedures Plan. The final plan should include measures to prevent the spread of invasive species due to construction activities within waterbodies and wetlands and procedures for monitoring the success of the revegetation and weed control efforts.
NA2-26	The draft EIS suggests adding large woody debris into streams in an attempt to mitigate the impacts of clearing riparian areas for pipeline construction. However, information indicates that such wood additions are	We agree that the placement of LWD into streams could have temporary adverse impacts on water quality due to increased suspended sediment and turbidity levels. However, it should be noted that, as stated repeatedly in the

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	often not only ineffective but also interfere with a variety of important stream processes and degrades aquatic habitat attributes.	commentor's letter and in agency correspondence, LWD is an essential fish habitat attribute and is important for both the survival and production of salmonids. Therefore, we believe that the benefits of using LWD as part of the proposed mitigation efforts outweigh any potential temporary impacts.
NA2-27	The draft EIS fails to adequately examine and disclose the impacts of detention ponds on water temperature.	As described in section 4.3.1.3, stormwater runoff from the terminal would be routed to stormwater retention ponds where it would be infiltrated to the ground and would not be released to surface waters. The retention ponds would be sized to hold runoff from a 100-year storm.
NA2-28	The draft EIS notes that construction mats will be used under heavy construction equipment operating in soft and saturated soils, but fails to disclose the degree, extent and persistence of soil compaction with these measures in place and consequent impacts on the infiltration rates, water holding capacity, runoff process, and other affected wetland functions, including the ability to absorb, store, and slowly release water. The draft EIS fails to disclose that the measure does not actually avoid water quality and aquatic habitat damage.	We believe section 4.4.1.3 adequately describes construction impacts to wetlands (temporary and permanent), restoration of wetlands, and measures taken to avoid spills in wetlands. NorthernStar is required to avoid impacts on wetlands to the maximum extent possible and must demonstrate that it has taken appropriate and practicable steps to minimize wetland impacts in compliance with the COE's section 404(b)(1) guidelines that restrict discharges of dredged and fill material where a less environmentally damaging alternative exists. This is consistent with the CEQ's Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1508.20), as further described in section 4.4.1.2.
NA2-29	Water quality effects are still an outstanding question that needs to be assessed. Water quality must be evaluated not as a river-wide average, but need to be calculated for their impacts to unique habitats. Discharges into Clifton Channel's shallow river margins and wetlands needs to be carefully analyzed. The water quality of Hunt Creek will be significantly impaired.	Within section 4.3.2.3, potential impacts on water quality are discussed for activities associated with construction and operation of the proposed project. In addition, potential impacts on unique or sensitive wildlife habitats due to construction of the LNG terminal are described in section 4.5.2.3. Therefore, we believe that potential impacts on Hunt Creek, Clifton Channel, and the mainstem of the Columbia River are discussed where appropriate. No discharges to Hunt Creek or Clifton Channel are proposed by NorthernStar.
NA2-30	The pipeline will result in many hazards, including enhancing landslide potential, increasing erosion, removing riparian cover to streams, and increasing the potential for frac-out and sedimentation. The unvegetated zone will be a constant source of sediment and stream heating.	See responses to comments IND35-7and IND106-53. Restoration of riparian areas is discussed in NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov , through the eLibrary link.
NA2-31	The draft EIS fails to adequately analyze the impacts of the 25-foot riparian strip which will not allow the area to revegetate with deep-rooted shrubs or trees more than 15 feet all over a 30-ft width of the center line. Studies have shown that impacts on water quality and aquatic habitats, including loss of: large wood recruitment, sediment detention from upslope sources, stream shading, and stream microclimate regulation can occur.	The EIS is a summary document; therefore, we believe that the level of detail of potential impacts on wetlands and waterbodies is appropriate. However, the revised BA and EFH Assessment will include additional analysis of potential impacts on wetlands and waterbodies, as they relate to potential impacts on federally listed species.
NA2-32	The draft EIS fails to adequately disclose the expected impacts of stormwater runoff and elevated erosion from the project with the cited measures in place.	NorthernStar has drafted a pipeline ESC Plan, and SWPPP, which are intended to meet the requirements of the respective Oregon and Washington stormwater discharge permits (see table 1.3-1 for a list of the major federal, state, and local codes, ordinances, statutes, rules, regulations, and permits

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		that would apply to the project.)
NA2-33	No data is provided on the temperatures or current levels of sediment delivery from watersheds of any streams crossed by the pipeline. The draft EIS does not disclose the extent, location, and proximity of all areas that will be disturbed near waterbodies that will reduce stream shade and LWD recruitment.	All waterbodies crossed by the proposed pipeline are provided in table 4.3.2-4. Potential impacts to these waterbodies and aquatic resources are discussed in sections 4.3.2 and 4.5.3. Habitat Overlay Maps were submitted to the FERC on October 20, 2006 as part of a Supplemental Filing to Resource Report 3. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov , through the eLibrary link.
NA2-34	The draft EIS fails to adequately assess the impacts to the area caused by water withdrawal for the water intake system.	Additional information discussing the potential impacts on water quality and aquatic resources due to water appropriations associated with construction and operation of the proposed project has been added to sections 4.3.2.3 and 4.5.2.1, respectively.
NA2-35	In streams that are already afflicted by high levels of sediment delivery and sedimentation, additional sediment delivery is likely to significantly and persistently add to existing problems. The draft EIS fails to disclose the magnitude of the effects on turbidity and suspended sediment caused by the construction of pipeline stream crossings.	Studies indicate that impacts on streams and rivers from typical pipeline construction would be temporary, and no long-term effects are expected.
NA2-36	The draft EIS does not adequately assess and disclose the impacts of stream crossings if methods other than HDD are used to cross streams. The draft EIS does not disclose the likely magnitude and frequency of frac-outs. The draft EIS fails to disclose that with frac-outs and the release drilling mud, it also will disrupt unconsolidated channel substrate, which will also generate downstream sediment delivery and turbidity. If the stream crossing method employed is HDD, the requirement to remove all riparian vegetation still exists, which will cause localized impacts to stream heating and sedimentation. The NorthernStar Mitigation Plan, for the HDD and boring methods, the stream crossings using the trenching method do not have any minimization procedures, pre-project baseline conditions, or post-project restoration conditions specified.	Non-HDD waterbody crossing techniques and potential impacts from, as well as discussion of potential frac-outs from HDDs are addressed in NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan, and its Attachment B, HDD Contingency Plan. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov , through the eLibrary link. The only potential disturbance in the area between entry and exit points of the HDD would be limited to the temporary deployment of HDD guidance (telemetry) cables. Clearing would be done by hand tools, and allowed to revegetate once construction was completed. The right-of-way would not be maintained between the entry and exit points of the HDD, preserving the riparian area around the stream crossing.
NA2-37	The draft EIS fails to disclose that attempts to divert streams for construction of pipeline crossings fail with some frequency, and these failures greatly increase sediment delivery and consequent impacts on streams.	Crossing methods are determined on a site-specific basis, therefore minimizing the potential for failure. Through the implementation of the FERC staff's Procedures, NorthernStar's Waterbody and Wetland Construction and Mitigation Plan, and adherence to in-water work windows, potential impacts would be minimized.
NA2-38	It is highly probable that placement of the pipeline in the sloughs would be used in the future as justification for never restoring these lands, should they become available. The draft EIS fails to explore the critical value of these sloughs and the long-term loss to the Columbia River ecosystem's restoration by pipeline construction.	NorthernStar would restore the pipeline right-of-way to its preconstruction condition following construction. Following temporary wetland impacts resulting from construction of the proposed project facilities, habitat and ecosystem function would be restored in place. Permanent impacts on wetlands would be mitigated by restoring habitat with similar ecological function. Mitigation would occur in areas substantially larger than that lost to permanent impacts, and would be restored to a higher level of ecosystem function. No future planned restoration projects have been identified for

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NA2-39	Placing the rail line within 30 feet of Hunt Creek would be a source of permanent and continuing degradation to the stream. Buffers are not sufficient as a means to reduce solar radiation and stream heating, reduce sediment delivery down-slope to the stream, or to protect the microclimate of the stream. The railroad has not been in use. Why is it being restored?	sloughs that would be crossed by the proposed project. We cannot require NorthernStar to alter its construction techniques based on speculative future projects. Section 2.1.3.6 addresses why the railroad is being restored. Discussion of the railroad realignment in section 4.3.2.3 has been updated.
NA2-40	The draft EIS fails to disclose all of the following aspects of project activities that will occur within 300 feet upslope of the Columbia River and all Hunt Creek tributaries, including intermittent channels and those that do not provide fish habitat: <ol style="list-style-type: none"> 1. The location and area of vegetation removal and soil disturbance, including soil compaction; 2. The type and amount of vegetation removed; 3. The nature and degree of soil impacts, including compaction, removal of soil cover, and alteration of soil properties 4. The distance to the nearest channel or waterbody 5. The type of activity 6. Activity duration and expected season(s) of occurrence; 7. Spatial connectivity of the nearest channel/waterbody to fish habitat and the fish populations using the habitats; 	Although we agree that potential impacts on waterbodies due to pipeline construction in upland areas should be addressed in the EIS (see sections 4.3.2.4 and 4.5.3.1), we believe that to quantify impacts within 300 feet of waterbodies would be arbitrary and capricious. The location, type, and amount of vegetation that would be disturbed due to the project are described in section 4.4.2.3 and in NorthernStar's Habitat Overlay Maps, which can be accessed through the FERC's eLibrary as described in the response to comment NA2-33. Potential impacts on soils due to pipeline construction are discussed in section 4.2.3.2. The cross-country and downstream distances to the nearest channel or waterbody from any point along the proposed route can be calculated using the Pipeline Location Maps (Appendix B). The proposed crossing method for each portion of the pipeline is shown on the Alignment Sheets for the Bradwood Landing Project, which can be accessed through the FERC's eLibrary as described in the response to comment LA3-31. Specific details regarding the duration of construction activities and season of occurrence in upland areas would be determined by the project contractor and cannot be predicted at this time.
NA2-41	The proposed LNG terminal site is located immediately adjacent to and upstream from the Julia Butler National Wildlife Refuge containing most of the remaining marshy tidelands in the estuary. This habitat is essential rearing habitat for salmon. The marsh grasses and other habitat here provide cover and food sources for these young salmon as they prepare for ocean entry.	Additional information has been added to sections 4.5.1.1 and 4.5.2.1 regarding potential impacts on unique and sensitive wildlife habitats, including the JBHNR.
NA2-42	The draft EIS does not adequately account for the current availability habitat for salmon fry and fingerlings within Reach C (NorthernStar) or Reach B (Svensen Island area) relative to historic conditions. The draft EIS does not clearly describe the effect of the project on these habitats.	A comparison of the current availability of habitat relative to historic conditions is outside the scope of the EIS. However, the revised BA and EFH Assessment will discuss potential impacts of the proposed project as they relate to the environmental baseline.

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Comment Number	Comment (Summary)	Response
NA2-43	The draft EIS failed to disclose all important impacts associated with the construction and operation of the terminal infrastructure at the scale of the Hunt Creek watershed.	The known impacts that are described individually within section 4.5.2.1 of the EIS are not expected to result in significant cumulative impacts on the Hunt Creek watershed. The EIS is a summary document and based on CEQ guidelines presents a full and fair discussion of significant environmental impacts; therefore, we believe that our analysis of potential impacts on Hunt Creek is adequate.
NA2-44	The draft EIS does not analyze the hydrologic impacts of pipeline construction and maintenance. The draft EIS fails to disclose the total amount of soil compaction associated with pipeline activities in wetlands with 300 feet of streams. This is significant because soil compaction alters soil hydrologic processes, including infiltration, water holding capacity, surface runoff, and surface water interactions with ground water. These all influence the functionality of wetlands, because the ability of wetlands to absorb, store, and release water is one of their key ecological features.	See the response to comments IND35-7 and IND106-53.
NA2-45	The draft EIS fails to adequately disclose the magnitude, persistence, and ramifications of pipeline construction on other impacts to the hydrology of wetlands and riverine areas.	See the response to comment NA2-31.
NA2-46	No mitigation for the long-lasting effects of soils compaction in wetlands was described.	See the response to comment FA2-10.
NA2-47	The draft EIS does not reveal the riparian buffer width that would be affected, without which it is impossible to accurately determine riparian impacts. The shade values or potential recruitable LWD of riparian buffers lost are not provided.	<p>The width of the riparian buffer that would be impacted would be site-specific for each waterbody crossing. However, as described in section 4.4.2, riparian habitats that would be impacted by the project in Oregon were classified based on the Oregon Habitat Mitigation Policy. Although the State of Washington does not have a similar habitat classification system, riparian habitats have been identified by the WDFW as a priority habitat. Impacts on riparian habitats are described in section 4.4.2 and depicted in Appendix C of the final EIS.</p> <p>Because the EIS is a summary document, the inclusion of detailed descriptions of each riparian area impacted is not appropriate. However, waterbody crossings will be addressed in additional detail in NorthernStar's revised Waterbody and Wetland Construction and Mitigation Procedures Plan as well as in the revised BA and EFH Assessment.</p>
NA2-48	It is unclear what would be done to revegetate the construction areas. It is not clear that replacement of native vegetation would occur by means other than passive restoration or that tree planting would even be attempted. What is considered to be potential natural vegetation for the area?	Revegetation methods are described in detail in sections 4.4.1.3, 4.4.2.2, and 4.4.2.3.
NA2-49	The draft EIS notes that when available, certified seed would be used for revegetation of areas disturbed by pipeline construction. This indicates that this measure may not be implemented. What impacts will occur if this	We have included a recommendation in section 4.4.2.3 that NorthernStar continue to consult with the COE, FWS, NMFS, Oregon and Washington Departments of Agriculture, and other appropriate resource agencies to revise

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Comment Number	Comment (Summary)	Response
	measure is not implemented.	its <i>Noxious Weeds and Soil-borne Plant Disease Control Plan</i> .
NA2-50	NorthernStar claims to replant more trees than the FERC requires, however no where is it mentioned what the FERC requires or how NorthernStar is exceeding those requirements. Is NorthernStar meeting the needed restoration quality of wetlands? Would it be more useful to refer to what the state considers needed and what is required to prevent environmental damage?	The FERC's revegetation requirements are described in our Plan and Procedures, which are available online at http://www.ferc.gov/industries/gas/enviro/uplndctl.pdf and http://www.ferc.gov/industries/gas/enviro/wetland.pdf , respectively. NorthernStar is proposing to replant forested communities in-kind. This would provide a higher level of mitigation than seeding, which is required by the Plan. The adequacy of NorthernStar's Compensatory Mitigation Plan is discussed in the response to comment FA2-10.
NA2-51	A longer monitoring plan is needed to assess revegetation. It is not clear that plant communities would replace what was lost in upland areas or what is considered to be the potential natural vegetation for the area. It would benefit disclosure interest to describe the minimal set of guidelines to know how far NorthernStar practices could potentially be degraded and what the consequences of this would be at sensitive sites and cumulatively.	Monitoring by NorthernStar would meet the requirements of the FERC staff's Plan and Procedures. Because the EIS is a summary document, inclusion of the Plan and Procedures would not be appropriate; however, these documents are available online as described in the response to comment FA2-51. Areas disturbed by construction activities would be restored; seeded with conservation grasses, legumes, native plant species, or other standard erosion control/cover species, where required; and allowed to naturally revegetate to preconstruction conditions, with the exception of upland forested communities which would be replanted in-kind with trees. As described in section 4.4.2.3, NorthernStar would monitor the success of revegetation efforts and employ reseeded, fertilizing, and other measures until herbaceous vegetative cover and density are similar to the adjacent areas not disturbed by construction. If there are excessive noxious weeds after the first or second growing season, an agronomist would determine the need for additional restoration measures that NorthernStar would implement, as necessary.
NA2-52	How will vegetation be kept from regrowing along the pipeline?	Per the FERC staff's Plan, NorthernStar would conduct maintenance clearing within the permanent right-of-way no more than once every 3 years.
NA2-53	The draft EIS fails to disclose the width of undisturbed vegetation on Hunt Creek. It is inadequate to maintain unimpaired riparian processes vital to water quality and fish habitat. It also fails to adequately disclose that the loss of riparian vegetation and its functions due to the railroad re-alignment measure will permanently maintain degradation of water quality and fish habitat.	Potential impacts on riparian habitat due to construction of the project are provided in table 4.4.2-1. The potential impacts on water quality within Hunt Creek and mitigation measures proposed by NorthernStar are described in section 4.3.2.3. Additional analysis of potential impacts on salmonids within Hunt Creek will be included in the revised BA and EFH Assessment.
NA2-54	Will the trees that are lost in construction of the pipeline, outside of the 15-foot riparian buffer to each side of the pipeline, be replaced?	As described in section 4.4.2.3, with the exception of the portion of the right-of-way within 15 feet of the pipeline (30 feet total), upland forested communities cleared for construction of the pipeline would be replanted in-kind with trees.
NA2-55	The EIS should include a mechanical cleaning system for the fish screens which will insure there is a back up to the air burst system or in the instance if the air burst system is overwhelmed. The draft EIS is unclear how and where LNG ship ballast, ship hull, and anchors would be treated to eliminate the threat of exotic organisms without contaminating the	As described in section 4.5.2.1, the NMFS has approved of NorthernStar's fish screen designs. Because the EIS is a summary document, specific details relating to cleaning system for the system would not be appropriate. However, the proposed water intake system will be described in additional detail in the

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Comment Number	Comment (Summary)	Response
	Columbia River. More information must be provided on the berth-side intake system and the shop retro-fit and demonstrate that fish will not be adversely impacted by its use.	revised BA and EFH Assessment.
NA2-56	Additional erosion from ship wakes could accelerate sediment deposition downriver in rearing habitats.	See the response to comment FA4-14.
NA2-57	The draft EIS also needs to be revised to clearly define, in a quantitative sense, what is meant by its repeated use of "minimize". The draft EIS describes many significant and persistent impacts to aquatic resources as being "minimized" without any clear description.	The term "minimize," as it is used in the EIS, means to reduce or lessen potential impacts on a given resource. Quantification of the extent that each measure proposed would minimize potential impacts would be based on site specific field conditions and can not be effectively predicted at this time.
NA2-58	The draft EIS has failed to analyze the proposed project dredging impacts to temperature, and salinity, and water flow and velocity both from a short-term and long-term perspective.	See the responses to comments SA1-54 and IND100-2.
NA2-59	Although the draft EIS claims that different deep draft ships have different tendencies to strand fish, there was no information presented on the probable tendency of the LNG ships to cause such a problem.	See the response to comment FA2-19.
NA2-60	The project will pose significant and irreversible harm to anadromous fish which rear, transit and hold in the area. The project will also adversely affect habitat needed to support other treaty resources such as sturgeon and lamprey. Protection and restoration of estuarine habitat is a vital component for the recovery of 13 salmon stocks listed as threatened or endangered under the ESA as well non-ESA listed salmon stocks.	Potential impacts on non-listed and federally listed fish species due to construction and operation of the LNG terminal are discussed in sections 4.5.2.1 and 4.6.2.2. As described in section 4.6.3, the FERC would not allow construction to proceed until after we have concluded formal consultation with the FWS and NMFS.
NA2-61	Ballast and water intake is a great concern and will impact juvenile fish. There is still an open question as to whether the source of the intake will be on the berth or through the conventional method via the ship. Either choice is full of problems that were either ignored by the draft EIS or not adequately examined.	See the response to comment FA1-28.
NA2-62	The draft EIS fails to offer specific fish migratory and behavior data coupled with flow, physical and chemical habitat parameters in the vicinity of the site and within the project navigation corridor.	The papers cited in this comment (Truelove et al., 2007; Baptista et al., 2005) reference an environment and observation forecast system model which use river conditions to predict fish behavior in the estuary by linking it to behavioral observations in radio tagged fish. Sufficient behavioral data in the proposed project area is not available to make this type of analysis. Further, according to the CEQ Guidelines for the preparation of an EIS, the level of effort in addressing potential impacts from project activities should be commensurate with the expected level of impact. The cited papers do not seem to point to a level of impact on migrating fish which would warrant this level of analysis.
NA2-63	Permanent loss of essential salmon habitat at the Bradwood Landing site is known to be a planned part of the facility development. The extent of loss of associated shallow water habitats in creation of the ship berth is not well described. The habitat improvement on Svensen Island is	Potential impacts on designated critical habitat at the LNG terminal site are described in section 4.6.2.2. Section 4.5.2.1 has been revised to include a description of the potential impacts on shallow water habitat due to construction of the LNG terminal. Additional information on the Svensen Island

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Comment Number	Comment (Summary)	Response
	unspecified. The draft EIS is deficient in its description of salmon life histories and critical habitat associated with the estuary and proposed project area and impacts.	Mitigation Sites will be included in NorthernStar's final Compensatory Mitigation Plan. The EIS is a summary document; although salmonid life history, critical habitat designations, and potential project impacts are included in sections 4.6.1.1 and 4.6.2, additional information will be included in the revised BA and EFH Assessment.
NA2-64	Dredging of a 58-acre turning basin next to the Columbia River navigation channel, frequent re-dredging of the turning basin, and filling of the log pond represent substantial impacts to estuary rearing habitats for salmon smolts and possible to spawning habitats. The use of habitats affected has not been evaluated.	Potential impacts on aquatic resources (including salmonids) due to the LNG terminal are discussed in section 4.5.2.1. See also the response to comment PM3-68.
NA2-65	The draft EIS fails to address the issue that the fall Chinook migrate and may rear in the proposed project turnaround lane that would be dredged. Chinook live in many tributaries that will be affected by the project (e.g. Westport Slough, the Clatskanie River, Abernathy Creek, Germany Creek, and the Cowlitz River. The draft EIS does not discuss habitat use by these species in the vicinity of the impact zones.	Potential occurrence of Chinook salmon in the vicinity of the LNG terminal site is described in section 4.6.2.2. Similarly, occurrence of Chinook in waterbodies impacted by pipeline construction are described in section 4.6.2.3 and in NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan, which is available through the FERC's eLibrary as described in the response to comment FA3-13.
NA2-66	How will Hunt Creek and Clifton Channel habitats be protected?	Impacts on aquatic habitats within Hunt Creek and Clifton Channel would be minimized through the implementation of the FERC staff's Plan and Procedures, NorthernStar's proposed mitigation measures and terminal ESC Plan, and our recommendations. In addition, NorthernStar is proposing to place the Hunt Creek Mitigation Site into a conservation easement that would be protected in perpetuity as part of its Compensatory Mitigation Plan.
NA2-67	Epidemiological studies for fish in the estuary are critical and should proceed and be included in the final EIS. The draft EIS did not consider the methodology for the study of the loss of reproductive success in Great Lakes trout due to exposure to toxic contaminants.	According to the CEQ Guidelines for the preparation of an EIS, the level of effort in addressing potential impacts from project activities should be commensurate with the expected level of impact. The assertion that bioaccumulative affects of pollutants resulting in long term effects to fish resulting from construction activity at the Bradwood site, can not be characterized with the best available science. Therefore, we believe that epidemiological or other field studies regarding bioaccumulation of toxins due to the proposed project are outside the scope of this EIS.
NA2-68	The draft EIS fails to discuss the potential efforts on Delameter Creek. The timing, nature, and location of actual measures along Delameter Creek are unspecified, not required, and uncertain to actually occur. The final EIS should clearly disclose these activities and measures.	See the response to comment FA2-10.
NA2-69	The draft EIS fails to include new field data regarding the potential impacts of the project on estuary health or fish health impacts from the proposed dredging activity or other proposed Bradwood Landing Project impacts. The draft EIS fails to offer specific fish migratory and behavior data coupled with flow, physical, and chemical habitat parameters in the vicinity	See the response to comment NA2-67.

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	of the site and within the protect navigation corridor. The ecological effects of the proposed alternatives in the draft EIS are largely founded upon information and conclusions of physical modeling. The lack of field studies and data are identified as major deficiencies of the draft EIS.	
NA2-70	There is a lack of studies conducted or reviewed that would determine what effects would be caused by lighting problems during construction and operation of the terminal.	Potential impacts of terminal lighting on aquatic and terrestrial resources are discussed in sections 4.5.2.1 and 4.5.2.3, respectively. We have recommended in section 4.5.2.1 that NorthernStar continue to consult with the NMFS, FWS, ODFW, and other applicable agencies regarding its Lighting Plan. We believe that the development of the Lighting Plan in coordination with applicable agencies would identify and minimize potential impacts on sensitive species in the vicinity of the terminal.
NA2-71	The draft EIS fails to provide current conditions of the affected aquatic habitat attribute in streams that will be affected by the operation and construction of the terminal, pipeline, and transportation network, railroad re-alignment, and associated power line construction.	The EIS is a summary document; therefore, we believe that the information provided in tables 4.3.2-1, 4.3.2-2, and 4.3.2-4 adequately describes current conditions of the waterbodies impacted by the proposed project. However, a detailed description of the environmental baseline will be included in the revised BA and EFH Assessment.
NA2-72	The draft EIS fails to indicate what riparian buffer width was actually affected in pipeline corridors.	See the response to comment NA2-47.
NA2-73	The draft EIS misleads in its discussion of the impact of power line construction and maintenance, incorrectly stating that impacts on non-fish-bearing tributaries to the fish-bearing Hunt Creek are unlikely to have impacts on downstream fish habitat. The draft EIS must be revised to clearly identify all tributaries to fish-bearing streams that will be affected by project activities, and must clearly disclose that impacts to intermittent and/or non-fish-bearing streams have water quality impacts and contribute significantly to the degradation of downstream fish habitat.	Comment noted. Sections 4.3.2.3 and 4.5.2.1 have been revised to include additional information regarding potential impacts on water and aquatic resources, respectively, due to construction of the electric power line. Additional information on the waterbodies that would be crossed by the power line was filed with the FERC as part of the JPA, which can be accessed through the FERC's eLibrary as described in the response to comment PM1-4.
NA2-74	The draft EIS does not discuss how the alternatives could affect tribal socioeconomic factors or culture, and fails to assess how the proposed project will impact treaty and cultural resources. The proposed project will not benefit the protection of tribal trust resources.	The alternatives can not reasonably be studied to the same level of detail as the proposed site due to the time and cost that would be required. Our alternatives analysis focuses on the major factors that would result in the highest level of potential environmental impacts and for which data is readily available through published and public sources.
NA2-75	The proposal to construct and operate an LNG terminal in essential rearing habitat for salmonids, sturgeon and lamprey impacts treaty resources for which CRITFC was formed to protect.	Potential impacts on aquatic resources are included in section 4.5. Indian treaty fishing rights are discussed in section 4.8.1.7.
NA2-76	The draft EIS fails to address impacts from the alternatives on archaeological resources. The final EIS should contain the linkages between the fish populations, and their fate under the four alternatives and others presented in these comments with tribal cultural resources. It should also examine the issue of Environmental Justice with respect to all	See the response to comment NA2-74.

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Comment Number	Comment (Summary)	Response
	alternatives analyzed.	
NA2-77	It is recommended that government-to-government basis be appropriated with CRITFC member tribes and become engaged in consultation with the tribes.	As discussed in section 4.9.3, the CRITFC has been included in our consultations with Native American tribes.
NA2-78	The nature of the CRITFC member tribes' treaty rights are mischaracterized (page 4-330).	Section 4.8.1.7 has been revised to provide additional discussion of the CRITFC member tribes' treaty rights.
NA2-79	Each LNG ship would maintain a Shipboard Oil Pollution Emergency Plan (SOPEP). It is not clear how carrying a plan on board would be effective in dealing with a spill or a leak. What materials are available on board that would actually assist in limiting the spill or leak? What materials would be required at the LNG terminal or at stations along the pipeline route to rapidly deal with major leaks or spills?	LNG carriers would be required to carry Coast-Guard approved vessel response plans and comply with state spill prevention and contingency plans, including the applicable requirements in Chapter 317-40 of the Washington Administrative Code – Bunkering Operations. Any materials used for leak and spill mitigation at the terminal would be detailed in the ERP.
NA2-80	The draft EIS must reasonably evaluate the efficacy of proffered mitigation measures based on available scientific information, together with the physical setting of the project's impacts, and use this to reasonably determine and disclose the direct, indirect, and cumulative impacts on aquatic and watershed resources in a clear fashion.	We have recommended in sections 4.3.2.4 and 4.4.1.2 that NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan and final Compensatory Mitigation Plan, respectively, be filed, along with agency approvals, with the Secretary prior to construction of the project. We do not feel that it is unreasonable to assume that agency-approved mitigation measures would be effective. Therefore, an analysis of the efficacy of the measures in the EIS is not warranted.
NA2-81	There is no cumulative effects analysis. For example, the pipeline impacts could result in cumulative sediment delivery for the multiple headwater tributary crossings that could affect sloughs and mainstream habitats.	We disagree. Cumulative effects are discussed in section 4.12 of the EIS. Cumulative impacts are defined in section 4.12 as those impacts resulting from other projects that are projects would be constructed at or close to the same time as the proposed project. In response to the example stated, with the implementation of our Procedures and NorthernStar's pipeline ESC Plan in Oregon and its SWPPP in Washington, impacts on water quality and aquatic resources in the waterbodies crossed by the proposed pipeline would be less than significant; therefore, we believe that our analysis of cumulative impacts as it relates to these topics is adequate.
NA2-82	The draft EIS lacks assessments of synergistic and cumulative impacts to salmon and critical habitat that could result from dredging.	Because dredging associated with the other projects described in table 4.12-1 is not expected to occur concurrently with either construction or maintenance dredging associated with the Bradwood Landing Project, cumulative impacts on salmonids from dredging activities are not expected.
NA2-83	The draft EIS does not meet the requirements of the NEPA with regards to the cumulative impacts analysis. 1. Catalogue past projects in the area 2. Assess the cumulative environmental impacts of those projects with the proposed project 3. Analyze the additive cumulative impact of all reasonable	We are not aware of past projects in the area of the project with similar types of impacts that would contribute significantly to cumulative environmental impacts. We interviewed representatives of local governments to determine projects that were planned in the area of the project. If projects have not been proposed and local officials are unaware of them, we do not believe they are reasonably foreseeable.

Due to the length of the Columbia River Inter-tribal Fish Commission comment letter (comment letter NA2), we have summarized the issues raised and include them in the following table along with our responses. A copy of the complete letter follows the response table.

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	foreseeable federal and non-federal actions, whether or not they have actually been proposed.	

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**COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION**

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December 21, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

**RE: Docket Nos. CP06-365-000 (Bradwood Landing LLC); CP06-366-000; CP06-376-000;
CP06-377-000 (NorthernStar Energy LLC).**

Dear Secretary Salas:

The Columbia River Inter-Tribal Fish Commission (CRITFC) appreciates the opportunity to provide FERC with comments on its Draft Environmental Impact Statement for the proposed Bradwood Landing LNG Project. We have reviewed the document and are attaching our general and specific comments to this letter. Likewise, we incorporate by reference comments filed by the Nez Perce Tribe as well as the Bureau of Indian Affairs (filed 9/2007). As the BIA noted, FERC has not consulted on a government-to-government basis appropriately with CRITFC member tribes on this action. We recommend that FERC engage in consultation with the tribes.

This project is substantial and complex and poses a myriad of potential negative impacts to our member tribes' treaty resources. We have attempted to address as many of our concerns as possible in the following comments, however we reserve the right to supplement our comments in the future as data gaps are filled and new information is released. Through our review of the proposed project and the DEIS, we have found that the DEIS has failed to meet the requirements of NEPA, including consideration of an adequate range of alternatives, provision of available or appropriate environmental analyses and a thorough and complete cumulative impacts analysis. Through our comments we have attempted to point out many of these specific problems. Because the DEIS fails in so many respects to fulfill the requirements of NEPA, we strongly recommend that FERC issue a Supplemental DEIS and solicit comments on this document prior to proceeding to an FEIS.

Consistent with FERC's consultation policy with tribal sovereigns, the CRITFC member tribes request a meeting with FERC staff to discuss and attempt to resolve these critical issues in the very near future.

Sincerely,

Olney Patt, Jr.
Executive Director

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CERTIFICATE OF SERVICE

I hereby certify that I have this day served by electronic mail and/or U.S. Mail the foregoing document on all parties listed on the official service list compiled on this proceeding as of July 5, 2006.

Dated this 21st day of December, 2007.

/s/ Julie Carter
Julie Carter
Columbia River Inter-Tribal Fish Commission

K-398

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**CRITFC COMMENTS ON THE
BRADWOOD LANDING PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT**

The Columbia River Inter-Tribal Fish Commission (CRITFC) believes the construction and operation of the Bradwood LNG terminal will detrimentally and unavoidably impact important estuarine habitat, and that the construction of a gas pipeline along the Columbia River would similarly affect a great deal of habitat. We disagree with FERC's statement in its opening letter for the DEIS:

[I]f the project is constructed and operated according to applicable laws and regulations, and with implementation of NorthernStar's proposed mitigation measures, and additional measures recommended by the Agency Staffs, we believe that environmental impacts will be substantially reduced.

First, the statement is factually incorrect. The project will result in adverse impacts to the environment that will continue to exist regardless of the mitigation chosen. Mitigation simply attempts to purchase benefits, usually in another location, that may mirror the benefits lost from an activity. Based on our review of scientific materials, we believe that the project will pose significant and irreversible harm to anadromous fish which rear, transit and hold in the area. The project will also adversely affect habitat needed to support other treaty resources such as sturgeon and lamprey. Protection and restoration of estuarine habitat is a vital component for the recovery of thirteen salmon stocks listed as threatened or endangered under the Endangered Species Act (ESA), as well as other, non-ESA listed salmon stocks, *e.g.*, Pacific lamprey and sturgeon. A terminal such as this is at odds with state, federal and tribal efforts to protect and restore these estuary functions. As such, we recommend that FERC deny this permit outright.

The following comments are based on review of the Draft Environmental Impact Statement (DEIS) and salient scientific literature and information regarding the project's likely impacts on aquatic and watershed resources.¹ These comments focus on the adequacy of the analysis and disclosures in the DEIS of the project's direct, indirect, and cumulative impacts on aquatic and watershed resources. The comments describe some of the many significant defects in the DEIS that must be rectified in a Supplemental EIS and/or the final EIS in order to reasonably analyze and disclose these impacts. Due to time and space constraints, together with the manifold defects in the DEIS, these comments are not an exhaustive description and discussion of the document's many shortcomings with respect to reasonable disclosure of the project's direct, indirect, and cumulative impacts on aquatic and watershed resources. Instead, these comments describe only some of the more significant flaws in the DEIS disclosure of these impacts.

¹ In these comments, "aquatic resources" is used to denote biotic and abiotic in-channel elements and processes, including fish and macroinvertebrate populations, habitats for these populations, water quality, large woody debris, channel morphology, substrate, and streamflow, as well as the riparian processes and elements that strongly influence the condition of these aquatic resources. In these comments, "watershed resources" is used to denote processes and elements at the watershed scale that influence aquatic resources. These processes and elements include vegetation, soils, wetlands, erosion, sediment routing, surface runoff, and, groundwater-surface water interactions.

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CERTIFICATE OF SERVICE

I hereby certify that I have this day served by electronic mail and/or U.S. Mail the foregoing document on all parties listed on the official service list compiled on this proceeding as of July 5, 2006.

Dated this 21st day of December, 2007.

/s/ Julie Carter
Julie Carter
Columbia River Inter-Tribal Fish Commission

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GENERAL COMMENTS

In 1977, CRITFC was formed by the four Columbia River treaty tribes: the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Yakama Nation. The fish and wildlife committees of these tribes govern CRITFC. The four CRITFC member tribes have 1855 treaty rights to take fish that pass their usual and accustomed fishing places. CRITFC functions to protect, promote, and enhance the Columbia River Basin's anadromous fish resources consistent with the treaty-secured interests of its member tribes by formulating a broad, general fisheries program, and providing technical and legal support. Salmon, lamprey, sturgeon, water and other natural and cultural resources of the Columbia River Basin, including the Lower Columbia River Estuary, are critical to tribal culture, religion and economy. Consequently, CRITFCs' tribal members rely upon these resources in a manner that differs greatly from the non-tribal community.

The Bradwood Landing/NorthernStar LLCs proposal to construct and operate an LNG terminal in essential rearing habitat for salmonids, sturgeon and lamprey implicates treaty resources for which CRITFC was formed to protect. We strongly disagree with FERC's unsupported assessment that "no significant adverse impacts on Indian treaty fishing rights are anticipated as a result of the proposed project" or, even more significantly, that the project will have a "net benefit to fishery resources in the lower Columbia River." (4-330). This incredibly short-sighted notion that a large industrial development constructed right in the middle of the nursery for the most significant fish run for the tribal treaty fisheries would be beneficial is quite similar to old promises made to the tribes, such as when the U.S. Corps of Engineers promised that hatcheries would mitigate for fish lost to Bonneville Dam or that putting fish in barges and trucks would protect the fish. Today, with many fish stocks in serious decline and listed under the ESA, it is abundantly clear that these promises did not come to fruition.

Wy-Kan-Ush-Mi Wa-Kish-Wit (Spirit of the Salmon), CRITFC's guiding plan for fish recovery in the Columbia and Snake river basins, recommends: *Protect the remaining wetlands and intertidal areas in the estuary in which anadromous fish are particularly dependent.* The Bradwood site is located immediately adjacent to and upstream from the Julia Butler National Wildlife Refuge containing most of the remaining marshy tidelands in the estuary. This habitat is essential rearing habitat for salmon, including salmon that originate more than 500 miles upstream in Idaho, Oregon, and Washington. The marsh grasses and other habitat here provide cover and food sources for these young salmon as they prepare for ocean entry. This area is critical to the salmon's lifecycle and is a key component to the recovery of salmon stocks that have sustained tribal peoples for millennia. Contrary to characterizations of this project in this, and other permitting forums, this project is a large-scale development that is wholly inappropriate for the Bradwood location. The storage tanks themselves would be as tall as high-rise buildings (approximately 15 stories high) and the amount of dredging required (700,000 cubic yards) in a riverbed area considered for aquatic conservation, is immense. The ships that will visit the site two to three times each week will be the largest ships on the river to date. Their consumptive ballast water requirements are equivalent to a new large (unscreened) irrigation development. The DEIS notes that this site was formerly a mill, however, in the interim fifty (or more) years, much of the property has restored itself to be functional marsh habitat for a variety of aquatic species, including those in the mill pond which would be filled for this development.

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It is important to note, however, that we are not opposed to the use of natural gas as a source of energy for the region. The Tribal Energy Vision (Vision) was created to “reduce the pressure of energy demand on Columbia Basin fish and wildlife resources” – in effect, to “take energy policy off the backs of salmon and the environment that supports them.” (Vision, pg. v). In addition to other recommendations, the Vision supports “strategically placed” gas-fired power generation as a part of a diversified energy portfolio for the region. Natural gas, a “bridge” fuel to seeking alternative sources energy, is still a fossil fuel, meaning it is non-renewable and has many limitations. While we support sources of energy that decrease reliance on hydropower, we are also wary of those projects that may result in more harm to aquatic wildlife which already face innumerable challenges throughout their life stages in the Columbia River. The Bradwood LNG project would not fit under the goals of the Tribal Energy Vision in that it once again supplants energy acquisition over salmon recovery.

The Lower Columbia River Estuary has been subjected to a great deal of industrial and other development over the past century which has harmed fish populations that are crucial to tribal fisheries. Recently, the Estuary, and its value to the ecology of the entire basin, has been receiving more notice and evaluations from agencies, tribes and legislators. In 2006, the Affiliated Tribes of the Northwest Indians (ATNI) and the National Congress of American Indians (NCAI) both passed resolutions opposing the Bradwood project as an inappropriate development and supporting efforts to preserve and protect the Lower Columbia River Estuary as an essential sanctuary and refuge for preserving aquatic life that is integral to tribal treaties. The Environmental Protection Agency recently listed the Columbia River as a “Great Water Body” as part of its Strategic Plan. The estuary is noted as a priority for restoration under this plan. In addition, there is a bill³ on the United States Senate’s calendar to consider studying the feasibility of naming the lower Columbia River estuary as a National Heritage Area.

In the ongoing litigation, *National Wildlife Federation v. National Marine Fisheries Service*,³ the National Marine Fisheries Service (NMFS, or NOAA Fisheries) was ordered to revisit its Biological Opinion (BiOp) on the operations of the Federal Columbia River hydropower system (FCRPS) and work with resource managers to develop a plan that would protect and recover the fish that are lost to the hydropower system (the so-called “Remand Process”). In fall of 2007, NOAA Fisheries released its 2007 draft BiOp which contains many provisions focusing on the value and importance of the estuary in the recovery of salmon. In its Supplemental Comprehensive Analysis, NOAA Fisheries notes that how ever they attempt to increase the Smolt-to-Adult Return (SAR) of fish, the success of the program depends on a variety of factors; including “biological productivity in the estuary/near shore ocean environment.” NOAA Fisheries Draft Supplemental CA, at 8-6. Throughout its analysis, NOAA Fisheries repeatedly notes that “key limiting factors” for ESA-listed salmonids include the estuary. *Id.*, at 8.2-4. Notably, for Snake River Fall Chinook, NOAA Fisheries notes that if “habitat actions” to improve quality and access are undertaken in the estuary, there is a survival benefit of approximately 9%, but that recovering estuarine habitat would result in “positive effects” that “will be long-term”. *Id.*, at 8.2-4 to 8.2-5. The BiOp pays particular attention to the dramatic changes in the estuary over the course of the last century.

Historically, the downstream half of the Columbia River estuary was a dynamic environment with multiple channels, extensive wetlands, sandbars, and shallow areas. ... Today, navigation channels have been dredged, deepened and maintained, jetties and pile-dike fields have been constructed to stabilize and concentrate flow in navigation channels, marsh and riparian

³ H.R. 401, the Columbia-Pacific National Heritage Area Study Act

³ See, e.g., *National Wildlife Federation v. National Marine Fisheries Service*, 254 F. Supp.2d 1196 (D. Or. 2003).

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habitats have been filled and diked, and causeways have been constructed across waterways...More than 50% of the original marshes and spruce swamps in the estuary have been converted to industrial, transportation, recreational, agricultural, or urban uses. More than 3,000 acres of intertidal marsh and spruce swamps have been converted to other uses since 1948 (Lower Columbia River Estuary Program [LCREP] 1999). Many wetlands along the shore in the upper reaches of the estuary have been converted to industrial and agricultural lands after levees and dikes were constructed.

NOAA Fisheries Draft Supplemental CA, § 5.3.1, at 5-19. While several pages in the DEIS were given to explaining how the Bradwood site was a mill site fifty years ago, the DEIS gives little credence to the fact that the property has self-restored and is important viable marsh habitat. Reading the NMFS’ supplemental CA and other trends noted by other resource managers, it is clear that stepping backwards and allowing industrial development anew on this property is contrary to recovering aquatic species.

NEPA Requirements

The National Environmental Policy Act (NEPA) requires FERC staff to articulate its proposed action and then analyze the environmental impacts of and alternatives to this action. 42 U.S.C. § 4332(C). NEPA also makes clear that FERC is required to discuss in detail all appropriate alternatives to its recommended course of action. *Id.* The Council on Environmental Quality’s implementing regulations emphasize that the discussion of alternatives constitutes the “heart” of the environmental impact statement and explain that FERC is required to “rigorously explore and objectively evaluate” the environmental impacts of all reasonable alternatives. See 40 C.F.R. § 1502.14.

NEPA’s implementing regulations require that FERC present the environmental impacts of its proposed alternative and alternatives in comparative for, “thus sharply defining the issues and providing a clear basis for choice among options.” See 40 C.F.R. § 1502.14. By eliminating alternatives before truly analyzing them, FERC staff has avoided conducting a rigorous analysis of the environmental impacts and benefits of these alternatives and has failed to provide reviewers with a clear, comparative way of evaluating all options.

Furthermore, NEPA requires a cumulative impacts analysis to: (1) catalogue past projects in the area; (2) assess the cumulative environmental impacts of those projects with the proposed project; and (3) analyze the additive cumulative impact of all reasonably foreseeable Federal and non-Federal actions, whether or not they have actually been proposed. See *City of Carmel-By-The-Sea v. United States Dep’t of Transp.*, 123 F.3d 1142, 1160 (9th Cir. 1997) (rejecting cumulative impacts analysis that referred generally to other past “development projects” and did not discuss the additive impacts of foreseeable future projects); *Fritiofson v. Alexander*, 772 F.2d 1225, 1243 (5th Cir. 1985) (agency must consider reasonably foreseeable actions regardless of whether they have yet formally been proposed). NEPA requires that a cumulative impacts analysis provide “some quantified or detailed information” because “[w]ithout such information, neither courts nor the public . . . can be assured that the Forest Service provided the hard look that it is required to provide.” *Cuddy Mountain*, 137 F.3d at 1379.

This DEIS falls far short in satisfying all these requirements. Throughout the Draft Environmental Impact Statement (DEIS), FERC continuously downplays the likelihood for negative effects that this project could have on fish and wildlife. At the same time, FERC inaccurately emphasizes the positive “benefits” of the project without much substance to back its conclusions. Simply put, the facts found do not support the conclusions made.

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While recognizing the need to assess cumulative impacts, the DEIS contains no analysis of such impacts. For example, with regard to aquatic resources, the DEIS merely lists a few factors in addition to the proposed Bradwood Project that affect the species and asserts that the effects of such additional factors is included in the baseline description of the species. A review of this section illustrates the complete lack of any meaningful cumulative impacts assessment. That section merely provides a description of the current status of some species affected by the project. In no way does it meet the requirements of NEPA to (1) catalogue past projects in the area; (2) assess the cumulative environmental impacts of those projects with the proposed project; and (3) analyze the additive cumulative impact of all reasonably foreseeable Federal and non-Federal actions, whether or not they have actually been proposed. In fact, there is no discussion of specific actions, whether past or reasonably foreseeable, as required by NEPA. Therefore, we recommend that, at a minimum, FERC require the applicant, NorthernStar to conduct further studies and gather more substantive information prior to issuing a final EIS.

Summary List of Problems with the Proposed Project

Following is a summary list of the some of the deficiencies we discovered in the DEIS as well as with the Bradwood LNG project generally. These are not comprehensive, but provide guidance to our concerns.

- Alternatives analysis is severely deficient. It lacks the strengths and weaknesses of all alternatives, particularly the no action alternative. Most alternatives were discarded without full consideration required by NEPA and necessary to the FERC to make a reasoned decision on this project.
- Mitigation is seriously inadequate, and there is no analysis of its effectiveness. In the case of the “voluntary” SEI (upon which FERC appears to rely a great deal), the mitigation is not guaranteed to be completed. In addition, much of the habitat used for mitigation is too far distant to be “replacement” habitat as much of it is located in a different ecological zone in the estuary. Also, the loss of mainstem rearing area will not be compensated.
- There is no cumulative effects analysis. One example; the pipeline impacts could result in cumulative sediment delivery for the multiple headwater tributary crossings that could affect sloughs and mainstem habitats.
- Ballast and water intake is a great concern and will impact juvenile fish. There is still an open question as to whether the source of the intake will be on the berth or through the conventional method via the ship. Either choice is full of problems that were either ignored by the DEIS or not adequately examined.
- Hunt Creek will be significantly impaired.
- Dredging (during construction and thereafter) will greatly affect the area. Sedimentation of Clifton Channel is a significant risk and there appears to be very few protections to fish.
- Water quality effects is still an outstanding question that needs to be assessed. To start, water quality must be evaluated not as a river-wide average, but need to be calculated for their

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impacts to unique habitats. Discharges into Clifton Channel’s shallow river margins and wetlands needs to be carefully analyzed.

- Impacts to sloughs are significant. Change in groundwater flow, sedimentation, turbidity, increased temperature. It will result in forgoing restoring these habitats for the life of the project, rendering their potential restoration value to zero. Soil compaction will be severe and permanent. Potential for channeling flow, causing erosion.
- The pipeline will result in many hazards, including enhancing landslide potential, increasing erosion, removing riparian cover to streams, and increasing the potential for frac-out and sedimentation. The unvegetated zone will be a constant source of sediment and stream heating.

PROBLEMS WITH THE DEIS

The DEIS is devoid of substantive analysis and full of unsupported conclusory determinations. There is a serious lack of information within the actual document such that it was exceptionally difficult to review and analyze. There are several general types of recurrent defects in the DEIS that need rectification in order to reasonably disclose the project’s impacts on aquatic and watershed resources. These recurrent problems are listed below.

The DEIS has some major factual inaccuracies as well. For one, FERC mischaracterizes the nature of the CRITFC member tribes’ treaty rights:

{Pg. 4-330} Comments were received during scoping regarding potential impacts of the project on Indian treaty fishing rights. Four Indian tribes hold treaty fishing rights for ceremonial, subsistence, and commercial purposes in the Columbia River above Bonneville Dam. Although the court has approved the 2005-2007 Interim Management Agreement providing that the Treaty Tribes and the States of Oregon and Washington may agree to a fishery for the Treaty Tribes below the Bonneville Dam, no agreement has been negotiated that would authorize Indian treaty fishing in the area adjacent to the proposed site. No Indian treaty fishing sites have been identified along the waterway for LNG marine traffic. However, salmon migrating to and from sites above Bonneville Dam could be affected by the passage of LNG ships during operation of the proposed project. As discussed in section 4.5.1.1, NorthernStar would avoid, minimize, reduce, rectify, and compensate for impacts on fishery resources during construction and operation of the project. Therefore, no significant adverse impacts on Indian treaty fishing rights are anticipated as a result of the proposed project. In fact, implementation of NorthernStar’s SEI is expected to result in a net benefit to fishery resources on the lower Columbia River.

As we noted above, we do not agree with FERC that there will be no significant adverse impact to fishery resources and more important, no impact to tribal treaty fishing rights. Furthermore, it is important to note that the four CRITFC member tribes hold “the right to take fish at all usual and accustomed fishing places” through their respective treaties. This right has been affirmed by a long line of court precedent. In the case, *United States v. Oregon*, the court stipulated that each tribe held at least one usual and accustomed fishing place in river Zone 6, i.e., the mainstem Columbia River from Bonneville to McNary dams. However, this stipulation does not define the geographical extent of any of the tribes’ usual and accustomed fishing places, nor does any subsequent agreement. We recommend that FERC correct this paragraph.

Data Deficiency in Model Predictions

The ecological effects of the proposed alternatives in the DEIS are largely founded upon information and conclusions of physical modeling. The lack of field studies and data are identified as

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major deficiencies of the DEIS. Despite the fact that physical models were constructed, no new field studies or data were produced for the DEIS. Other than some cursory sediment sampling, the DEIS fails to include new field data regarding the potential impacts of the project on estuary health or fish health impacts from the proposed dredging activity or other proposed Bradwood LNG impacts. The DEIS fails to offer specific fish migratory and behavior data coupled with flow, physical and chemical habitat parameters in the vicinity of the site and within the project navigation corridor, even though such an approach is available (Truelove et al. 2007; Baptista et al 2005). McComas et al. (2007) have begun juvenile salmon acoustic telemetry work and habitat assessment work from Cathlamet Bay to Tenasillahe Island which covers the proposed LNG site. Further, there is only limited information in the DEIS regarding ship wake impacts on EFH.

ESA: Lack of Analysis of Impact to Listed Species

The DEIS describes some potential impacts to 13 ESUs of Columbia and Snake River salmon, but fails to mention or list, much less address, proposed project impacts to other non-listed salmon and other fish species. Mid-Columbia summer Chinook, Mid-Columbia Sockeye, Mid-Columbia coho, Deschutes River fall Chinook and the last great North American wild stock of fall Chinook that originates in the Hanford Reach all depend upon critical habitat, including the Columbia River Estuary, and all pass through and may directly utilize the proposed project site. In addition, Pacific lamprey that are severely depressed and Columbia River white sturgeon migrate and may rear in the proposed site. These are all treaty trust resources of CRITFC's member tribes.

Tribal Socio-Economic Resources

The DEIS does not discuss how the alternatives could affect tribal socioeconomic factors or culture, and fails to assess how the proposed project will impact treaty and cultural resources. The FEIS should analyze the continuing and cumulative impacts of the DEIS alternatives to the socioeconomic factors for tribal communities using methods and data described in Meyer Resources (in CHM2Hill 1999). The Meyer Resources analysis describes the transfer of river wealth from tribal communities to non-tribal communities from actions such as dredging for navigation. Loss of tribal wealth with respect to loss of fish and wildlife resources from the river has resulted in disproportionate rates of poverty and mortality to tribal communities compared to non-tribal communities.

With respect to tribal cultural resources, the DEIS fails to address impacts from the alternatives to archaeological resources. The health and abundance of anadromous fish, including salmon, steelhead, Pacific lamprey and sturgeon are also critical tribal cultural resources and have been since time immemorial. The FERC has not consulted with the tribes about impacts to cultural resources from the proposed alternatives. The FEIS should contain the linkages between these fish populations, and their fate under the four alternatives and others presented in these comments with tribal cultural resources. The FEIS must examine the issue of Environmental Justice with respect to all alternatives analyzed. The proposed project will not benefit the recovery of Columbia Basin fish populations or protection of tribal trust resources.

Mitigation Options

The mitigation plan that is required by regulations amounts to little more than avoidance, minimization, and reduction of impacts. This type of mitigation, as described, is highly discretionary in its consideration of what impacts are actually avoidable. Some aspects that are available (e.g., suspension of work during adverse weather) are not even required but merely suggested. Impacts are

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disclosed only in the most qualitative manner (e.g., riparian vegetation removal is apt to result in increases in water temperature and avoidance of some of the impact could be facilitated by minimizing riparian loss to the extent possible). Quantitative impact analysis was not conducted, nor was a cumulative evaluation of impact at a basin scale, where a basin is the habitat unit supporting populations of listed or sensitive species.

• **Salmon Enhancement Initiative (SEI)**

We are encouraged by NorthernStar's "Salmon Enhancement Initiative" (SEI) as a step in the right direction. We would like to see more private industry step up and contribute for their respective impacts on aquatic resources in the region. But we are also troubled by the grand predictions made by both the applicant and FERC of the results of this program which we know to be overly optimistic and unrealistic. The SEI, if implemented correctly, *could* be beneficial to the recovery of salmonids. However, we disagree with FERC's assertion that it "would potentially contribute significantly to the conservation and recovery of salmonids (and other species) protected under the ESA." (pg. 2-242).

The SEI is addressed *no less* than eleven times in the DEIS, and its proposed composition and processes given several pages of discussion. FERC continually refers to the SEI as something that will be implemented throughout the life of the project, (e.g., 4-151, 4-162, 4-453), and would be "above and beyond" the usual set of mitigation measures (2-32). Yet FERC emphasizes that the initiative is merely voluntary (e.g., 2-32, 4-271, 5-7) while noting that the SEI is an interrelated and interdependent action (e.g., 2-28). First, it is not entirely clear why the SEI does not fall under FERC's regulatory authority; and second, why, if FERC intends to give it so much credence, doesn't FERC require the SEI program as part of FERC's conditions to the license?

If FERC is using this program to demonstrate that the LNG project will adequately mitigate for its impacts to fish, then it is inconceivable why FERC claims it has no jurisdiction over the program. On the other hand, if FERC does not, in fact, have jurisdiction, then the DEIS should not include the benefits of this mitigation within the framework of analyzing the LNG project. There is virtually no assurance anywhere that SEI will be implemented once FERC issues the license. If the license is transferred to a third party to take control of construction and/or operations, again, without the SEI as part of conditions of licensure, there is zero assurance that the provisions of the initiative will be respected. Indeed, in the applicant's IPO filing with the SEC, there is no mention of the SEI as a commitment or a liability, whereas other (smaller) donations to other organizations were listed. We recommend that FERC address the SEI as either a required condition of the license, or remove the SEI from consideration as a certain-to-occur mitigation for the project's damages.

• **Limits of Effectiveness of Mitigation Measures Relative to "Minimization" of Impacts**

The DEIS fails to take a hard look at the limits of the effectiveness of mitigation measures and BMPs based on available scientific information and literature, including applicable case studies. Instead of reasonably considering the limits of mitigation and BMP effectiveness, the DEIS makes sweeping, arbitrary assumptions about the impacts of activities in the complete absence of a hard look at the limited efficacy of mitigation measures. This recurrent defect precludes reasonable disclosure of the project's impacts and ignores the best available scientific information.

This type of defect occurs throughout the DEIS in its discussions of many aspects of the project's impacts on aquatic and watershed resources. For instance, in discussing the significant impacts of heavy machinery and construction on wetland soils, the DEIS merely describes measures

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that might be taken to somewhat limit soil damage (compaction, disruption, loss of infiltration rates, and water-holding capacity) relative to what would occur in the absence of these measures, but without any disclosure of the degree, extent, and persistence of soil damage that will occur to soils with these measures in place. As a specific example, the DEIS notes (p. 4-46) that construction mats will be used under heavy construction equipment operating in soft and saturated soils, but fails to disclose the degree, extent and persistence of soil compaction with these measures in place and consequent impacts on the infiltration rates, water holding capacity, runoff process, and other affected wetland functions, including the ability to absorb, store, and slowly release water. In this specific example, the arbitrary approach thoroughly precludes reasonable impact disclosure because wetland soils will still be compacted under machinery operating over mats, resulting in direct, indirect, and cumulative impacts on wetland functions that are not reasonably disclosed in the DEIS. In this specific instance, the DEIS also fails to reasonably disclose that wetland impacts from widespread soil compaction are extremely persistent, usually requiring more than 50 years for complete recovery.

In discussions of the impacts of pipeline construction and operation of streams, the DEIS repeatedly asserts (e.g., p. 4-168) that "... to **avoid impacts on aquatic habitat water quality (sic)**..." a riparian strip with a width of at least 25 feet from the mean high water mark would be allowed to revegetate after construction, although not with deep-rooted shrubs or trees more than 15 feet tall over a 30-ft width centered over the pipeline. However, the DEIS utterly fails to disclose that a legion of studies have documented that this is inadequate to avoid impacts to water quality and aquatic habitats, and, instead creates many significant negative impacts on water quality and aquatic habitats, including loss of: large wood recruitment, sediment detention from upslope sources, stream shading, stream microclimate regulation (e.g., Rhodes et al., 1994; CWWR, 1996; USFS et al., 1993). In this specific example, the DEIS fails to reasonably disclose impacts and the limited effectiveness of a purported mitigation measure. The DEIS fails to reasonably disclose that the measure does not actually avoid water quality and aquatic habitat damage, but instead perpetuates it.

Another example is that the DEIS repeatedly and baselessly asserts that measures to manage stormwater runoff and erosion from project activities will "minimize" project impacts. However, these assessments are made without any hard look at the effectiveness of the cited measures, based on available scientific information. These assertions are also made without any clear definition as to what the DEIS deems to be a "minimized" impact. There is abundant scientific information that such measures do not eliminate the significant and numerous impacts associated with the project, which the DEIS completely fails to factor into its analysis. In so doing, the DEIS fails to adequately disclose the expected impacts of stormwater runoff and elevated erosion from the project with the cited measures in place, based on thorough analysis of available scientific information on the limits of the effectiveness of proposed measures. The DEIS cannot merely cite measures together with an unsupported assessment that they will effectively "minimize" impacts to a wholly undefined degree. Instead, it must take a hard look at available scientific information related to the impacts of the project with cited measures in place.

In this vein, the DEIS also needs to be revised to clearly define, in a quantitative sense, what is meant by its repeated use of "minimize." This is warranted because the DEIS currently describes many significant and persistent impacts to aquatic resources as being "minimized," without any clear description of the criteria used to determine what constitutes a "minimized" impact.

This type of defect is repeated throughout the DEIS and is not relegated to the previous examples. The DEIS uses this same flawed approach regarding numerous impacts, including chemical spills, wetland damage and destruction, noxious weed spread, deposition of dredge spoils, and, erosion

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and sedimentation from the construction and operation of the terminal, pipeline, power line, and railroad re-alignment.

These flaws in the DEIS must be rectified by reasonably evaluating the efficacy of proffered mitigation measures based on available scientific information, together with the physical setting of the project's impacts, and using this to reasonably determine and disclose the direct, indirect, and cumulative impacts on aquatic and watershed resources in a clear fashion. In order to remedy this problem in the DEIS, in all cases where the FEIS discusses its assessment of the efficacy of measures to ameliorate impacts, it must thoroughly disclose the scientific basis for that assessment. The FEIS must also disclose scientific information that supports a conclusion that is contrary to those made in the FEIS regarding the effectiveness of measures aimed at limiting impacts. Absent such rectification, the assessments of the effectiveness of mitigation measures and resulting impacts are arbitrary, baseless, and inadequate for impact disclosure.

• Listing of Mitigation Measures is Not Analysis of Impact and Effectiveness

In many of the discussions of the project's impacts, the DEIS repeatedly merely lists mitigation measures and plans aimed at addressing impacts, instead of analyzing and disclosing the impacts on aquatic and watershed resources with the listed measures and plans in place. This is not adequate for reasonable disclosure of impacts because the magnitude, extent, intensity, and persistence of impacts to aquatic and watershed resources that still accrue are not disclosed. Examples of defects of this ilk occur with great regularity throughout the document. But a few examples of this common flaw include discussions of the impacts from wetland damage and destruction, mitigation of permanent destruction of wetlands, revegetation measures, noxious weed spread, and water quality impacts.

The DEIS must do more than repeatedly list measures that will be taken in effort to somewhat ameliorate impacts; it must completely and reasonably disclose the likely impacts based on the measures taken and their limited effectiveness based on taking a hard look at the available scientific literature related to these issues. Merely listing project measures is not a credible surrogate for taking a hard look at the likely impacts of the project and disclosing them as required in an EIS.

• Impacts Associated with Mitigation

The DEIS fails to reasonably evaluate and disclose the likelihood and significance of negative collateral impacts from proposed mitigation measures. For instance, the DEIS suggests adding large woody debris to streams in an attempt to mitigate the impacts of clearing riparian areas for pipeline construction. However, the DEIS fails to take a hard look at available information that indicates that such wood additions are often not only ineffective but also interfere with a variety of important stream processes and degrade aquatic habitat attributes (Beschta et al., 2004).⁴

As another example of the DEIS's failure to examine collateral damage, the DEIS suggests (p. 4-96) that vegetation seeding in areas proposed as mitigation for wetland destruction would use seed mixes that "... would be certified weed free..." However, the DEIS fails to adequately disclose that

⁴ The DEIS completely fails to reasonably disclose that Beschta et al. (2004) also expressly noted that it should not be assumed that the addition of instream wood mitigates the negative effects of management practices that accelerate sediment delivery to streams. Although inadequately disclosed in the DEIS, pipeline construction and operation will persistently and significantly elevate sediment delivery to streams. This is one of the many examples where the DEIS failed to examine and disclose available scientific information that indicates that proposed mitigation measures are likely to be ineffective.

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despite certification, such seed mixes often contains noxious weed seeds, such as cheatgrass (Karr et al., 2004).

Stormwater detention ponds, which are proposed to reduce erosion and runoff from the terminal construction site, will cause stored water to be heated during the summer months, contributing to increases in downstream water temperature. However, the DEIS fails to adequately examine and disclose the impacts of detention ponds on water temperature. Similarly, the project will introduce a concrete berm during the construction period. Studies have documented that such runoff from impermeable areas, such as the berm, is considerably warmed during critical summer months, increasing water temperatures in receiving streams (USGAO, 1990). However, the DEIS includes no adequate analysis of the impact of this stormwater management measure on water temperatures.

The DEIS also fails to reasonably disclose that attempts to actively restore systems often fail, these efforts can also set back restoration and cause additional ecosystem damage that sets back ecosystem restoration (Kaufman et al., 1997). The DEIS needs to remedy this general defect by reasonably examining and disclosing the potential of mitigation measures to exacerbate, rather than ameliorate impacts, based on a thorough analysis of available scientific literature and information.

• FERC Lists its Recommended Refinements in Actions but Impacts are Not Analyzed

Instead of reasonably evaluating and disclosing the impacts of the project as it will be implemented, the DEIS repeatedly suggests the development of additional measures and refinements for numerous aspects of the project, including those that will affect aquatic and watershed resources by damaging and destroying wetlands, and creating levels of noise that injure fish. This is obviously inadequate. Reasonable analysis and disclosure of project impacts require analyzing the impacts of the project as it will be implemented. Recommending refinements is not a surrogate for such analysis.

If FERC believes there will be substantive changes in impacts in response to its recommendations, then it must not issue the EIS until its recommendations have been met, analyzed for their impacts, and thoroughly disclosed. It is not reasonable for FERC to make assumptions about the efficacy of its recommendations until they have been fully addressed, formalized as part of project requirements, and evaluated in detail. The recommendations for project refinements are not salient to impact analysis until a response has been finalized, made mandatory, and analyzed.

• Permanent Losses, Uncertain Gains

Permanent loss of essential salmon habitat at the Bradford Landing site is known to be a planned part of the facility development. The extent of loss of associated shallow water habitats in creation of the ship berth is not well described. The frequent dredging of the 52-acre turning basin combined with the propeller wash will ensure that this habitat will be first degraded and then never allowed to recolonize to the extent that it will be functional habitat.

The DEIS suggests that permanent habitat loss at the facility site be exchanged for future, but unspecified, habitat improvement on Svensen Island. Much of what is proposed as mitigation is already functional habitat and would likely reestablish itself by passive means. Other habitat would undergo restoration via passive means if dikes were removed. Because restoration is voluntary, there is no assurance that mitigation would actually occur according to some benefit ratio relative to the value of the current habitat that would be lost. In addition, the location of the Svensen Island is miles downriver in Reach B. Svensen Island is located in the estuary mixing zone, while the habitat to be

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impaired and lost near the LNG facility is in Reach C (generally a freshwater rearing zone). These ecological types are different, so it is not clear that brackish water rearing areas to be produced in a mitigation program would be an equal exchange for freshwater habitats lost. In fact, there has been no spatial, ecological analysis of the values of habitats to be destroyed and created to determine whether all biological functions and life cycles affected are mitigated in place and kind.

p. 2-32. *NorthernStar proposes to implement an SEI to contribute to the recovery of salmon and the lower Columbia River ecosystem. The SEI would be entirely voluntary and would be above and beyond the mitigation measures used to avoid, minimize, rectify, reduce, and/or compensate for environmental impacts that are required by the regulations. NorthernStar's SEI would entail providing funding for salmon preservation, enhancement, and restoration projects on the lower Columbia River that would likely total more than \$50 million over the life of the Bradford Landing Project. The National Fish and Wildlife Foundation's Western Partnership Office in Portland, Oregon would serve as the fiscal agent for SEI funds. The long-term implementation of this voluntary SEI is outside of FERC's regulatory authority.*

The basic mitigation measures are simply to avoid or reduce impacts, probably to the extent considered feasible. The voluntary nature of mitigation measures that could be considered as compensation for known, planned damage to the Columbia River environment is unacceptable. It is not clear what the anticipated life of the Bradford Landing Project is expected to be or whether the \$50 million is calculated in terms of today's dollars. Loss of habitat to the facility will be permanent and may not be truly compensated if all cumulative effects were to be accounted.

p. 43. *NorthernStar Mitigation Plan (Aug. 1, 2007). The driving factor in selecting a site for restoration was the ability of a given site to replace estuarine functions that would be lost at the Terminal. An estuarine functions assessment of the impact site (URS 2006b) determined that providing rearing habitat for anadromous fish species (ESA-listed Chinook, coho, and chum salmon in particular) was one of the most important functions provided by the impact site. To this end, the mitigation site selection process placed finding sites with the opportunity to restore fish habitat as the highest priority.*

p. 44. *NorthernStar Mitigation Plan (Aug. 1, 2007). The middle Svensen Island site met all the search criteria and was deemed suitable for replacing estuarine habitat in Oregon. The site is located 14 river miles west of the Terminal impact site within the portion of the Columbia River designated as estuarine by the Department of State Lands (DSL). Salinity and tidal influence are similar at both the impact and mitigation sites, and both are within the lower Columbia River watershed.*

Although it was apparently the intent was to find mitigation opportunities that matched the salmon rearing environments being destroyed in building the terminal, the classification of these estuarine habitats would argue against this being the case. No information was presented to reflect the similar salinities and tidal influence.

p. 44. *NorthernStar Mitigation Plan (Aug. 1, 2007). In addition, preservation of the estuarine wetland adjacent to the Terminal at the confluence of Hunt Creek and Clifton Channel will protect and maintain high-value estuarine wetland habitat. This site serves the same ESA-listed salmon as the Terminal impact site.*

It is not clear how the Hunt Creek and Clifton Channel high-value habitats will actually be protected, despite the statement that they will be protected. It appears to be far more likely that with high levels of terminal activity, continued dredging, and prop wash of bottom sediments, that there will be persistent sedimentation of these habitats.

Some parts of the estuary (e.g. the Clifton channel off the northern tip of Tenasillahe Island) show relatively larger amplitude currents than at surrounding grid points, thus these regions may be subject to increased erosion and sediment transport due increased bottom stresses and dispersion due to large horizontal velocity shears. (CREST 1984).

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The potential for increased rates of erosion in the Clifton Channel (CREST 1984), combined with the proposed terminal and the inherently high fishery potential for Clifton Channel, make activities in this area biological hazardous. Among a number of Columbia River estuary habitats sampled in a test fishery, the Clifton Channel had among the highest catch rates for Chinook, steelhead, shad, and sturgeon (Hirose et al. 1998). There have also been more recent surveys by NOAA research staff in upper Clifton Channel and other locations throughout the estuary of the use of key habitats by juvenile salmon. Bottom (2006) reported that in this sampling network, peak Chinook catches were broadly distributed from February through July, while abundances of chum and coho were spatially and temporally restricted. Chum occurred mostly from February to May. The FEIS contains only the most general life history and habitat use information. No data or studies were presented on the estuary habitats most likely to be affected. No information was provided on the spawning or rearing use of the Clifton Channel, the mainstem Columbia, the sloughs, mouth of Hunt Creek, Tenasillake Island, or Puget Island. This represents a serious data gap, making all estimates of impact ambiguous.

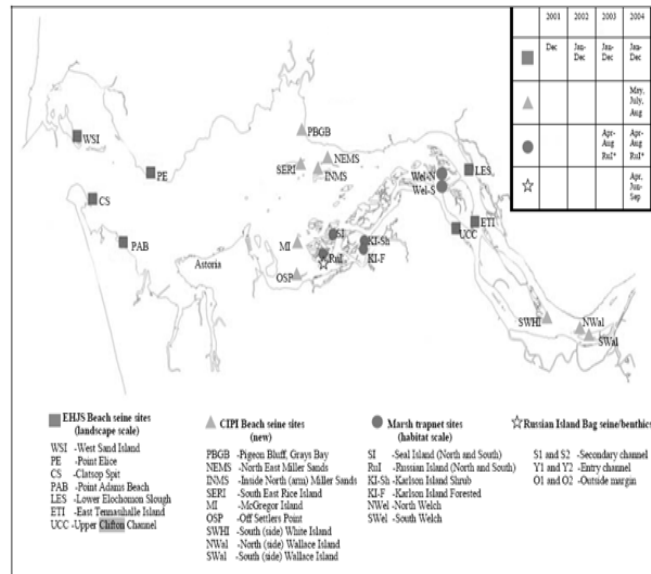


Figure 0. NOAA Fisheries monitoring project sampling locations. (EHJS=Estuarine Habitats for Juvenile Salmon, CIPI=Channel Improvement Project Investigation). LCREP (2004).

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• Significant Uncertainties in Plans Cannot be Ignored in a NEPA Disclosure Document and Deferred to Future Planning

The Bradford LNG plans are filled with uncertainties concerning plans and environmental effects. Any project with likely environmental impacts would undoubtedly involve a level of uncertainty in its full impact. However, the LNG DEIS tends to offer little more than the most general types of environmental disclosure. For example, see the following:

p. 4-84. *The impacts of the open-cut construction method on the minor intermittent and perennial streams along the pipeline routes would generally be localized and short term. Clearing, grading, and trenching within and adjacent to these streams would have the greatest effect on water quality. Clearing of trees and vegetation in and around streams could lead to an increase in water temperature. Sediments would be resuspended by in-stream construction activities or by erosion of cleared stream banks and riparian areas. Turbidity resulting from the resuspended sediments could reduce light penetration and the corresponding photosynthetic oxygen production. Resuspension of deposited organic material and inorganic sediments could cause an increase in consumption of biological and chemical oxygen, decreasing available dissolved oxygen.*

p. 4-84. *Clearing and grading of streambanks, in-stream trenching, backfilling, and trench dewatering could affect surface water quality through increased sedimentation, increased turbidity, decreased dissolved oxygen concentrations, and stream warming.*

Impacts will generally be localized and short term, of course, unless they are widespread and long term. To say that clearing trees from riparian areas could lead to an increase in water temperature is certainly an understatement. It also does not resolve at all what the level of impact is. If the impact is relatively small, one would need to know what this really means. No data are ever given on the temperatures or current levels of sediment delivery from watersheds of any streams crossed by the pipeline. Without such information, the generalities offered are not of use in estimating the local or cumulative effects of all actions proposed in the pipeline. It is obvious that turbidity could result from suspension of sediments, both from dredging and ship wakes, and from pipeline corridors and construction.

• Reference to Miscellaneous External Documents that Could Govern Mitigation but which are Undecided

The DEIS alludes to external plans that represent some kind of melding of FERC guidelines, proposed NorthernStar impact reduction plans, and state requirements. See quotations below for a significant cross-section of the references to ESC plans, SWPPP Plans, FERC procedures, JPA, and JARPA plans. Given the large volume of the DEIS, it is essential to have tables describing the mitigation measures that would be applied for each location and type of detrimental action. It is not feasible to sift through 350 Mb of miscellaneous reports posted on the FERC website to attempt to piece together the mitigation that is assured and which is merely recommended but optional. It appears that none of this is at all reasonably certain to occur, given that final mitigation would only be decided after a contractor is selected. It is not clear why selection of a contractor has anything to do with measures needed to protect the environment. If a contractor is incompetent, this should be no excuse for downgrading the measures required.

p. ES-3. *Potential impacts on soils, wetlands, and water resources would also be minimized through measures specified in NorthernStar's Erosion and Sediment Control (ESC) Plans and Stormwater Pollution Prevention Plan (SWPPP), and the FERC's Wetland and Waterbody Construction and Mitigation Procedures (FERC's Procedures).*

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p. ES-8. *NorthernStar would implement its project-specific ESC Plans and a SWPPP, and follow the FERC Procedures to mitigate impacts on soils, wetlands, and water resources;*

p. 2-39. *NorthernStar has also drafted an Erosion and Sediment Control Plan for Oregon – Bradwood Landing Pipeline (pipeline ESC Plan) and a Construction Stormwater Pollution Prevention Plan for Washington – Bradwood Landing Pipeline (SWPPP).² These plans incorporate elements of the FERC's Plan and Procedures, state and county requirements and provisions, stormwater pollution prevention plans, and spill prevention and response procedures. Drafts of these plans were included in NorthernStar's JPA and JARPA. The pipeline ESC Plan and SWPPP are discussed further in section 4.2.3.2.*

p. 2-39. *NorthernStar included its terminal ESC Plan and pipeline ESC Plan as part of its JPA, and included its SWPPP as part of its JARPA. NorthernStar's JARPA was filed with the FERC on November 6, 2006, and supplemented with a filing on November 22, 2006. NorthernStar also filed its JPA on November 22, 2006, and filed revisions to the JPA with the FERC on April 5, 2007. These documents are available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range. The FERC's Plan and Procedures are also available to the public on the FERC's Internet web page by clicking on Industries, Gas, Environment, Guidelines.*

p. 2-48. *The restored construction right-of-way would be revegetated in accordance with NorthernStar's pipeline ESC Plan for Oregon and SWPPP for Washington, FERC staff's Plan, other permit requirements, and site-specific landowner requests.*

p. 4-44. *NorthernStar would use prescribed erosion control devices (e.g., silt fence, hay bales) and construction practices as specified in its pipeline ESC Plan for Oregon and SWPPP for Washington to minimize erosion during and after construction activities (see section 2.4).*

p. 4-45. *NorthernStar would minimize impacts on prime farmland by constructing the pipelines in accordance with its ESC Plan and SWPPP.*

p. 4-45. *NorthernStar would minimize rutting of hydric soils by using construction mats where hydric soils cannot support equipment and/or by employing low-ground-weight equipment according to its ESC Plan and SWPPP and our Procedures.*

p. 4-46. *NorthernStar would minimize compaction and rutting impacts by using measures outlined in its pipeline ESC Plan and SWPPP and our Procedures (e.g., construction from timber mats, or low-ground-weight equipment) during construction in soft or saturated soils.*

p. 4-48. *NorthernStar's pipeline ESC Plan and SWPPP incorporate elements of the FERC's Plan and Procedures, state and county regulations and provisions, stormwater pollution prevention plans, and spill prevention and response procedures. Drafts of these plans were included in NorthernStar's JPA and JARPA. Final versions of these plans would be developed after a construction contractor has been selected prior to construction. We have reviewed NorthernStar's pipeline ESC Plan and its SWPPP and find that in many cases they lack specific procedures, and are less detailed than or do not provide equivalent or greater protections to the environment compared to our Plan. On the other hand, the pipeline ESC Plan and SWPPP contain BMPs and mitigation measures for items outside the scope of our Plan, such as spills prevention and cleanup, wind erosion and dust control, and project-specific seasonal work restrictions. To ensure that potential impacts on soils as well as vegetation are effectively minimized, we recommend that:*

• *NorthernStar should conduct a comparative analysis of the FERC's Plan and its pipeline ESC Plan and SWPPP to demonstrate that NorthernStar's plans provide equal or greater protections to the environment. If the analysis determines that specific aspects of NorthernStar's plans do not provide equal or greater protections, NorthernStar should revise its plans to include the measures from the FERC's Plan or should provide proposed alternative measures that would provide equal or greater protections. The results of the comparative analysis and NorthernStar's revised plans (if applicable) should be filed with the Secretary for the review and written approval of the Director of OEP prior to the end of the draft EIS comment period.*

p. 4-86. *To reduce impacts on vegetation within the construction and permanent rights-of-way and improve revegetation potential for open-cut waterbody crossings, NorthernStar would implement its SWPPP in*

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Washington. Following construction, all work areas would be restored, seeded with conservation grasses, legumes, native plant species, or other standard erosion control/cover species, where required, and allowed to naturally revegetate to preconstruction conditions.

p. 4-116. *To reduce impacts on riparian vegetation within the construction and permanent rights-of-way, NorthernStar would implement the measures included in its pipeline ESC Plan and SWPPP, as well as utilize the HDD or bore methods at 19 waterbody crossings (see section 4.3.2.4). NorthernStar would reduce the size of waterbody crossing staging areas and place these staging areas at least 50 feet from the water's edge whenever topographic conditions permit. Additionally, NorthernStar would allow a riparian buffer at least 25 feet wide, as measured from the waterbody's MHHW mark, to permanently revegetate with native woody plant species across the entire right-of-way; however trees greater than 15 feet tall, or deeprooted shrubs that could damage the pipeline's protective coating, obscure periodic surveillance, or interfere with potential repairs, would not be allowed to grow within 15 feet (30 feet total) of the pipeline.*

The procedures in the SWPPP are not specified so it is unclear what would really be done to revegetate construction areas. It also appears that revegetation will typically be only via scattering of grass seed to control erosion. It is not clear that replacement of native vegetation would occur by means other than passive restoration or that tree planting would even be attempted.

• Estuary Habitat and Mitigation: Loss of Estuary Habitat

Dredging of a 58 acre turning basin next to the Columbia River navigation channel in the vicinity of Bradwood, frequent (every 2-4 years) re-dredging of the turning basin, filling of the log pond that is connected by channel to the Columbia, represent substantial impacts to estuary rearing habitats for salmon smolts and possibly to spawning habitats. The use of habitats affected has not been evaluated..

The Bradwood facility site and pipeline through the Oregon sloughs toward the vicinity of the Columbia River cross-channel HDD location is within what has been designated as Reach C of the estuary (NOAA 2006). The LNG facility lies just upriver from Reach B.

Reach B has been referred to as the mixing zone of the estuary. This is an area of mid-channel shoals and flats with high salinity variation due to interaction of tidal cycles and river flows. Reach B is where the estuarine turbidity maximum (ETM) occurs (NOAA 2006). Over the course of development of the mainstem Columbia River (hydropower development) and diking and filling of the estuary, there has been a loss of 65% of the tidal marshes and swamps (i.e., 121.6 km²) that existed prior to 1870 below Jones Beach at Rkm 75 in Oregon (Bottom et al. 2005). This loss has been associated with channel deepening, loss of large wood debris, shoreline armoring, logging and agriculture, and deliberate filling of the tidal marshes and swamps themselves (Bottom et al. 2005).

These changes in the river caused a shift from a macrodetritus-based food web to a microdetritus-based food web. The microdetritus food base derives from phytoplankton originating from the upriver reservoirs and supplies the energy base to calanoid copepods and other pelagic organisms, which unfortunately are not consumed to any extent by juvenile salmon (Bottom et al. 2005). This organic material that passes through Reach C and enters the Reach B mixing zone, becoming transferred to copepods, is used by pelagic fish such as anchovy, smelt, shad, and herring, but the food base for juvenile salmon associated with shallow water habitats has become impoverished (Bottom et al. 2005). This places much greater emphasis on maintaining and expanding the productive capacity of those estuarine habitats (tidal marshes, swamps, mud flats, and shallow habitats with emergent vegetation) that support the portion of the food web that direct energy toward juvenile salmon. Salmon fry and fingerlings occupy habitats preferentially that are between 10 cm and 2 m

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deep (Bottom et al. 2005). The DEIS does not adequately account for the current availability of these habitats within Reach C (Bradwood) or Reach B (Svensen Island area) relative to historic condition. The DEIS does not clearly describe the effect of the project on these habitats. Even the historic condition of the shallow water habitats in the vicinity of the proposed Bradford Landing LNG facility was not described. What is known is that functional shallow water habitat in the log pond will be filled to create a base for the facility.

• NorthernStar Estuary Classification Scheme

The Plan adopts crude and inaccurate descriptions of the boundaries of the estuary that enable it to justify finding mitigation sites that suffice as replacement for habitat that is to be obliterated.

p. 9. NorthernStar Mitigation Plan (Aug. 1, 2007). *Oregon mitigation sites (specifically Svensen Island) are located in the lower Columbia River estuary ("Estuary means a body of water semi-enclosed by land and connected with the open ocean, within which salt water is usually diluted by fresh water derived from the land. In the general sense, 'estuary' includes all estuarine waters, tidelands, tidal marshes and submerged lands extending upstream to the head of tidewater. However, the Columbia River Estuary has been more narrowly defined to extend to the western edge of Puget Island [ORS 54.605])."*

p. 47. NorthernStar Mitigation Plan (Aug. 1, 2007). *The estuary is the transitional area between fresh and salt water. Downstream flow plus significant tidal fluctuations create a complex array of currents, salinities and bathymetry and a great diversity of potential habitats. This complexity is captured in several related classification schemes. The NPCC (2004) scheme is based on Simenstad et al. (1984) and has been used in the NOAA salmon recovery plans (NOAA Fisheries 2006). The areas in Figure 2-3 are grouped into two major subsystems defining the estuary proper and upriver tidally influenced areas. The estuarine subsystem is the lower 46 miles up past Puget Island (and Bradwood Landing). Areas in Figure 2-3 above Puget Island are classed as the tidal freshwater subsystem.*

p. 48. NorthernStar Mitigation Plan (Aug. 1, 2007). *Svensen Island lies along the south edge of Cathlamet Bay approximately 14 miles downstream of Bradwood Landing (Figure 1-1). Cathlamet Bay is a distinct reach of the river in the Simenstad et al. (1984) scheme (reach "B" in (NOAA Fisheries 2006)) shown in Figure 2-3.*

It is not discussed in the mitigation plan that Bradwood Landing is in NOAA's Reach C, as opposed to Svensen Island, which is in Reach B. See Figure 1 below for the biological zonation of the Columbia River estuary and Figure 2 for the relationship of Bradwood Landing to Svensen Island.

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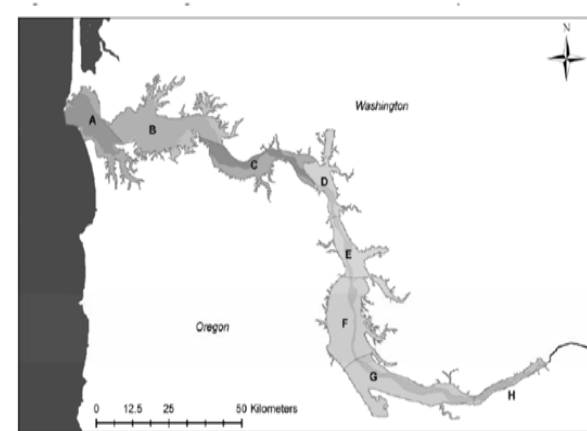


Figure 1. Lower Columbia River Estuary Reaches. Reprinted from Lower Columbia River Estuary Partnership (2004). Also, see NOAA (2006) for a similar presentation of this chart.

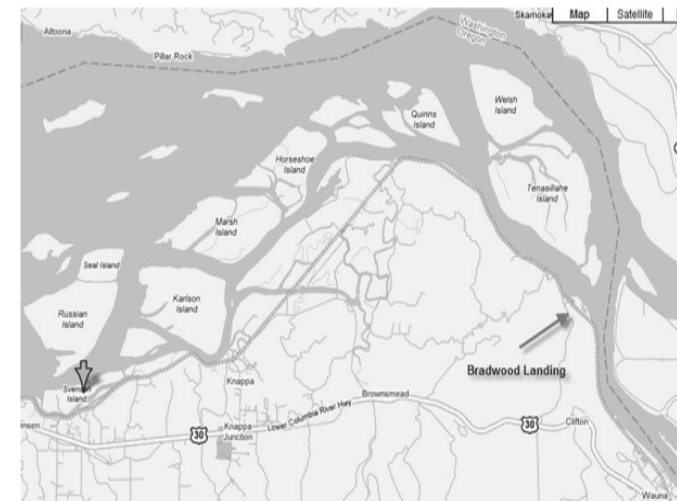


Figure 2. Location of Bradwood Landing and Svensen Island downstream on the Columbia River.

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Bottom et al. (2005) indicated that the estuary was classified by Simenstad into the following reaches:

We define the Columbia River estuary (Figure 1) to include the free-flowing waters that are influenced by oceanic tides: a reach spanning 235 river kilometers (Rkm) [146.0 RM] from the mouth to the base of Bonneville Dam. Relative to juvenile salmon migration along the estuarine gradient, this system includes three physiographic subsystems:

- the tidal freshwater portion or fluvial region (Simenstad et al. 1990a) from Bonneville Dam to the maximum upstream extent of salinity intrusion (≈ 55 Rkm [34.2 RM] from the entrance),
- the brackish-mesohaline region above the open expanse of the main estuary (≈ 30 –55 Rkm [18.6–34.2 RM] from the entrance), and
- the broad, euryhaline region in the lower 30 Rkm [18.6 RM] of the estuary. Ecological studies in the estuary during the early 1980s further partitioned the euryhaline region into seven subareas (Simenstad et al. 1990a):

- 1) entrance,
- 2) Trestle and Baker bays in Oregon,
- 3) Youngs Bay in Oregon,
- 4) estuarine channels,
- 5) mid-estuary shoals of the estuarine mixing zone,
- 6) Grays Bay in Washington, and
- 7) Cathlamet Bay in Oregon.

Svensen Island is located 36.4 km [22.6 RM] upstream of the Columbia River mouth, while the proposed terminal site at Bradwood Landing is located at 61 km [38 RM, see p. ES-1] upstream. According to Simenstad's classification, Svensen Island is located in the lower brackish-mesohaline region, which extends upstream as far as Rkm 30. The terminal site, on the other hand, is located in the tidal freshwater region. Rather than two subregions as stated in the Mitigation Plan (Aug. 1, 2007), the estuary is subdivided by Simenstad into three regions. The mitigation site is in a different region than the site being obliterated.

The likelihood of being able to restore Svensen Island to a condition expected to be useable as a replacement for habitats lost as a result of the project has not been revealed. Parts of Svensen Island have been separated from the estuary for many years. Typically, these kinds of former habitats maintain their elevations by interaction with river flows, production of organic matter, accretion of sediments, etc. Disconnection from the river over the long term results in subsidence. Restoring connection may initially result in creation of mudflats or other types of habitats, depending upon the elevation of the island in relation to the tidal elevations. None of this information was discussed.

Salinity conditions are significantly different between the Svensen Island portion of the Columbia River and upstream at Woody Island, which is downstream of Bradwood Landing. At Svensen Island, the maximum salinities are 6.6 ppt, while at Woody Island, maximum salinities are 0.2 ppt. (See <http://www.ccalmr.ogi.edu/CORIE/>). At Bradwood, salinities would be even less, much closer to freshwater conditions. Consequently, even though restoration of Svensen Island is a worthy project for the overall estuary ecosystem, the destruction of rearing habitat at Bradwood Landing represents a permanent loss of important lower river estuary habitat that is especially significant for chum and fall Chinook salmon. This is a permanent loss that is not mitigated.

FERC Fails to Fully Assess the Problems Associated with Ballast Withdrawals

Approximately 125 LNG ships are expected to enter the river per year, and approximately 6.3 billion gallons of Columbia River water per year will be used by these ships as ballast. A smaller

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amount of water would likewise be withdrawn and used for engine cooling. The design proposals for ballast intake for this project have changed dramatically over the course of the pre-filing and post-application phases of the proposal. At this time, we understand that the current "live" design for intake for the purposes of ballast/engine cooling will be on the berth, noted on Figure 2.1.3-3. In reviewing this proposal, we have come up with essentially four issues that the DEIS and the applicant must address before the project is licensed.

First, this proposal necessitates a third-party provider (the ship owners) to take affirmative actions to retrofit its ships to meet the design of the terminal. Currently, the only mechanism apparently available to "enforce" this requirement is the applicant's assertion that it would offer "contract incentives" (pg. 2-7) for these third-party providers to obtain the retrofit. Recently, the U.S. District Court in Oregon in *National Wildlife Federation v. National Marine Fisheries Service*, determined that NOAA Fisheries could not rely on actions that were "not reasonably certain to occur." See, *National Wildlife Fed. v. National Marine Fish. Serv.*, 254 F. Supp.2d 1196, 1215 (D. Or. 2003). While this is an ESA standard, it bears notice to FERC in this case because it is clear that it is unreasonable to rely on the applicants' promise to contract with third party entities which do not fall under FERC or NOAA Fisheries' enforcement authority. There is no guarantee, at this point, that NorthernStar would turn away a non-retrofitted ship should one show up at its terminal.

Second, we are unconvinced that this is technologically available or even testable at this time. FERC and the applicant must provide more information on the berth-side intake system and the ship retro-fit and demonstrate that fish will not be adversely impacted by its use. Similarly, our third issue is the concerns about the use fish screens (and cleaning pump) to avoid entrainment and impingement of fish traveling through Clifton Channel [comments below in a subsequent section].

Fourth, after examining the plans for a berth-side water intake system, it appears that NorthernStar will likely have to obtain a water right. The immense amount of water that will be withdrawn – on the magnitude of a small agricultural operation – is of great concern with regard to resulting temperature and flow effects on the river, and subsequently, on fish. The DEIS fails to adequately assess the impacts to the area from this water withdrawal.

If the project once again changes its ballast water withdrawal system design to rely on the conventional ship-side intake system, we will have greater concerns as the risk to small juvenile fish which are in the area for much of the year would be very high.

Permitting and Compliance Processes are Not a Substitute for Analysis

In its assessments of many of the project's impacts, the DEIS repeatedly lists consultation and permitting procedures that must be completed, instead of reasonably evaluating and disclosing the impacts of the project as it will be implemented. Description of permitting, compliance processes, and consultation requirements are not a surrogate for a full description of the project's impacts. If FERC believes that these required procedures will have a substantive effect on the project's impacts, then FERC must not issue an FEIS until these procedures have been fully completed with the results analyzed and disclosed in the FEIS. Until then, listing consultation and permitting procedures is largely irrelevant regarding disclosure of the project's impacts.

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Speculative Actions and Speculative Assessments of Impacts

The DEIS repeatedly makes arbitrary and conclusory assessments of measures that are highly speculative in terms of implementation and outcomes. This repeated flaw is compounded by the DEIS's consistent failure to reasonably consider and disclose the project's impacts if these speculative and optional measures are not implemented. For instance, the DEIS (p. 4-46) notes that for activities in wetlands and other soils susceptible to compaction "...environmental inspectors *could* recommend restricting construction activities during unfavorable conditions (e.g., wet weather) to further reduce [soil] compaction and rutting." (Emph. added). This is plainly speculative and largely irrelevant. There is no requirement to restrict activities to limit such soil damage.

Similarly, the DEIS repeatedly asserts that the use of HDD to place pipelines across waterbodies will limit impacts on riparian vegetation and the waterbodies. However, HDD may not be used to cross any waterbody. The DEIS (p. 4-84) notes that, instead, other methods besides HDD may be used for stream crossings by the pipeline. However, the DEIS does not adequately assess and disclose the impacts of stream crossing if methods other than HDD are used to cross streams.

As another example, the DEIS (p. 4-117) notes that when available, certified seed would be used for revegetation of areas disturbed by pipeline construction. This clearly indicates that this measure may not be implemented, depending on availability. The DEIS includes no assessment of impacts that will occur if this speculative measure is not implemented.

Similarly, the DEIS includes discussions of the potential measures that might be taken under the SEI, although the timing, nature, and location of actual measures that might be taken under the SEI are currently unspecified and entirely optional. Therefore, the potential effectiveness of SEI measures is unknown and cannot be reasonably determined, although this is not adequately disclosed in the DEIS.

The DEIS (pp. 4-106, 4-107) also discusses the potential efforts on Delameter Creek that might be taken in an effort to mitigate the permanent damage to forested wetlands. However, the timing, nature, and location of actual measures along Delameter Creek are unspecified, not required, and uncertain to actually occur. The DEIS fails to adequately disclose this ambiguity or the project's impacts if these speculative measures are not implemented. Space constraints preclude listing the many other numerous instances where the DEIS evaluates the effects of measures that are not required, specified, or sure to occur.

In order to remedy these defects in its discussions of impacts, the FEIS must focus solely on activities that are required with a degree of specificity that allows evaluation of their impacts. If discussions of optional, unspecified measures are retained in the FEIS, the FEIS must clearly disclose that these activities and measures that are not required and may not occur. It must also reasonably evaluate the consequences if such optional, speculative measures are not implemented. The FEIS needs to rectify all such defects in the DEIS, not just the specific instances cited in the foregoing.

FERC Fails to Analyze Cumulative Effects

The DEIS fails to assess the project's cumulative effects on aquatic resources in several ways. It primarily provides piecemeal analysis of individual impacts or activities. For instance, the project activities will significantly elevate sediment delivery to Hunt Creek due to a variety of impacts from numerous activities, including the construction and maintenance of railroad re-alignment, power lines,

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bridge work, road activities, and the LNG terminal. However, the DEIS fails to provide any credible cumulative estimate of the magnitude and persistence of sediment delivery to Hunt Creek and the Columbia River from these cumulative sources and activities. Similarly, the DEIS fails to assess and disclose the cumulative impacts of cumulative sediment delivery from these multiple activities on water quality and aquatic habitat in Hunt Creek. In so doing, the DEIS fails to adequately disclose the cumulative effect of activities in Hunt Creek on fish survival and production.

In a similar vein, elevated sediment delivery from the impact of multiple activities in the Hunt Creek watershed will elevate turbidity in Hunt Creek and the Columbia River. However, the DEIS fails to reasonably disclose how this cumulative sediment delivery from all project activities in the Hunt Creek watershed, in combination with terminal construction, deposition of dredge material, and dredging will cumulatively affect turbidity in the Columbia River. The piecemeal, qualitative, and cursory assessments of individual activities on sediment delivery and turbidity in the DEIS are not adequate to disclose these cumulative impacts.

Similarly, as discussed later in these comments, the DEIS also fails to reasonably analyze and disclose the cumulative impacts of pipeline construction on sediment delivery to streams. It also fails to adequately disclose the total impacts of this cumulative sediment delivery on water quality, and fish habitats at the watershed scale. The DEIS also failed to reasonably disclose the impacts to the Columbia River from cumulative delivery from pipeline construction and maintenance activities.

Pipeline construction and maintenance will persistently remove stream shade and contribute to channel widening via elevated sedimentation in many streams. However, the DEIS fails to disclose the cumulative effects of these impacts on water temperature in affected watersheds, or in the Columbia River, which will ultimately receive the water with elevated temperature.

The DEIS is riddled with so many other examples of this recurrent type of defect that space does not allow a complete listing of their occurrence. It is critical that the DEIS be revised so that the FEIS clearly and fully analyzes and discloses the cumulative impacts of all project activities that are likely to combine to produce adverse cumulative effects.

Disclosure requirements are not the only reason that cumulative impacts must be clearly and thoroughly analyzed. Although there are many reasons that it is unlikely to be realized, the DEIS (e.g., pp. 2-27, 4-95) repeatedly asserts that the applicant purportedly aims for the project to have an overall environmental benefit to the lower Columbia ecosystem. In order to reasonably assess the veracity of this claim, it is obvious that negative cumulative impacts of all aspects of the project must be fully determined and disclosed. Notably, because the negative cumulative impacts of the project have not been adequately determined in the DEIS, FERC has no basis for asserting that the project meets this purported goal.

Existing Condition of Affected Aquatic and Watershed Resources

Existing conditions of affected aquatic and watershed resources exert a strong influence on the significance and persistence of impacts to these resources, although the DEIS fails to adequately disclose this. For instance, in streams that are already afflicted by high levels of sediment delivery and sedimentation, additional sediment delivery is likely to significantly and persistently add to existing problems (Rhodes et al., 1994). Similarly, in streams afflicted by a lack of large in-channel wood and high water temperatures, any additional exacerbation of these problems is ecologically significant. Notably, many of the stream attributes that will be affected by the project activities are already

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significantly degraded (e.g., WDFW, 2000), although the DEIS fails to adequately disclose this. The currently degraded state of stream and watershed attributes that will be affected by the project is also acknowledged, albeit inadequately, in the project's Biological Assessment (BA) (FERC, 2007).

Although it is not reasonably disclosed in the DEIS, additional habitat damage that affects weak populations of salmonids in degraded watersheds increase the likelihood of extirpation (USFS and USBLM, 1997a; 1997c; Karr et al., 2004). Such impacts can be profound. Extirpations and habitat degradation decrease population connectivity, increasing the likelihood of extinction or additional extirpations.

Other stream attributes also influence the magnitude and persistence of habitat degradation associated with the projects impacts. Many types of low gradient streams are extremely susceptible to persistent sedimentation problems associated with the elevated sediment delivery that will be caused by project activities (Rhodes et al., 1994; Espinosa et al., 1997; Montgomery and Buffington, 1998). Many types of higher gradient streams are extremely susceptible to degradation due to loss of channel stability from vegetation removal and have very poor prospects for recovery from such degradation (Rosgen, 1996).

Although it is inadequately disclosed in the DEIS, the project will significantly degrade aquatic habitat conditions and water quality by elevating sediment delivery, removing stream shade, reducing the recruitment of large woody debris (LWD), and reducing bank stability in numerous streams that are either tributary to or provide habitat for a significant number of salmonids that are highly imperiled. These impacts will reduce the survival and production of these salmonids in many ways, including reductions in pool quality and volume, degradation of stream substrate, channel widening, loss of stream complexity, loss of LWD, increased suspended sediment, and elevation of stream temperatures. However, the DEIS fails reasonably disclose the current condition of these affected aquatic habitat attributes in streams that will be affected by the operation and construction of the terminal, pipeline, transportation network, railroad re-alignment, and associated powerline construction. The DEIS also fails to reasonably disclose the existing conditions of affected populations at the watershed scale that will be affected by the project. The DEIS also fails to analyze and disclose the attributes of affected streams and waterbodies that influence aquatic impacts.

These significant flaws must be rectified in the FEIS. The FEIS must disclose the existing condition of affected aquatic resources at the watershed scale for all affected streams and waterbodies, including those that will have tributary impacts. At a minimum, this must include a description, at the watershed scale, of the status of affected fish populations, substrate, channel width, the frequency and quality of pools, water temperature, LWD, bank stability, stream shade, channel width/depth ratios, turbidity, and sediment delivery. The FEIS must also include a description of the attributes of water bodies affected by the project, including identification of sensitive reaches, based on available scientific information.

Magnitude, Type, and Location of Impacts That Will Affect Water Quality and Fish Habitat

There is a considerable body of information indicating that ground-disturbing activities that occur within several hundred feet upslope of streams and waterbodies have numerous negative and enduring impacts on the waterbodies and streams. These impacts include alteration of groundwater-surface interactions from soil compaction, elevated sediment delivery, loss of bank stability, loss of thermal regulation, loss of the capacity to detain sediment from upslope sources, and loss of LWD (USFS et al., 1993; Rhodes et al., 1994; CWW, 1996). These impacts cumulatively degrade adjacent

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and downstream aquatic habitats and water quality in ways that reduce the survival and production of salmonids. However, the DEIS completely fails to reasonably disclose the extent of project activities within the area along streams and waterbodies that causes degradation.

Given available information on impacts to aquatic systems as a function of their proximity to waterbodies and streams, the DEIS should be revamped to disclose *all* of following aspects of all project activities⁵ that will occur within at least 300 feet upslope of all stream channels and waterbodies, including intermittent channels and those that do not provide fish habitat⁶:

- 1) the location and area of vegetation removal and soil disturbance, including soil compaction;
- 2) the type and amount of vegetation removed;
- 3) the nature and degree of soil impacts, including compaction, removal of soil cover, and alteration of soil properties;
- 4) the distance to the nearest channel or waterbody;
- 5) the type of activity;
- 6) activity duration and expected season(s) of occurrence;
- 7) spatial connectivity of the nearest channel/waterbody to fish habitat and identification of the fish populations using the habitats;

The foregoing information must not only be disclosed, but also factored into disclosure of the project's impacts on aquatic resources, including all essential fish habitat attributes (LWD, substrate, channel morphology, etc), the survival and production of fish populations, channel erosion, bank stability, sediment delivery, and all affected aspects of water quality.

Notably, for more than a decade, the sort of information listed above has been routinely included in EISs for logging and road construction activities in watersheds with imperiled salmonids, indicating that it is both tractable and necessary to include. The project will have impacts on aquatic resources and the areas along streams that will be more severe, extensive, recurrent, and persistent than those from most logging and road activities.

The current discussions of impacts to riparian areas in the DEIS are highly inadequate for several reasons. First, they do not describe the amount of area occupied by activities occurring within the distance to streams that strongly influences impacts on water quality and fish habitat. Second, the DEIS fails to clearly identify and disclose stream crossings by the pipeline that do not supply fish habitat, but are tributary to fish habitats. For instance, the DEIS's (pp. 4-79 to 4-82) summary listing of waterbodies crossed by the pipeline fails to clearly identify tributaries and intermittent stream that will be crossed by the pipeline that may not supply fish habitat but do influence fish habitat conditions because they are tributary to fish-bearing streams. This is insufficient because impacts to upstream segments lead to the degradation of downstream fish habitats and water quality.

The DEIS similarly misleads in its discussion of the impact of power line construction and maintenance, incorrectly stating that impacts on non-fish-bearing tributaries to the fish-bearing Hunt Creek are unlikely to have impacts on downstream fish habitat (DEIS, p. 4-154). This is in direct

⁵ At a minimum, these aspects should include all areas that are subject to heavy machinery operation, soil compaction, vegetation removal, grading, filling, and/or excavation, including the construction, operation, and maintenance of the terminal, pipeline, railroad alignment, roads and bridges, and power line.

⁶ Impacts to intermittent streams and streams without fish need to be included because impacts to these parts of the stream network are translated downstream to fish habitats, affecting habitat conditions and downstream water quality. Water quality and fish habitat conditions are strongly influenced by upstream impacts and conditions (e.g., USFS et al., 1993; Rhodes et al., 1994; CWW, 1996).

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conflict with available scientific information. Simply enough, impacts to streams and water bodies are translated downstream.

These significant defects must be thoroughly rectified. The DEIS must be revised to clearly identify all tributaries to fish-bearing streams that will be affected by project activities. The DEIS must also be revised to completely and clearly disclose that impacts to intermittent and/or non-fish-bearing streams have water quality impacts and contribute significantly to the degradation of downstream fish habitat.

Risks and Hazards

• Gas Spillage to the River

The LNG facility is proposed for the Bradwood Landing site, 39 miles upriver within the estuary zone. This facility siting creates several problems. The ecological risk incurred by tankers of flammable liquid the size necessary to transport LNG under the Astoria Bridge is high. Because the LNG ships have such a high freeboard, making their maneuverability treacherous at low speeds (p. 2-3), there is additional reason for concern in these ships passing under the Astoria Bridge. LNG ships that would lose their liquid cargo in the river or from pipeline leaks could compromise much greater extents of habitat than would facilities sited close to the river mouth. Trapping of gas in marginal estuarine habitats could cause intense localized damage to rearing salmon populations.

Each LNG ship would maintain a Shipboard Oil Pollution Emergency Plan (SOPEP). (p. 4-67). It is not clear how carrying a plan on board would be effective in dealing with a spill or leak. What materials are available on board that would actually assist in limiting the spill or leak? What materials would be required at the Bradwood Facility or at stations throughout the course of the pipeline to rapidly deal with major leaks or spills?

• Spread of Exotic Organisms

The Columbia River food web has become highly altered by spread of exotic organisms, likely transported to the Columbia by ship traffic (NPPC Return to the River, Williams et al. 1996). The DEIS (p. 4-124) states that it is unlikely that the LNG ships would introduce exotic species because the Coast Guard has a plan for conduct of ships entering the Columbia. The DEIS is not at all clear how LNG ship ballast would be treated to eliminate this threat or where ship hulls and anchors would be treated to eliminate exotics without contaminating the Columbia.

• Fish Screens

The DEIS discusses the use of fish screens for various water intakes. While the NOAA criteria are generally acceptable, we are concerned about NothemStar's use of an air burst system for cleaning. These systems may or may not meet the NOAA criteria of a "proven" cleaning system. A mechanical cleaning system should be included in the design to insure there is a back up to air burst system or in the instance if the air burst system is overwhelmed. Aquatic weeds and wood chip both present in the estuary have been shown to overwhelm systems at fish facilities on the Columbia.

Further it is unclear if the temporary pumps meet the passive screen criteria the NOAA has developed. If the screens do not meet the passive standard then a "proven" screen cleaning system

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would need to be added to the diversion screens. The NOAA criteria for passive pump system appears to conflict with the system proposed in the DEIS:

Passive pump intake screens have no cleaning system and should only be used when the debris load is expected to be low, and

- 1) if a small screen (less than 1 CFS pump) is over-sized to eliminate debris impingement, and
- 2) where sufficient sweeping velocity exists to eliminate debris build-up on the screen surface, and
- 3) if the maximum diverted flow is less than .01% of the total minimum streamflow, or
- 4) the intake is deep in a reservoir, away from the shoreline.

See NMFS 1996. NOAA Screen Criteria Addendum: Juvenile Fish Screen Criteria for Pump Intakes. The Bradwood location is likely not expected to be in a low debris location, the required pumping rate will not be conducive to using a small screen because the pumps required will be >>1 CFS capacity, and the sweeping velocity is purely site location.

Moreover, due to the location of the Bradwood site, *i.e.*, 38 miles upriver, the size of most of the salmonids who will be rearing in the area will be small. FERC must consider this issue as impacts will be greater to smaller sized fish and probably less able to adequately quantify the impact.

• Fish Stranding

Shipwake stranding is potentially a significant problem in the lower Columbia. NOAA (2006) reported that:

A study in 1977 by the Washington Department of Fisheries estimated that more than 150,000 juvenile salmonids, mostly chinook, were stranded on five test sites as a result of ship bow waves striking shorelines (Bauersfeld 1977). Additional studies since the Bauersfeld study have not documented the same level of mortality. Results from a new study by the University of Washington and the Portland District of the U.S. Army Corps of Engineers indicate mortality from ship wakes; however no existing research has been directed to extrapolating the results to pertinent reaches of the lower river. (Pearson et al. 2006).

The DEIS, however, states:

(Pg. 3-28) *The wakes of LNG ships may result in the stranding of juvenile fish at specific locations and contribute to river bank erosion (see sections 4.6.2.1 and 4.1.3.3, respectively).*

(Pg. 4-122) *LNG marine traffic during operation of the Bradwood Landing Project has the potential to impact aquatic species through fish strandings, increased shoreline erosion, introduction of exotic species, vessel strikes, and releases of LNG. Much of the impact discussion included below applies to the salmonids protected under the ESA, which are described in detail in section 4.6.1.1.*

(Pg. 4-123) *It is noteworthy that the three sites chosen for the Pearson et al. (2006) study are located upstream of Bradwood and the portion of the river that the LNG ships would transit to reach the proposed LNG terminal. Reported strandings are greater upriver of the proposed LNG terminal compared to down river. Only one record of wake stranding (on Tenasillake Island at about CRM 37) was found for the lower river downstream of the proposed LNG terminal site. There would appear to be important differences in the lowermost 38 miles of the Columbia River, compared with the portions of the river above the proposed LNG terminal site. The lower part of the river is broader, and distances from the navigation channel to beaches are generally greater than in the upriver segment. The sampled densities of juvenile salmon are lower in the lower river shallows. Further, the effects of tides, currents, and winds may be more variable in the lower Columbia River.*

The comments in the DEIS conflict with what was reported by NOAA (2006). If there have been no significant studies of stranding in the lower Columbia, it is not possible to conclude that strandings in the lower river would be less than in the upper. Also, the claim that the lower river is wide so would have less problem with stranding doesn't apply to the full travel of the LNG ships to

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Bradwood. The channel becomes very narrow upon passing Welsh and Tenasillahe Islands and stranding here could be great. Although the DEIS claims that different deep draft ships have different tendencies to strand fish, there was no information presented on the probable tendency of the LNG ships to cause such a problem.

In a study of ship wake erosion in the Columbia River, it was estimated that ship wake could account for 4 to 24 percent of the total erosion observed at the Puget Island disposal site. (Abbe 1989). With the impact of ship traffic passing Puget Island adding to natural erosion rates on Puget Island, it is likely that erosion from dredge deposits made around this island taken from near the Bradwood terminal could accelerate sediment deposition downriver in rearing habitats. The ongoing dredging might make such deposits accumulate at greater rates.

- **Hazards at the Bradwood Facility**

(Pg. 4-12) The final engineering design for the LNG terminal would incorporate detailed seismic specifications and other measures to mitigate the impacts of seismic hazards.

Loosely deposited dredged fill and alluvium along the shoreline of the lower Columbia River are typically susceptible to liquefaction. Damage due to liquefaction may be manifest in several ways, including temporary loss of bearing support leading to liquefaction-induced settlement and differential settlement of structures; temporary loss of bearing support and subsequent ground subsidence;

The foundation for the LNG facility will be placed on unconsolidated sand and gravel from the river and detailed seismic investigations will not be made until very late in the process, after the facility is already permitted. It appears highly likely that liquefaction of the loose fill at the facility site could occur and be mobilized by seismic activity. The plan is to place 350,000-400,000 yd³ of dredged fill on the LNG terminal site to raise the elevation by 20 ft. This would place 19.7 acres of the terminal site that are currently within the 100-year floodplain above the 100-year floodline (p. 4-70). Corps of Engineer standards for estimation of 100-year floodplains have changed substantially in recent years. It is very likely that a terminal in the floodzone would easily become destabilized by flood waters.

Details of seismic studies are not planned until the early design phase (p. 4-13). This disclosure of potential fatal flaws in the plan would come only after approval of the plan.

- **Hazards along the Pipeline**

Seismic studies have not yet been done along the route of the pipeline, even though it crosses various fault lines. The potential environmental impacts of leaks from pipeline leaks caused by ground movement have not been thoroughly evaluated, nor has a means been explained to engineer the pipeline to safeguard it from rupture.

p. 4-20. NorthernStar identified 110 potential landslide areas in table 4-1 of NorthernStar's Geohazards Report, and ranked each feature by the confidence level that it may be a significant area of unstable slopes.³ The proposed pipeline would cross 31 potential landslide areas; however, some of these are considered lower confidence features that may require no mitigation following field confirmation.

It is not clear how landslide hazards in steep terrain can be mitigated when there is a possibility of the pipeline being dislocated from a hillslope and spilling the contents into a local drainage. In addition, if the pipeline is planned for hazardous slopes, it is not clear why avoidance of these slopes would not be

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the first priority. Local impact to salmon-bearing streams is of concern, both for destabilization of the slope from pipeline placement and from damage to the pipeline from upslope activities from forestry.

- **Effects of Continuous Lighting on Neighboring Wetlands**

FERC acknowledges some problems with lighting – both during construction and operation of the terminal – on aquatic species, yet there is a lack of studies conducted or reviewed that would analyze what those effects would be. Some potential issues to consider would be increased predation by limiting the amount of refuge, increased stress, loss of food sources, etc. FERC needs to fill this information gap.

FERC'S Analysis of Alternatives Lacks Substance

The DEIS conducts a superficial assessment of alternatives that is wholly inadequate for the scope of this project. There is a desperate need for a regional needs-based assessment in order for FERC to make a reasoned, educated decision on whether to license this project and to ascertain whether the goal of providing LNG to the region is a necessary one. FERC needs to assess the viability of other sources of energy, including wind and conservation. In addition, FERC needs to examine alternative LNG sites in the region much more thoroughly than in the current DEIS.

FERC must consider alternative energy sources as part of its "no action" alternative. Alternative energy sources exist and need to be examined, particularly renewables. As Lazarus (2002) found in their report, "efficiency, fuel switching, and combined heat and power (CHP) measures could reduce grid electricity demands by 12% in 2010 and 24% in 2020." Furthermore, the report found that just three renewables: wind, biomass and geothermal, could potentially provide 35% of the region's energy needs. As for cost analysis, the report concluded that investing in renewable resources (solar, wind, biomass and geothermal) "can provide an important hedge against volatile electricity markets" something that LNG can never claim, as it must deal with the value-added costs associated with supply (and demand from other energy-starved countries), shipping and extra labor.

The DEIS summarily reviews proposed LNG terminal sites in the region and likewise summarily concludes that these sites do not appear "environmentally superior" to the Bradwood project. We are not advocating for one LNG project over the other, but we strongly disagree with FERC's unsupported and conclusory dismissal of what may be very viable sites. For example, Oregon LNG's proposed location may have far less impact on the aquatic resources upon which the CRITFC tribes depend. FERC correctly notes that the Oregon LNG sendout pipeline will be longer than the Bradwood project,⁷ but we are equally concerned with Bradwood's 36 mile pipeline that runs adjacent to the Columbia River for many miles and crosses no less than ninety-four waterbodies, many of which are tributaries of the Columbia. This poses a far great risk to the river and its resources.

While the Tansey Point proposal has not progressed in the FERC process (and thus may not be a viable project at this time), FERC contends that it is disadvantaged because of the close proximity of the navigation channel to the berth. It is incongruous to us that this would be a disadvantage compared to the Bradwood site in which less than one half mile separates Bradwood and Puget Island, giving

⁷ Unless, of course, the Palomar Pipeline, becomes the primary sendout for the Bradwood; a likely occurrence considering the news that the Williams Northwest Pipeline at Longview, Washington, is at capacity and currently unavailable to Bradwood. According to the company, they have long-term contracts with domestic gas providers and they are "unlikely to disrupt the relationships we already have with our customers right now." Cassandra Proffitt, *Who Knows Where the Gas Will Go?* Daily Astorian, Nov. 27, 2007.

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very little space for the Bradwood berth and the navigation channel. Again, we are not advocating for one specific terminal over another, but this is yet another example of FERC's simplification – for the benefit of the Bradwood project – of what should be a very complex analysis.

SPECIFIC IMPACTS

Fish Biology

- **Salmon Life History**

The DEIS is deficient in its description of salmon life histories and critical habitat associated with the estuary and proposed project area and impacts. Juvenile salmonids, including chinook, coho, and steelhead are found in the estuary all year around, in migration corridors, and tidal flats and marshes (Fresh et al. 2004; Bottom et al. 2001). Currently studies are being conducted in the estuary to determine the estuarine lifecycle of these fish, however, major data gaps continue to exist warranting further research. In addition, information on sturgeon and lamprey populations need to be developed as these have been taking major hits upriver. The following discussion examines research that was directed at chinook populations, however, there are likely many parallels to (at a minimum) steelhead lifecycles, as well, as coho.

Because of the nature of tributaries directly entering the lower river and estuary (i.e., Lewis River), as well as fish populations from the mainstem Columbia River, fry, subyearling and yearling Chinook may be present in the proposed project site during much of the year (Dawley 1985 in Fresh et al. 2004). A recent study indicated that 70% of juvenile salmon sampled in the estuary had resided in the estuary from 2-6 weeks and that subyearling Chinook salmon attained 20-66% of their fork length in the estuary (McComas et al. 2007).

Subyearling salmon enter the Columbia River estuary as fry or fingerlings and occupy shallow water habitat predominantly (10 cm-2 m depth), although they are known to also extend their range into deeper waters (Bottom et al. 2005). Among the shallow-water habitats used by subyearling salmon are emergent marshes, forested wetlands, peripheral floodplain channels, and beaver ponds (Bottom et al. 2005). Fall Chinook from above Bonneville Dam (e.g., Hanford Reach fall Chinook, Snake River fall Chinook, Deschutes River fall Chinook) are essential to the Columbia River Tribes' ability to exercise their treaty rights to fish. These fish populations utilize habitats that would be directly affected by the Bradwood LNG proposed activities, involving impacts at the terminal, downstream in Clifton Channel, in the turning basin, on littoral habitats of Puget Island, downstream in the shipping channel, in sloughs of the Columbia River, and associated wetlands. Impacts to these habitats arise from disturbance from dredging, sedimentation from terminal and pipeline construction, dredging, and spoils deposition; water temperature increases in these special habitats due to a combination of riparian harvest, sediment deposition, and shoreline reconfiguration.

- **Salmon Viability and the ESA**

According to the NMFS Cumulative Risk Analysis (CRI) in the 2000 FCRPS Biological Opinion and conclusions from Kareiva and Marvier (2000), survival of listed juvenile salmon in the estuary and near shore environment must be increased to 11-14% in order to prevent jeopardy of listed salmon in the Columbia River and that increasing estuarine survival is key to recovery of stocks (Fresh

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et al. 2004). Current juvenile estuarine survival estimates range from about 46-89% (Schreck et al. 2004; Schreck et al. 2006). Much of the mortality is due to the loss of productive estuarine habitat, particularly tidal and shallow water habitat and avian predation which is exacerbated by stress that produces poor juvenile fish condition. Analysis by Bottom and Jones (1990) and NMFS researchers (Dawley, pers. comm. 2000) and Congleton et al. (2001) indicate that juvenile salmon in the Columbia estuary have less food in their stomachs than juvenile salmon in other Oregon and British Columbia estuaries. Percy (1992) noted that smaller juvenile salmon (from the lack of food) have higher ocean mortality rates.

The proposed project will degrade Essential Fish Habitat (EFH) and have the potential to directly impact all of the basin's listed and unlisted fish in the estuary. Truelove et al. (2007) note that changes in salmonid movements and salmonids' abilities to disperse in the face of existing, fragmented estuary habitats need to be better defined. The proposed project would create more habitat fragmentation and likely will result in negative changes to fish behavior which will impact fish survival. These impacts cannot be mitigated by the applicants' speculative benefits of creating new habitat. Thus, the proposed project is not considered in the DEIS in context with overall actions in the basin to promote basinwide salmon recovery.

- **Salmon Habitat Use--Mainstem**

Available juvenile radio tracking data indicate that Columbia River fall Chinook migrate and may rear around the north end of Puget Island near Cathlamet, Washington (Schreck et al. 2002). This is directly in the proposed project turnaround lane that would be dredged. The DEIS fails to address this issue.

In radio and acoustic telemetry studies of juvenile salmon migrating through the CR Estuary, Schreck et al. (2005) and Truelove et al. (2007) found that migration speeds were enhanced by outgoing tides. All fish showed a positive relationship between travel velocity and water flow during outgoing tides. Fish migration, behavior and location is also significantly influenced by estuarine physical parameters, such as temperature and salinity (Fresh et al. 2004). The DEIS has failed to analyze the proposed project dredging impacts to these critical parameters, both from a short-term and long-term perspective. Deepening the shipping channel for the turnaround area has the potential to cause the saltwater intrusion to shift upstream. This could cause changes to the Estuary Turbidity Maximum (ETM) and impact tidal regimes, possibly causing delay to outmigrating salmonids and longer smolt development rates.

Deepening the shipping channel for the turnaround area will likely increase the salinity wedge upstream which could cause fish to move higher in the water column to avoid the increased salinity (See Lower Columbia Channel Deepening FEIS). Delay of salmonid migration can cause increased exposure to avian predators, a key mortality factor for juvenile salmonids migrating through the estuary (Schreck et al. 2005). Avian mortality estimates have been cited from 11-17% of all Columbia River smolts (Schreck et al. 2006) and as high as 23% for yearling Chinook and 29% for steelhead (Schreck et al. 2005). For 2002, NMFS estimated that some 126.5 million juveniles arrived at the estuary, indicating that some 7.6-15.2 million were consumed by avian predators, the majority using habitat created by existing dredging spoils. The DEIS has not identified, much less addressed this issue.

Data from High and Bjornn (2001) and Goniera and Bjornn (2001) indicate that adult salmon below Bonneville Dam migrate as deep as sixteen meters below the surface and seek cool

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temperatures. Adult salmon at these depths would be at risk from proposed project dredging activities including contact with the dredging machinery and contact from turbidity plumes. Hydroacoustic studies by Ploskey et al. (2001) and sampling by Backman (2000 pers. com.) indicate that juvenile salmonids can be found migrating in the water column at depths of 30-40 feet in the impounded river and in the free flowing river below Bonneville Dam. Juvenile salmon tagging studies indicate that tracked fish through the Columbia River estuary could be detected at depths greater than 5 meters below the surface, although the study authors recommended additional studies to confirm this (Truelove et al. 2007). Thus, juveniles would be subjected to mechanical and turbidity plume impacts of dredging as well as exposure to toxics in sediments. Schreck et al. (2004) and Schreck et al. (2005) noted that most radio-tagged juvenile steelhead migrate through the navigational channel, near the area that is proposed for additional dredging. This fact was not noted in the DEIS. The DEIS assumption that salmon do not actively migrate below 20 feet is not supported by any scientific literature.

- **Salmon Habitat Use--Tributary**

The proposed pipeline runs south from Bradwood Landing, either up Hunt Creek or up to a ridge above Hunt Creek, upriver along the southern border of the Columbia River, through approximately 19 km of Oregon slough habitat, crosses under the Columbia River near Abernathy Creek, Washington, and then runs eastward in Washington approximately 12 km through low to moderate slope instability terrain, then through approximately 12 km of moderate to high slope instability terrain to a terminal north of Longview (Figure 4).

Along this path fall Chinook-bearing tributaries are crossed at Westport Slough, the Clatskanie River, Abernathy Creek, Germany Creek, and the Cowlitz River (Figures 5 and 6). The Cowlitz also provides habitat for spring Chinook. The DEIS does not discuss habitat use by these species in the vicinity of the impact zones. Cameron Creek is a major tributary crossed that drains to Abernathy Creek.

Coho habitat is affected in Hunt Creek, Westport Slough, Clatskanie River, Abernathy Creek, Germany Creek, and the Cowlitz River (Figures 7 and 8). Steelhead habitat is affected in Westport Slough, Clatskanie River, Cameron Creek, Abernathy Creek, Germany Creek, and the Cowlitz River (Figures 7 and 8). Coastal cutthroat habitat is affected in Hunt Creek, Driscoll Slough, Westport Slough, Clatskanie River, Cameron Creek, Abernathy Creek, Germany Creek, Coal Creek, the Cowlitz River, and Ostrander Creek (Figures 7 and 8). The extensive coho, steelhead, fall Chinook, and coastal cutthroat distributions in the Clatskanie River and Cowlitz River, and the additional spring Chinook distribution in the Cowlitz make these tributaries to the Columbia River especially of great concern in downstream impacts of the pipeline on migratory habitat and spawning/rearing habitats.

When examining the small tributaries crossed at a map scale of 1:24K in Washington alone, as an example, it is clear that the number of crossings becomes magnified greatly (Figure 9). Superimposing a map layer of the slope instability hazards on the pipeline route, where the pipeline is mapped at a corridor width of 100 ft and the stream courses have a uniform 50-ft width assigned to them, it is clear that there is a large impact area (Figure 10). The western half of the pipeline run through the forests of Washington have a high concentration of uniformly distributed high hazard slopes (Figure 11) while the eastern half has a sparser distribution of high hazard slopes but a large number of moderate hazards (Figure 12). Although the DEIS failed to indicate what riparian buffer width was actually affected in pipeline corridors, it would make sense to consider a minimum of 200 ft on each side of each tributary as being affected in ways that would contribute sediment to the drainage system, affect stream heating, or alter LWD inputs. The extensive sloughs on the Washington side of

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the Columbia downstream from these hazardous slope areas that could experience elevated erosion and mass failure incidence due to pipeline construction could be at risk of degradation.

The pipeline route extends for considerable distance in terrain with high land instability problems. Although some judicious placement could avoid some of these hazards, it does not appear that it would be feasible to avoid placing the pipeline in terrain with a high hazard for landslides, excessive erosion, and pipeline rupture hazards when traversing the mountainous region north of Longview, Washington. Rupturing of a natural gas pipeline has been reported in the mountainous region of Cowlitz County, leading to gas ignition and fire (Wegmann and Walsh 2001). Even the NSNG Geohazard Map (p. 4-20) provided in the DEIS package of submitted materials indicates that there are 7.13 miles of unstable terrain that the pipeline rests on and 27 separate highly unstable areas of note (p. 4-20). However, a count of the areas ranked as "high" or "medium-high" hazard totals 31. Many other areas are listed as medium hazard.

- **Epidemiology**

Allen and Hardy (1980) note that after construction, the new channel becomes a sink for toxic contaminants that are re-suspended again and again from ship traffic and maintenance dredging. This was not addressed in the DEIS. Much more detailed and specific baseline information on the ecological status of the estuary through field studies is necessary before determining new impacts. This includes fish migration studies, rearing and holding studies, wake studies and additional sediment studies for toxic entrainment. Monitoring and research accomplished after additional dredging would make it impossible to measure the changes in ecological response to new dredging, as the opportunity to establish the baseline before dredging would be lost.

Epidemiological studies for fish in the estuary are critical and should proceed and be included in the FEIS. The DEIS did not consider the methodology of Mac and Edsal (1991: in Ewing 1999) for the study of the loss of reproductive success in Great Lakes trout due to exposure to toxics. Ewing (1999) notes that toxics can affect fish behavior such as schooling, temperature selection, seawater adaptation, endocrine disruption and sexual development to the detriment of the population. The DEIS did not address possible sub-lethal effects that would compromise salmon populations. The current contaminant loading of fish in the lower Columbia and estuary is already excessive. The DEIS did not address heavy metal, other herbicide and insecticide impacts on salmon or their habitat, nor effects of wave action that will re-suspend toxics in shallow water habitat where organic sediments are likely to contain toxics and where salmon rear and rest. The applicant should conduct toxic contaminant screening, bioassay and bioaccumulation studies of sediments and biota along the proposed channel dredging sites and backwaters that will be disrupted by ship wakes. The results from these tests should be included in the FEIS. The FEIS should also contain the updated EPA/Corps Dredged Material Evaluation Framework.

The DEIS lack assessments of synergistic and cumulative impacts to salmon and critical habitat that could result from dredging. These include oil spills from larger vessels and more frequent shipping, bilge dumpings, further toxic contamination from increased shipping and industrial activity and introduction of exotic species that could directly or indirectly impact listed species. Because larger ships are less maneuverable than smaller ships the risk of an accident would be increased. These issues are not adequately addressed in the DEIS.

Sediment Delivery (Surface erosion and Mass Wasting) and Pipeline Construction

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- **The DEIS fails to reasonably disclose the impacts of pipeline construction and maintenance on cumulative sediment delivery to streams and consequent impacts to fish habitats and water quality.**

The DEIS has many defects related to the impacts of pipeline construction and maintenance on sediment delivery to waterbodies. First, the DEIS's assessments fail to incorporate the existing conditions that will be affected by sediment delivery and influence the type, significance, and persistence of these impacts on fish habitat attributes, the survival and production of fish, and water quality.

Second, the DEIS failed to disclose the amount, type, and proximity of land-disturbing activities within a distance to streams that will strongly and persistently contribute to elevated sediment delivery to streams. This defect is compounded by the DEIS's failure to adequately factor these impacts into a credible disclosure of the magnitude and persistence of elevated sediment delivery from pipeline construction and maintenance.

Third, the DEIS failed to reasonably disclose the persistence of elevated sediment delivery from pipeline construction and maintenance. The DEIS (4-166) incorrectly and baselessly asserts that elevated sediment delivery from stream crossings by the pipeline will be "temporary." However, this is contradicted by available information. The DEIS (p 4-166) concedes, "...clearing the pipeline right-of-way would be analogous to, but on a much smaller scale than, timber harvest and associated road construction, which have been found to increase the frequency and magnitude of soil destabilization, erosion, and eventually stream sedimentation..." However, the DEIS fails to reasonably disclose that significantly elevated erosion in logged areas typically persists for at least five years.

Pipeline clearing and resulting disturbance will be more akin to road construction than logging due to associated soil impacts from excavation and heavy machinery. Roads undergo elevated erosion for decades, even after obliteration (Rhodes et al., 1994; CWW, 1996; Beschta et al., 2004). The soil compaction from pipeline construction activities is likely to persist for at least several decades, contributing to elevated surface erosion. The DEIS also fails to disclose that at and near stream crossings, efforts to prevent delivery of eroded sediment are not typically completely effective, as is the case with road crossings (Kattelman, 1996).

The DEIS fails to reasonably disclose that stream crossings by the pipeline will have several other impacts that will cause persistent increases in sediment delivery. An area 30 feet in width, centered over the pipeline will be kept free of deep-rooted vegetation and trees greater than 15 feet high (DEIS, p. 168). This recurrent removal of vegetation will likely have impacts akin to logging. Therefore, this repeated removal of vegetation will periodically elevate erosion and sediment delivery in a persistent fashion proximate to streams where sediment delivery will be significant.

This periodic removal of ecologically important vegetation will also prevent full recovery of bank stability at stream crossings, because trees and deep-rooted vegetation are critically important to bank stability (USFS et al., 1993; Rhodes et al., 1994). Decreased bank stability contributes to both stream sedimentation and channel widening. The persistent loss of bank stability associated with pipeline construction and maintenance at waterbodies will cause persistently elevated sediment delivery.

The DEIS also fails to reasonably disclose the magnitude of the effects on turbidity and suspended sediment caused by the construction of pipeline stream crossings. These impacts on

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turbidity and suspended sediment are typically acute, well in excess of regulatory limits, and at levels that significantly degrade aquatic habitat conditions and adversely affect fish and macroinvertebrate populations (Lévesque and Dubé, 2007), although the DEIS fails to adequately disclose these impacts.

The DEIS also fails to reasonably disclose that attempts to divert streams for construction of pipeline crossings fail with some frequency (Lévesque and Dubé, 2007). In so doing, the DEIS fails to reasonably disclose that these failures greatly increase sediment delivery and consequent impacts on streams. These fatal flaws must be corrected in the FEIS.

The DEIS has multiple defects regarding the impacts of sediment delivery from HDD crossings of waterbodies. Although the DEIS (p. 4-83) concedes there is the potential for "frac-out" with HDD crossings, resulting in releases of drilling mud to streams, the DEIS fails to reasonably disclose the likely magnitude and frequency of frac-out. The DEIS fails to reasonably disclose that frac-outs are likely to result in severe increases in sediment delivery and turbidity. While the DEIS concedes that frac-outs release drilling mud, it fails to clearly disclose that the release of drilling mud creates high turbidity. It also fails to disclose that the frac-outs will not only release drilling mud, but also disrupt unconsolidated channel substrate, which will also generate downstream sediment delivery and turbidity in addition to that from drilling mud. The DEIS also fails to disclose that frac-outs from HDD crossings are relatively common (Reid et al. 2002). These defects preclude reasonable disclosure of HDD impacts. These defects must be completely rectified in the FEIS in order to reasonably disclose the project's impacts on aquatic and watershed impacts.

• **Sediment Impacts of HDD Pipeline Crossings**

The DEIS also fails to disclose that HDD crossings will have other impacts that will significantly and persistently increase sediment delivery to streams. The DEIS fails to disclose the location of HDD entry and exit points and reasonably describe the associated ground-disturbing activities including their proximity to waterbodies. It is highly likely that the impacts to staging areas for HDD crossings will involve significant disturbances, including the clearing of vegetation (DEIS, p. 4-84) in close proximity to waterbodies. These impacts of HDD crossings will persistently and significantly elevate sediment delivery to streams. Notably, these impacts are not reasonably analyzed and disclosed in the DEIS. These defects must be thoroughly remedied in the FEIS.

The DEIS (4-84) concedes that locations, activities, and affected area that will be disturbed for the staging of HDD crossings have not been determined. Plainly, this precludes reasonable disclosure of the impacts of these crossings on sediment delivery and conditions that influence both aquatic habitat conditions and water quality. As previously discussed, location of these activities and their impacts must be determined, analyzed, and disclosed as part of the FEIS in order to reasonably determine the impacts on affected aquatic resources.

Importantly, the use of HDD to cross waterbodies is not required for any waterbody and may not occur (DEIS, p. 4-84). However, the DEIS fails to reasonably disclose the impacts of other stream crossing methods that may be used instead of HDD to cross streams. These other stream crossing methods are likely to have significant impacts that must be disclosed. The FEIS must also disclose the likelihood that waterbodies will be crossed by methods other than HDD and reasonably estimate and disclose their impacts on sediment delivery and consequent impact on affected aquatic resources.

• **Limited Effectiveness of Measures to Control Sediment Delivery Via Surface Erosion or Mass Failure**

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Another overarching problem is that the DEIS fails to reasonably disclose the limited effectiveness of measures to control erosion and sediment delivery to streams from pipeline construction and operation. This problem must be corrected. Reasonable disclosure of impacts requires more than the listing of measures and arbitrary assumptions regarding their efficacy. The FEIS must take a hard look at the available scientific information regarding the limits of these measures' effectiveness, disclose these limits, and factor it into a credible analysis of the effect of pipeline construction and maintenance on sediment delivery and its consequent impacts to aquatic resources.

The DEIS includes no adequate analysis of the likely effects of pipeline construction and operation on sediment delivery to streams via mass failures. Although the DEIS (4-169) states that "Most of the unstable slopes near sensitive waterbodies would be crossed by the HDD construction method" this may not actually be the case, because HDD crossing of these slopes is not required and may not occur, as the DEIS (p. 4-84). Further, the DEIS provides no reasonable analysis that HDD crossings do not contribute to slope instability. Although the DEIS (4-169) asserts that there are no other locations, besides those that are initially assumed to be crossed by HDD, where the pipeline would cross an unstable slope within 200 feet upslope of a waterbody, mass failures from unstable slopes frequently travel much farther than 200 feet. Plainly, the DEIS has not taken a reasonably hard look at the potential for pipeline activities to elevate sediment delivery to streams via mass failure. This must be rectified.

- **Cumulative Impacts to Sediment Delivery**

Another major and severe defect in the DEIS is that it fails to reasonably estimate the cumulative magnitude and persistence of sediment delivery to streams from the combined impacts of pipeline construction and maintenance. This is tractable and has been part of many EISs involving land disturbing activities affecting water quality and imperiled fish populations. This failure must be rectified in the FEIS by reasonably estimating the total increase in sediment delivery to affected streams at the scale of both reaches and watersheds. In so doing, the FEIS must also disclose key uncertainties, potential sources of error in estimates, and their ramifications for water quality, fish habitat conditions and fish populations.

The DEIS also fails to reasonably disclose that the construction of multiple stream crossings by pipelines within a watershed has the potential for permanent cumulative effects on aquatic resources (Lévesque and Dubé, 2007). Persistent impacts from elevated sediment delivery are typical in degraded streams susceptible to sedimentation (Espinosa et al., 1997). Notably, the pipeline will cross multiple stream segments in watersheds with degraded streams, although this is not adequately disclosed in the DEIS.

All of the waterbodies that will be crossed by the pipeline drain into the Columbia River. Therefore, all of the pipeline crossings will cumulatively affect water quality and fish populations in the Columbia River. However, the DEIS fails to adequately assess these cumulative effects. The FEIS must rectify these significant flaws by adequately disclosing the cumulative effects of pipeline activities on sediment delivery based on a hard look at the total impacts at the multiple scales at which cumulative impacts will accrue.

- **Linkage of Sediment Impacts to Fish Habitat Conditions**

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The DEIS also fails to reasonably disclose the effects on aquatic habitats from elevated sediment delivery from pipeline construction and maintenance. Although it is not adequately disclosed in the DEIS, elevated sediment delivery has numerous adverse impacts on waterbodies and water quality, including: the loss of pool frequency, quality, and volume (USFS et al., 1993; Rhodes et al., 1994; Buffington et al., 2000); increased width-depth ratio (Richards, 1982); elevated levels of fine sediment in substrate (Rhodes et al., 1994; Waters, 1995); and elevated turbidity and suspended sediment (Waters, 1995). Notably, these impacts singly, but especially in concert, degrade aquatic habitats in ways that significantly reduce the survival and production of salmonids and other aquatic organisms (Meehan, 1991; Waters, 1995). Although wholly undisclosed in the DEIS, available research indicates that any increase of fine sediment harms steelhead trout production (Suttle et al., 2004).

Due to the nature of pipeline construction and maintenance, these impacts to water quality, fish habitat, and fish populations will accrue at multiple scales for multiple species. However, the DEIS fails to adequately disclose these impacts on these aquatic resources at ecologically relevant scales, including the watershed scale and at the scale of habitats used by the affected fish populations. These defects must be rectified in the FEIS.

The DEIS also fails to reasonably disclose that the elevated sediment delivery from pipeline construction and maintenance is likely to contribute to increased water temperatures. Scientific information amply indicates that impacts that elevate width-depth ratios of waterbodies contribute significantly to increases in water temperature (Beschta et al., 1987; Rhodes et al., 1994; McCullough, 1999; Bartholow, 2000) even in the absence of the loss of stream riparian cover density (Rhodes et al., 1994; Bartholow, 2000). The DEIS fails to adequately disclose this impact on water temperatures from elevated sediment delivery based on reasonable assessment of likely cumulative impacts, existing conditions, and available information. This is a significant defect because many streams affected by pipeline construction and maintenance are afflicted with water temperature problems and/or are listed as water quality limited for water temperature (e.g., DEIS, p. 4-63, 4-64). Water temperatures in the Columbia River do not meet water temperature standards (DEIS, p. 1-140). Figure 1 presents annual water temperature trends for the Columbia River at Tenasillahe Island, just downstream of Bradwood Landing. This shows that summertime temperatures are 5°C above the standards for Oregon and Washington and are at the incipient lethal level. Although it is feasible for salmonids to sound or to move to river margins to escape the high surface temperatures for those fish rearing in the estuary during the summer, deep water could subject the fish to dredging impingement and rearing in the margins could subject the fish to even higher temperatures. River margins are typically warmer than the mid-river flows. Margins are the preferred rearing habitats, but these are the most likely areas to be affected by warming impacts from the terminal or pipeline (Dauble 2000). In the Snake River, fall Chinook preferentially use the river margin for rearing until temperatures reach about 18-20°C, after which they move to mid-river (USACE 2002). Actions that make river margins warmer could reduce the effective rearing capability of margins. Food availability is lower in mid-river than in margins.

The Columbia River will be cumulatively affected by temperature impacts in its tributaries. Therefore, the DEIS clearly fails to reasonably disclose an important impact from sediment delivery from the pipeline construction and maintenance. This must be thoroughly rectified in the FEIS.

Hydrologic and Wetland Impacts of Pipeline Construction and Maintenance.

The DEIS does not take a reasonably hard look at the total hydrologic impacts of pipeline construction and maintenance. For instance, the DEIS fails to reasonably disclose the total amount of

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soil compaction associated with pipeline activities in wetlands and within 300 feet of streams. This is significant because soil compaction alters soil hydrologic processes, including infiltration, water holding capacity, surface runoff, and surface water interactions with ground water. These all influence the functionality of wetlands, because the ability of wetlands to absorb, store, and release water is one of their key ecological features. These flaws in the DEIS must be rectified in the FEIS, by disclosing not only these impacts but also their consequences for wetland and stream hydrology.

The DEIS also fails to adequately disclose the persistence of impacts from compaction. Under most conditions, at least 50-80 years are required for recovery from soil compaction in soils with lower clay content (Beschta et al., 2004). Wetland soils typically have higher levels of clays, significantly extending the time needed for recovery from compaction. There is almost no potential for mechanical restoration of compaction in saturated soils.

The DEIS fails to adequately disclose the magnitude, persistence and ramifications of pipeline construction on other impacts to the hydrology of wetlands and riverine areas. The pipeline will cause a permanent loss of the ability of soil to absorb and store water, because the pipeline is impermeable. Based on the pipeline length and diameter specifications in the DEIS, the pipeline itself will result in the permanent loss of about 225,374 cubic feet of water storage capacity in affected soils, which includes soils in wetlands and riparian areas. This obvious and enduring hydrologic impact of the pipeline will persist for as long as the pipeline is in place, although this is not adequately disclosed in the DEIS.

LWD, Stream Shade, and Water Temperature and Consequent Impacts on Fish Populations and Fish Habitat

- **Cumulative Impacts of Pipeline Construction and Maintenance**

In several ways, the DEIS does not reasonably disclose the many impacts of the pipeline maintenance and construction on elements and processes critical to fish habitat and water quality. One of the prime problems on this front is that the DEIS fails to disclose the extent, location, and proximity of all areas that will be disturbed near waterbodies that will reduce stream shade and LWD recruitment. The DEIS also fails to disclose the amount of stream shade that will be removed by pipeline activities at the scale of reaches, watersheds, and fish populations that use affected streams. Similarly it also fails to reasonably estimate the amount of LWD lost due to pipeline construction and maintenance at ecologically meaningful scales including at the scales of reaches, watersheds, and fish populations that use affected streams. These problems are compounded by the failure to assess these impacts within the context of the existing condition of LWD and stream shade.

Such an analysis is necessary for several reasons. First, it is necessary to reasonably determine and disclose impacts at the watershed scale. Second, it is needed in order to determine impacts to the various fish populations that inhabit the affected watersheds. Third, the DEIS (e.g., pp. 2-27, 4-95) repeatedly asserts that the applicant purportedly aims for the project to have an overall environmental benefit to the lower Columbia ecosystem. In order to reasonably assess the veracity of this claim, it is critical that all of the negative cumulative impacts of all aspects of the project and their spatial distribution must be fully determined and disclosed. Notably, because the negative cumulative impacts of the project have not been adequately determined in the DEIS, FERC has no basis for asserting that the project meets this purported goal. Therefore, it is critical that these defects be remedied in the FEIS.

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- **Thermal Impacts on Rivers and Streams**

p. 4.62. *The portion of the Columbia River between CRMs 35 and 98 has been on ODEQ's 303(d) water quality-limited list for temperature (summer only) since 1998, in addition to exceeding total maximum daily loads (TMDL) for arsenic, dichlorodiphenylchloroethylene (DDE), and PCBs year-round. The Clatskanie River is listed for dissolved oxygen levels, fecal coliform, and temperature.*

p. 4.63. *Cameron Creek, Abernathy Creek, Germany Creek, Tributary 5 to Coal Creek, Coal Creek, and Ostrander Creek are listed for temperature variations outside the water quality standards. A discussion of the potential impacts on waterbodies that would be crossed by the proposed pipeline route is provided in section 4.3.2.4.*

It is anticipated that there will be a total of 94 waterbody crossings (Table 4.3.2.4) by the pipeline with extensive travel of the pipeline through wetlands on the Oregon side of the river. Westport, McLean, Uncle Tom, Larson Slough, Whiskey Joe, Ludviksen Slough, Kelli, Randa, Beaver, and Dobbins Sloughs will all be significantly impacted by trenching and removal of native vegetation. Some of these sloughs are listed as perennial and connected to the river. Others are listed as non-fish-bearing and intermittent. It is unclear what their connection is to the river and their potential for use by salmon for rearing. Restoration of use by the system of sloughs would be an appropriate additional increment of mitigation. A total of 98 acres of disturbed land in the wetlands is envisioned. The potential for disruption of subsurface flow direction and drainage through the sloughs has not been significantly considered. Sediment and compaction impacts of heavy machinery operating in these areas have not been considered. Compaction itself could impair the throughflow of water for decades. Even though the sloughs specifically have not been identified as water quality limited, the Columbia River is listed for temperature. Its river margin habitats are the most likely areas to experience elevated temperatures. For this reason, temperature impacts from all pipeline construction should be evaluated for local impacts in rearing areas and not by simply averaging on a flow-temperature weighted basis the runoff from project areas with the entire Columbia River flow. Because these marginal areas are also essential as rearing areas for salmon smolts from the entire Columbia River upstream of Bradwood, it is essential to disclose the impacts of the pipeline in these habitats.

Probably the most egregious aspect of trenching a pipeline through the numerous sloughs on the Oregon side of the river, followed by pouring concrete into the trench to hold down the pipeline, is that future restoration options for these sloughs would be foregone forever. Greater than 60% of historic wetlands have been disconnected from the estuary by construction of tide gates and building of levees. This type of past action degraded the condition of the sloughs and removed their connectivity with the estuary. There is enormous potential for improving salmon production in the entire Columbia River by improving the rearing capability in these types of wetlands. It is highly probable that placement of the pipeline in these sloughs would be used in the future as justification for never restoring these lands, should they become available. This is far too great a price to pay. The DEIS fails to explore the critical value of these sloughs and the long term loss to the Columbia River ecosystem's restoration by pipeline construction.

The right-of-way for the pipeline will create a 100-ft wide clearcut swath. Within this corridor, a 30-ft path centered on the pipeline will never be allowed to revegetate with trees taller than 15 ft. At stream crossings, a stream buffer of 25 ft would be allowed to regrow, but a buffer of this small extent is insufficient to reduce sediment and temperature impacts from vegetation removal in the streamside zone. Numerous studies indicate that buffers of ≤ 25 ft are insufficient to prevent degradation of aquatic resources (e.g., Knutson and Naef 1997).

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The means of keeping vegetation from regrowing along the pipeline has not been discussed. If herbicides are planned for keeping trees from becoming re-established, the potential impairment to aquatic resources could be severe. The current temperature regimes of any of the streams being crossed or paralleled by the pipeline have not been presented. Likewise, the impact of temperature increases that can be expected from riparian clearcuts along the affected streams has not been calculated.

Even if the stream crossing method employed is HDD, the requirement to remove all riparian vegetation still exists, which will cause localized impacts to stream heating and sedimentation.

It is expected that there would be 17 waterbodies crossed by the pipeline using the HDD method, which can require a very large staging area (p. 4-84). In addition, 6 waterbodies would be crossed with the bore method. All others are planned for open trenching. There is some likelihood that if a decision is made that the HDD method or bore method is not feasible, the trenching method would be used. The impacts of the various methods obviously vary substantially. Given the uncertainty about which method actually will be used, disclosure of impact should reveal the impacts of all methods potentially employed. Because there is no requirement that any specific method should be used, it should be considered likely that other methods would actually be implemented in the field.

p. 4-85. In addition to using the HDD or bore methods for crossing waterbodies, NorthernStar also would use an open-cut technique for waterbody crossings. Clearing and grading of streambanks, in-stream trenching, backfilling, and trench dewatering could affect surface water quality through increased sedimentation, increased turbidity, decreased dissolved oxygen concentrations, and stream warming. A majority of the open-cut crossings would use a standard dry-trench method including either the dam and pump or flume method.

The impacts of the open-cut construction method on the minor intermittent and perennial streams along the pipeline routes would generally be localized and short term. Clearing, grading, and trenching within and adjacent to these streams would have the greatest effect on water quality. Clearing of trees and vegetation in and around streams could lead to an increase in water temperature. Sediments would be resuspended by in-stream construction activities or by erosion of cleared stream banks and riparian areas. Turbidity resulting from the resuspended sediments could reduce light penetration and the corresponding photosynthetic oxygen production. Resuspension of deposited organic material and inorganic sediments could cause an increase in consumption of biological and chemical oxygen, decreasing available dissolved oxygen. To minimize impacts on surface waters, NorthernStar would implement its pipeline ESC Plan for Oregon and its SWPPP for Washington as well as our Procedures.

The list of potential impacts from the various methods of constructing the pipeline is extensive, but this does not really constitute a disclosure of impacts. The commentary provides only the most general description of impacts. It offers no quantitative assessment of temperature impacts or sediment delivery estimates. In addition, it does not indicate which fish species are at risk in the affected streams, what their current condition is, the current condition of their habitat, or what the impact would be of changes in their habitat condition. For example, many of the streams affected by the pipeline are on the 303(d) list for water quality impairment. While temperature is a common type of impairment, no data on existing temperatures are given, no estimate of the increase in water temperature due to activities, or impact on fish populations.

- **Thermal Impacts of Pipeline**

Pipelines will be installed across streams using either the HDD, boring, or trenching/cofferdam approaches and 30-m clearcuts will be implemented at each crossing. This will result in cumulative opening of canopy on the affected stream systems. Because it is the intent of the project not to revegetate the sites with trees that could restore shade, this impact will be a permanent level of stream

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warming. NorthernStar plans to simply employ BMPs as a means to supposedly avoid all impacts of pipeline crossing (p.13. NorthernStar Mitigation Plan, Aug. 1, 2007). There is no indication what these BMPs consist of or how the removal of shading vegetation will be mitigated.

The rate of stream heating on a linear basis has been reported as between 0.7°C/100 m in SE Alaska to 15.8°C/100 m in the Oregon Cascades (Beschta et al. 1987). Moore et al. (2005) indicated that the literature documents downstream warming of 7°C/46 m in Oregon (Brown et al. 1971), and 2°C/50 m, 1.4°C/30 m, and 0.4°C/20 m (Herunter et al. 2003) in various cross-channel right-of-ways. For clearcuts of various dimensions, stream temperature increases have ranged from 0.5 to 11.6°C (Beschta et al. 1987, Moore et al. 2005). Despite arguments often made by the timber industry that streams cool rapidly when they pass into shaded reaches, this is not necessarily the case (Beschta et al. 1987, Moore et al. 2005, SER 2000, NOAA 2005). This means that each increment of warming from the combined road, logging, utility, or pipeline corridor crossings in a watershed produces a further degradation of water quality.

Several wetlands and stream crossings located on the Wauna Mill property will be temporarily disturbed due to trenching to install the Pipeline. (p.61. NorthernStar Mitigation Plan, Aug. 1, 2007).

Although avoidance and minimization procedures are described in Table 1-2 (Avoidance and Minimization Actions for Bradwood Landing Project on p.13. of the NorthernStar Mitigation Plan, Aug. 1, 2007) for the HDD and boring methods, the stream crossings using the trenching method (such as noted for the wetlands and streams on the Wauna property above) do not have any minimization procedures noted. Likewise, there are no pre-project baseline conditions or post-project restoration conditions specified. This is a significant oversight. All that is indicated that may refer to the use of trenching (although it is not specifically stated) is: *Use BMPs for crossings where boring is not feasible to minimize effects on salmonids and other aquatic organisms; restore habitat features* (p.13. of the NorthernStar Mitigation Plan, Aug. 1, 2007). Presumably if boring is not feasible, trenching would be used. The BMPs are not specified, which may simply equate to "try to resist mucking it up as much as you can." BMPs to protect against effects of trenching appear to consist only of use of hay bales and silt fencing. There needs to be a set of detailed BMPs for there to be any assurance that impacts will be restricted to some known level. These BMPs should have some documentation of known effectiveness. This information is totally lacking.

p. 4-78. The proposed pipeline route would result in 94 waterbody crossings in Oregon and Washington. Of these, 65 are located in Oregon and 28 are located in Washington; the remaining waterbody is the Columbia River, which is located in both states. These waterbodies and their proposed crossing methods are listed in table 4.3.2-4.

With a total of 65 water crossings in Oregon and 28 in Washington, the cumulative effect of thermal and sediment impacts to sensitive streams and wetlands will be large. Several of these streams are listed for temperature and/or sediment impairments. It is not discussed how further impacts to these streams will be mitigated. Even the HDD method applies only to the stream channel itself. Riparian trees will be cleared outside the channel boundaries, opening up the sideslopes to additional stream heating and sediment input. At a scale of 1:24K it is easy to count at least 31 tributaries that will be crossed in Washington alone. Some tributaries are paralleled for significant length which would have even greater riparian effects that are not described. Even so, the number of smaller order tributaries would be increased significantly if the analysis were done at a larger scale. This could magnify the true extent of the impact significantly.

Impacts of Terminal Construction and Operation on Hunt Creek and the Columbia River

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- **Impacts at Hunt Creek**

p. 4-9. *Debris flows or landslides initiated within the Hunt Creek drainage would proceed northward through the wetlands and mitigation areas west of the terminal and could not reach the terminal facilities.*

p. 2-27. *NorthernStar would also preserve and enhance about 62 acres at the mouth of Hunt Creek within the 411-acre parcel it controls at the Bradwood Landing terminal site as an additional wetland and habitat mitigation site. The compensatory mitigation sites were identified only after all other forms of impact mitigation (i.e., avoidance, minimization, rectification, and reduction) were considered and, when appropriate, implemented. In developing these sites, it was NorthernStar's intent to provide an overall net benefit to the environment of the lower Columbia River ecosystem. The locations of the sites are illustrated on figure 2.1.5-1, and they are described in greater detail in sections 4.4.1 and 4.5.*

Although it may be NorthernStar's intent to provide a net benefit to habitat of the lower Columbia River estuary, it is unclear what extent of benefit is actually targeted. Targeting a benefit that is simply equal to the value of the habitat lost is very risky. First, there is no concept that the FEIS has accurately identified the values of habitats being impaired and lost. The extent of use by various species is revealed only in the crudest manner. It appears that very little of value may be developed at the mouth of Hunt Creek that does not already exist. Further, there are more reasons to believe that ongoing activity at the terminal will compromise the habitat values present in this location. Hunt Creek is a significant natal stream for lower Columbia River coho and coastal cutthroat.

p. 2-41. *An existing PWR line runs through the proposed LNG terminal site. NorthernStar would need to remove a 4,200-foot-long portion of the existing tracks and relocate the railroad up to 250 feet south of its current alignment, still within the parcel controlled by NorthernStar. The right-of-way for the new railroad alignment would be 100 feet wide (i.e., 50 feet on each side of the centerline), consistent with the current right-of-way. Existing or new ballast would be moved or placed in the new right-of-way location and old tracks would be moved or replaced by new tracks. An undisturbed vegetation buffer zone would be maintained between the railroad realignment construction activities and the edge of Hunt Creek that would be at least 30 feet wide. The railroad line is in service, but not currently in use, which would allow for the possibility of delivering construction materials for the project by train. The extent of potential habitat damage focused at Hunt Creek is not confined to the terminal area.*

Placing the rail line within 30 feet of Hunt Creek would be a source of permanent and continuing degradation to the stream. Buffers of only 30 feet are not sufficient as a means to reduce solar radiation and stream heating, reduce sediment delivery downslope to the stream, or to protect the microclimate of the stream (Beschta et al. 1987, Moore et al. (2005), Krutson and Naef 1997). The railroad has not been in use, so it is not clear why this railroad would be restored at all except for purposes of supplying the terminal only during construction. Damage caused to Hunt Creek by development of this needless rail line cannot be justified.

p. 4-74-75. *During construction, the existing railroad line would be rerouted and would parallel Hunt Creek for approximately 2,000 feet. For most of this length, the creek and the edge of the railroad right-of-way would be between 50 and 400 feet apart. Hunt Creek would not be directly affected by railroad construction; however, for about 50 feet, the edge of the railroad right-of-way and Hunt Creek would be less than 50 feet apart. The railroad tracks would occupy approximately 22 feet at the center of the 100-foot-wide railroad right-of-way, and would have approximately 5-foot-wide ditches maintained along both sides of the railroad tracks. An undisturbed vegetated buffer of at least 30 feet would be maintained between the railroad tracks and the creek. NorthernStar's terminal ESC Plan describes measures that would be taken to prevent railroad bed ballast, other construction materials, and eroded soil from entering Hunt Creek during construction.*

Railroad corridors along stream channels create conditions whereby loss of riparian vegetation significantly contributes to stream habitat deterioration. Reduced canopy will increase solar radiation

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inputs. Steep hillslopes from the railway corridor will increase the sediment transport to the channel. It will be virtually impossible to prevent the mobilization of these sediments during and after construction. This railway should not be reconstructed. If needed at all it should not be a new source of impact to Hunt Creek, but should be kept out of this drainage.

p. 2-27. *NorthernStar would also preserve and enhance about 62 acres at the mouth of Hunt Creek within the 411-acre parcel it controls at the Bradwood Landing terminal site as an additional wetland and habitat mitigation site.*

The terminal construction area butts up directly adjacent to Hunt Creek (p. 2-34). It is not possible to conceive how Hunt Creek wetland areas can be protected or enhanced when the terminal encroaches so dramatically on the stream. Given the Clifton Road traffic, railroad line construction along Hunt Creek, ship wake disturbance, dredging, powerline construction, maintenance of the power line 100-ft corridor cleared of vegetation, maintaining any natural qualities of Hunt Creek is difficult to conceive and is devoid of technical support in the EIS. It appears that this coho and coastal cutthroat habitat will simply be a sacrifice zone. The cumulative impact of all actions (e.g., solar loading, sediment loading, loss of LWD) on Hunt Creek were not disclosed.

p. 4-112. *NorthernStar's railroad right-of-way revegetation plan consists of two vegetative zones. The width of the zones would be variable, depending on the distance from the railroad tracks to Hunt Creek. The majority of the planting zone would be vegetated with low-growing herbaceous species in order to maximize visibility and minimize fire fuel. Low-growing herbaceous species, including lupine species and native grass species, would have a mature height less than 5 feet. Where the railroad right-of-way approaches Hunt Creek, near the center of the rail realignment, upland shrubs would be installed. Upland shrubs would have a mature height of 10 feet and greater.*

The railway revegetation plan along Hunt Creek emphasizes only low-growing herbs and short shrubs. Mature trees that have a chance of providing shade to Hunt Creek are not considered. This would likely result in warming of Hunt Creek or maintenance of already warm conditions. In addition, bank stability and erosion control would likely be significantly greater with tree planting than merely shrubs and grasses.

- **The DEIS Fails to Reasonably Assess the Cumulative Effects of Combined Project Impacts of the Terminal Infrastructure on Water Quality and Fish Habitat**

The various aspects of the project will have numerous negative impacts that will cumulatively affect water quality and aquatic habitats in Hunt Creek and the Columbia River. These impacts are not reasonably assessed and disclosed in the DEIS. These activities include work on existing transportation corridors, dredging, deposition of dredge spoils, and the construction and maintenance of a power line, railroad re-alignment, and the terminal. These activities will have numerous impacts including the removal of vegetation, loss of LWD, removal of stream shade, loss of bank stability, alteration of groundwater-surface interactions due to soil compaction, elevated sediment delivery, and loss of thermal regulation. However, the DEIS fails to adequately disclose these cumulative impacts.

The defects on this front are many. As previously discussed the DEIS fails to disclose all of the following aspects of all project activities⁸ that will occur within at least 300 feet upslope of the

⁸ At a minimum, these aspects should include all areas that are subject to heavy machinery operation, soil compaction, vegetation removal, grading, filling, and/or excavation, including the construction, operation, and maintenance of the terminal, pipeline, railroad alignment, roads and bridges, and powerline.

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Columbia River and all Hunt Creek all tributaries, including intermittent channels and those that do not provide fish habitat:

1. the location and area of vegetation removal and soil disturbance, including soil compaction;
2. the type and amount of vegetation removed;
3. the nature and degree of soil impacts, including compaction, removal of soil cover, and alteration of soil properties;
4. the distance to the nearest channel or waterbody;
5. the type of activity;
6. activity duration and expected season(s) of occurrence;
7. spatial connectivity of the nearest channel/waterbody to fish habitat and the fish populations using the habitats;

This information must be factored into disclosure of the project's impacts on aquatic resources, including all essential fish habitat attributes (LWD, substrate, channel morphology, etc), the survival and production of fish populations, channel erosion, bank stability, sediment delivery, and all affected aspects of water quality in Hunt Creek and the Columbia River.

This problem is compounded by the DEIS's failure to reasonably disclose the very limited effectiveness of many measures touted to reduce impacts. For instance, the DEIS states that various widths of vegetation between project activities and Hunt Creek and the Columbia will be maintained undisturbed, allowed to revegetate, and/or replanted after activities. However, the DEIS fails to reasonably disclose that these widths are inadequate to prevent degradation or maintain unimpaired riparian processes.

As a specific example, the DEIS states that an "...undisturbed vegetation buffer zone would be maintained between the railroad realignment construction activities and the edge of Hunt Creek that would be at least 30 feet wide." However, the DEIS fails to reasonably disclose that available information amply indicates that a 30 foot wide buffer of undisturbed vegetation will not prevent degradation from elevated sediment delivery from re-alignment construction, the loss of LWD, thermal regulation by riparian vegetation, and many other impacts. The DEIS also fails to reasonably disclose that this width of undisturbed vegetation is inadequate to maintain unimpaired riparian processes vital to water quality and fish habitat. It also fails to adequately disclose that the loss of riparian vegetation and its functions due to the railroad re-alignment measure will permanently maintain degradation of water quality and fish habitat in Hunt Creek, and downstream in the Columbia River.

The foregoing is but one example of the DEIS's failure to reasonably disclose how the project's impacts associated with the terminal's infrastructure⁹ will cumulatively and permanently degrade riparian conditions and functions essential to the maintenance of water quality and aquatic habitat in Hunt Creek and the Columbia River. These defects must be rectified by analyzing and disclosing the magnitude, persistence, and consequences of the impacts of construction and maintenance of terminal infrastructure on riparian functions in Hunt Creek and the Columbia River. At a minimum, these functions and their consequences must include: LWD supply, ability to prevent sediment delivery from upslope sources, stream shade, stream thermal regulation, and bank stability.

The DEIS also failed to reasonably disclose all important impacts associated with the construction and operation of the terminal infrastructure at the scale of the Hunt Creek watershed. For

⁹ In these comments, "terminal infrastructure" includes all aspects of the terminal, including the areas to be dredged, areas affected by dredge spoils, the terminal, power line, railroad, and transportation corridors.

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instance, the DEIS does not disclose the amount of compaction and vegetation removal at the scale of the Hunt Creek watershed. This is critical because soil compaction reduces soil permeability. All areas of reduced permeability, and not just those that are totally impermeable, contribute to increasing peak streamflows and reducing low flows (Booth, 2002). The DEIS fails to reasonably disclose that hydrologically and biologically, there are no negligible amounts of clearing or watershed imperviousness (Booth et al., 2002). Similarly, the DEIS includes no adequate assessment in cumulative alterations in low flows and high flows that will be caused by all project activities in Hunt Creek, although clearing, compaction, and impervious surfaces will alter low and high flows in affected streams (Booth et al., 2002; Booth et al., 2004).

• Assessments are Piecemeal and Cursory and Lacking in Cumulative Effects Analysis

Similar to the defects related to pipeline impacts, the DEIS fails to reasonably disclose the cumulative effects of the construction and operation of terminal infrastructure on sediment delivery to Hunt Creek and the Columbia River and its consequent impacts, including those on turbidity levels, channel width, pool conditions, substrate conditions, and macroinvertebrate populations. This is a critical defect because the project will persistently and significantly elevate sediment delivery to Hunt Creek and the Columbia River.

Instead of quantitatively and cumulatively assessing the impacts of the construction and operation of sediment delivery, the DEIS instead only provides piecemeal qualitative assessments of the impacts of individual activities such as dredging, the placement of dredge spoils, power line construction and maintenance, bridge reconstruction. This is highly inadequate for disclosing the cumulative impacts on sediment delivery and consequent effects.

First, the piecemeal assessments are cursory and are not based on taking a hard look at available information. For instance, the DEIS asserts that most stormwater runoff from the terminal is expected to infiltrate on site due to existing infiltration rates. However, this is not a reasonable assumption, because grading and compaction will greatly reduce infiltration rates. Surface sealing of bare soil surfaces is likely to further reduce infiltration rates. It is also likely that during and after prolonged sequences of larger storms that are common to the areas, soils will be persistently saturated and unable to absorb water via infiltration. Therefore, the DEIS fails to adequately consider and disclose these impacts. In so doing, the DEIS fails to disclose the impacts of stormwater runoff from terminal construction and operation on sediment delivery.

Dredging at the Terminal and In-River

• Dredging Impacts at the Terminal

The DEIS analysis of dredging impacts on turbidity and suspended sediment is cursory and inadequate. The DEIS's analysis of this impact is based on the assumption that suction dredging will be the only method used, but other methods may be needed in order to excavate the area proposed for dredging. These methods have greater impacts than the hydraulic dredging analyzed in the DEIS. The DEIS failed to reasonably assess the likelihood and the effects of the use of other methods besides suction dredging for channel excavation. In so doing, the DEIS failed to reasonably assess the likely impacts of dredging on sediment delivery and turbidity in the Columbia River.

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Another obvious problem with the analysis of dredging effects on turbidity and sedimentation is that the DEIS failed to take a hard look at the assumptions and results of the modeling of changes in suspended sediment from dredging. The DEIS (p. 4-69, 4-70) indicates that only spillage from dredging was considered in modeling the effect of dredging on turbidity and suspended sediment. In contrast, several other factors are likely to contribute to turbidity elevation, including disruption, mobilization, and suspension of sediments disturbed during dredging. The DEIS also fails to adequately assess the veracity of modeling assumptions and sediment size characterization. The modeling was clearly based on assumed spillage rate that may not be reasonable or reflect actual spillage during dredging.

Although the DEIS asserts that modeling of dredging impacts on suspended sediment indicates that there is likely a limited effect, the DEIS fails to reasonably assess the likely accuracy of the analysis. Uncalibrated models that are based on limited information often are more than an order of magnitude in error, although this is not reasonably disclosed in the DEIS.

An additional problem with the analysis of dredging impacts is that the DEIS fails to adequately and quantitatively assess erosion, sediment delivery, and turbidity impacts from the deposition of dredge spoils. In fact, the DEIS (p. 4-71) concedes that no effort has been made to estimate erosion, sediment delivery and resulting turbidity from the 300,000 to 350,000 cubic yards of dredged material that would be placed at the Wahkiakum County Sand Pit site. In so doing, the DEIS clearly fails to assess a significant source of sediment delivery and turbidity that will combine with other sources of elevated turbidity in the Columbia River caused by the construction and operation of terminal infrastructure.

Second, the DEIS's qualitative assessment of individual impacts do not reasonably account for the limited effectiveness of measures aimed at somewhat limiting the project's impacts on sediment delivery. Third, the qualitative nature of the piecemeal evaluations of individual impacts precludes making a quantitative cumulative assessment of the total impact on sediment delivery from all aspects of the construction and operation of terminal infrastructure, which is central to determining cumulative impacts.

In order to reasonably assess the impacts of the construction and operation of terminal infrastructure, these manifold problems in the DEIS must be remedied. Sediment delivery strongly influences water quality and fish habitats. It will also be profoundly affected by the project. Therefore, the FEIS must include an adequate estimate of the total increase in sediment delivery and its temporal distribution in Hunt Creek and the Columbia River caused by the construction and operation of terminal infrastructure. As part of this analysis, the FEIS must also disclose key uncertainties, potential sources of error in estimates, and their ramifications for water quality, fish habitat conditions and fish populations.

The foregoing is not only necessary for the required disclosure of the cumulative effects of the project. It is also necessary in order to reasonably evaluate the proposition that the project could have overall benefit for the lower Columbia River.

The foregoing analysis is also necessary in order to reasonably evaluate the effects of proposed mitigation measures. The DEIS asserts that the preservation of Hunt Creek will be part of the project's attempts to mitigate significant environmental damage. However, if the project's cumulative impacts persistently degrade Hunt Creek, this clearly reduces the potential efficacy of using Hunt Creek as mitigation for ecological damage. Therefore, these defects in the DEIS must be rectified in the FEIS

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by fully analyzing and disclosing all of the likely cumulative impacts of project activities on aquatic, riparian, and watershed resources in riparian conditions Hunt Creek.

p. ES-2. *Modeling conducted by NorthernStar indicates that dredging for the maneuvering area would have no significant changes on the flow or channel characteristics of Clifton Channel and only minor changes to the main navigation channel of the Columbia River.*

The sediments are primarily sand and would settle quickly. As a result, the size of the sediment plume would be very small and confined to an area immediately surrounding the dredging site.

Although it is claimed that the sediment dispersal from dredging and the action of cutterheads is confined to a mere few feet of the activity, the fact that most of the sediment is sand does not mean that sediments will not be carried as bedload into Clifton Channel after being mobilized. The amount of blasting of the bed needed to excavate sediment and bed volume in the 45 acres to be deepened is an unknown that could result in greater levels of sedimentation in the Clifton Channel. It does not appear that NorthernStar has conducted any tests of bed transport relative to flow and bed disturbance. This would be a more reliable means of determining the field behavior of sediments. Even if the majority of sediments are sand sized particles, finer sands and silts could comprise a substantial volume of material, even if it is present as a small percentage by volume. Deposition of dredged materials just upstream at Puget Island in nearshore areas could easily create sand wedges that would act as a focus for bed scour and transport downstream to the shipping channel or to the Clifton Channel.

• Dredging Impacts on Fish and Fish Habitat

The DEIS lacks any discussion or comparison of dredging impacts on fish and fish habitat from other watersheds around the world. These are available in the literature and are discussed in Dodge (1989).

Elevated, but not extreme, levels of turbidity caused by dredging have been correlated with decreased juvenile survival by NMFS and others (Junge and Oakley 1970; Smith et al. 1997). The literature (Hardy and Allen 1980) notes that dredging can reduce turbidity as sediments sink into the navigation channel. This issue is not adequately addressed in the DEIS.

The DEIS fails to note that initial and maintenance dredging will cause reduction of water surface profiles and shoreline riparian areas in and below the proposed project area. Significant portions of sediment may sink into the deepened channel only to be removed by dredging out of the system. The DEIS does not adequately analyze what this impact could mean to existing riparian areas that are critical habitat for salmonids. Further, there should be annual mitigation requirements for existing and proposed maintenance dredging, but this is not addressed in the DEIS.

• Dredge Disposal Plan

The DEIS relies on inadequate studies and analyses of disposal impacts. The DEIS proposes an alternative that dumps dredge spoils back into the river. The impacts of this action have not been thoroughly assessed. Additional surveys should be conducted at the proposed site and included in the FEIS.

We believe that the applicant should conduct a small, pilot in-river disposal project to determine if the project has a demonstrable positive effect on fish habitat. The claim in the DEIS that in-river disposal enhances fish habitat is mere speculation. On the contrary, the EPA has noted that the

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effects of such projects could negatively affect salmon. Among other problems, shallow water habitat can increase water temperatures by increasing solar heating of the shallow water benches. The result can both benefit warmwater fish that prey on salmon, while harming salmon, which are coldwater fish. In addition, sediment disposal in-river will decrease total dissolved oxygen concentrations critical to salmon and other anadromous fish.

Pipeline Right-of-Way Ambiguity

p. ES-3. The pipeline right-of-way would be restored and seeded after construction. Upland forest would be replanted with in-kind trees, except for a **30-foot-wide strip** over the pipeline centerline. Routine maintenance of a **10-foot-wide corridor** centered on the pipeline would keep that area in an herbaceous state. To minimize impacts from the potential spread of noxious weeds from the disturbed right-of-way, NorthernStar developed a Noxious Weed and Soil-borne Plant Disease Control Plan.

p. 2-35. In wetlands where the pipeline crossing would exceed 100 feet in length, NorthernStar proposes to use a **100-foot-wide construction right-of-way** to account for the slumping of saturated segregated spoil piles. NorthernStar would reduce the construction right-of-way to a width of 85 feet in wetlands where the crossing length is 100 feet or less. The 85-foot limitation on the construction right-of-way width would not apply to wetlands in actively cultivated or rotated cropland. Pipeline impacts on wetlands are further discussed in section 4.4.1.3. Following construction, a **50-foot-wide permanent right-of-way** would be retained for operation and maintenance of the pipeline. The typical right-of-way cross sections that NorthernStar would use for the pipeline route are provided in Appendix D.

p. 2-35. In addition to the construction right-of-way, NorthernStar would require temporary **extra workspace outside the standard construction right-of-way** at locations where additional excavation, soil placement requirements, or equipment management and staging would make it impracticable to carry out all construction operations within a **100-foot-wide corridor**. These would include feature (e.g., road, railroad, waterbody) crossings; areas with steep side slopes or severe terrain; areas requiring topsoil segregation; tie-ins to existing pipelines and laterals; HDD entry and exit points; and staging and fabrication areas for HDD pull sections. NorthernStar has identified **43 temporary extra workspaces** areas that are required for the project, affecting approximately **54.0 acres**.

p. 2-48. A **riparian buffer** would be left between the wetland and the upland construction areas except for the pipe trench itself and erosion control measures (e.g., silt fences, interceptor levees, and hay bale structures) would be installed and maintained to minimize sedimentation into the wetland. Trench plugs would be installed where necessary to prevent the unintentional draining of water from the wetland. After construction, forested wetlands would be replanted in-kind with trees, with the exception of the portion of the right-of-way within 5 feet of the pipeline (10 feet total), thereby minimizing the extent of disturbance. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Plan and Procedures.

p. 2-49. After construction, forested wetlands would be replanted in-kind with trees, with the exception of the portion of the right-of-way within **5 feet of the pipeline (10 feet total)**, thereby minimizing the extent of disturbance. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Plan and Procedures. The corridor centered on the pipeline would be planted with a native grass seed mix and maintained in an herbaceous state to facilitate maintenance and inspection. Wetlands might also be crossed using the HDD construction method described below.

p. 4-115. Maintenance of the entire right-of-way would occur no more than once every 3 years. However, to facilitate maintenance and inspection, NorthernStar may clear a **10-footwide corridor** centered on the pipeline annually.

p. 4-115. In upland forested areas, **permanent impacts would be greatest over the maintained portion of the right-of-way, totaling about 54 acres**. Upland forested communities would be replanted in-kind with trees, with the exception of the portion of the right-of-way within **15 feet of the pipeline (30 feet total)**, thereby minimizing the extent of disturbance. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC

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staff's Plan and Procedures. The **30-foot-wide corridor** centered on the pipeline would be planted with a native grass seed mix and maintained in an herbaceous state to facilitate maintenance and inspection.

p. 4-167. Clearing the right-of-way would remove shading vegetation from uplands and riparian areas, exposing the land and water to increased sunlight, resulting in both direct increases in water temperatures and indirect increases as water flows over the warmer land surface and eventually reaches the waterbody (Beschta and Taylor, 1988). The effects of water temperature on the life stages of salmonids have been extensively reviewed and are described in section 4.5.2.1. To mitigate these potential impacts, NorthernStar would allow a **corridor at least 25 feet wide**, as measured from the OHWM, to **permanently revegetate with native plant species across the entire construction right-of-way following construction**. However, to facilitate access for periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to **10 feet wide may be maintained in an herbaceous state**. NorthernStar's use of the HDD construction method to cross waterbodies would also limit impacts on riparian habitats.

p. 4-305. Following construction, a **50-foot-wide permanent right-of-way** would be maintained for operation and maintenance of the pipeline. The typical right-of-way cross sections that NorthernStar would use for the pipeline route are provided in Appendix D.

The rules for the pipeline corridor width are extremely variable throughout the document. It appears that during the construction phase the corridor will be 100 feet, although additional width is used temporarily as a site for storage of excavated soil. In addition, the corridor right of way varies from 85-120 ft, although the predominant widths are 100 and 120 ft (Appendix F). After construction, the right-of-way will be either 25 ft, 30 ft, or 50 ft. The width that will be mowed and kept in a permanently herbaceous state will be either 10 ft or 15 ft. It is not clear whether all trees will be cut in the construction corridor initially. This should be avoided to reduce impacts. The 25 to 50 ft corridor will be "allowed" to revegetate naturally, but it is not apparent that NorthernStar will actually replant trees where trees were removed, outside of the permanently herbaceous strip. The ambiguity in corridor widths and what will happen in them makes interpretation of impact and expected recovery uncertain. A riparian buffer is claimed to be left between the wetland and upland construction area (p. 2-48), but this doesn't really indicate that all trees in the corridor will not be removed. To claim that NorthernStar is planting more trees than FERC requires in replanting is no indication that NorthernStar is exceeding the needed restoration quality of wetlands. More useful would be to refer to what the state considers to be needed and what is required to prevent environmental damage. Even FERC's minimal "standard" was not described, so it is even more difficult to understand the level of protection being provided.

The entire disturbed right-of-way corridor is 424 acres or 0.663 mi² based on an average 100-ft wide corridor. If the corridor average width is 110 ft, the area would be 467 acres or 0.73 mi². Assuming that the corridor width is only 100 ft and only 15 ft width is kept permanently disturbed, the total disturbed area would be 63.6 acres. This differs from the FEIS estimate of 54 acres. Also, the initial disturbance on the entire corridor is more likely to be at least 467 acres, with removal of all trees. Even the trench width itself would vary from 15-25 ft wide (Appendix D). Heavy machinery would be operating along the trench and would significantly compact soils on at least 50% of the entire corridor width. No mitigation for the extreme, long-lasting effects of soils compaction in wetlands was described. This alone could significantly impair the throughflow of water to wetland habitats.

With a total of 94 water body crossings, a mean right-of-way diameter of 100 ft, and an assumed 200-ft mean width of riparian buffer (width perpendicular to streamflow; assumed by us as a conservative estimate of the effective riparian function because the DEIS does not reveal this extent of impact), the total area of riparian vegetation lost would be 86.3 acres. The EIS does not reveal the riparian buffer width that would be affected. Consequently, it is not possible to accurately determine

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riparian impacts. The shade values or potential recruitable LWD of riparian buffers lost are not provided.

p. 4-88. The proposed pipeline would be operated and continuously monitored by a remote control center to be located at the LNG terminal. Operational activities with the potential to impact water quality would be limited to maintenance of the permanent right-of-way and repair of the pipeline. To minimize impacts on water quality and riparian vegetation, NorthernStar would allow a riparian buffer at least 25 feet wide, as measured from the waterbody's MHW mark, to permanently revegetate with native plant species across the entire right-of-way after construction is completed. However, trees greater than 15 feet tall, or deep-rooted shrubs that could damage the pipeline's protective coating, obscure periodic surveillance, or interfere with potential repairs, would not be allowed to grow within 15 feet of the pipeline. The frequency of the vegetation maintenance would depend upon the vegetation growth rate. This ongoing maintenance may have a discountable effect on stream temperature where large trees are not allowed to establish, and may reduce localized cover.

NorthernStar plans to allow a riparian buffer of ≥ 25 ft width to revegetate. This does not specify that all trees lost in construction of the pipeline outside the 15-ft buffer to each side of the pipeline would be replaced. Consequently, it appears that a massive loss in vegetation could occur. There are no provisions specified that failure of trees to become established would be followed by additional attempts to plant trees. A mitigation action specified in the paragraph above is to "limit" activities that have potential to impact water quality to the pipeline corridor. However, limiting impact does not indicate anything about how these impacts will be mitigated. The EIS claims that effects of stream temperature are discountable. However, this conclusion is not based upon analysis and is premature. Mitigation for stream warming at a site and cumulatively within a basin cannot be discounted by a mere allusion to a presumed minimal effect.

The extent of revegetation is very poorly described:

p. 2-48. The restored construction right-of-way would be revegetated in accordance with NorthernStar's pipeline ESC Plan for Oregon and SWPPP for Washington, FERC staff's Plan, other permit requirements, and site-specific landowner requests.

p. 4-46. About 51 percent (253.5 acres) of the proposed pipeline would cross soils with revegetation concerns.

The clearing and grading of soils with poor revegetation potential could result in a lack of adequate vegetation following construction and restoration of the right-of-way, which could lead to increased erosion, a reduction in wildlife habitat, and negative visual impacts.

p. 4-104. Monitoring of wetlands would be conducted for a minimum of 3 years post-construction to ensure the success of wetland revegetation. If revegetation is not successful after 3 years, a remedial revegetation plan would be developed and implemented.

p. 4-103. Forested wetlands would be replanted with in-kind wetland tree specimens, with the exception of the portion of the right-of-way within 5 feet of the pipeline (10 feet total), thereby minimizing the extent of disturbance. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Procedures. The corridor centered on the pipeline would be planted with a native grass seed mix and maintained in an herbaceous state to facilitate maintenance and inspection.

If revegetation fails, monitoring in year 3 would be employed. This is described as monitoring of wetlands. Because much regrowth will require decades to occur, especially tree growth, a significantly longer monitoring plan is needed to assess revegetation. There is no natural potential vegetation standard employed. Vegetation communities would be compared with whatever happens to be nearby as a standard. This lowering of the bar for restoration is not one designed to make gains in habitat quality. Beyond the 3-year point it appears there will be no subsequent attempts to reestablish vegetation. It is not even clear that plant communities would replace what was lost in upland areas or

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what is considered to be the potential natural vegetation for the area. Even in wetland areas, one can only deduce that similar tree species would be planted as had pre-existed in the construction area, but there is no indication that original tree densities would be targeted. If FERC guidelines are so much less than what NorthernStar proposed, what assurance is there that NorthernStar could not later opt for FERC rules? It would benefit disclosure interests for FERC to describe its minimal set of guidelines to know how far NorthernStar practices could potentially be degraded and what the consequences of this would be at sensitive sites and cumulatively.

Attachments to the Columbia River Inter-Tribal Fish Commission Letter (NA2)

Copies of these attachments are available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, by selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range. The accession number for this document is 20071221-5145.

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THEODORE R. KUONGOSKI
GOVERNOR

December 13, 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First ST NE, Room 1A
Washington, DC 20426

Re: Comments of the State of Oregon
Draft Environmental Impact Statement
Bradwood Landing LLC Docket No. CP06-366
Northern Star Energy LLC Docket Nos. CP06-366, CP06-376 and CP06-377

Dear Secretary Bose:

At my direction, State of Oregon natural resource agencies have been engaged in a review of the proposed Bradwood Landing Liquefied Natural Gas (LNG) import terminal and its associated pipeline. Oregon's comments on the Draft Environmental Impact Statement for this project are attached. My primary motivation for a detailed state review of this document is to ensure that state standards and concerns are addressed by the developer and by the Federal Energy Regulatory Commission.

As Governor of the State of Oregon, I do not support a statewide, categorical exclusion of LNG terminals from Oregon. Locating an LNG import terminal in Oregon, however, must be supported by a comprehensive review of all potential impacts of the facility in Oregon. That is the function of the Bradwood Landing DEIS. As more fully explained below and in the accompanying comments, the Bradwood Landing DEIS is incomplete and flawed in a number of respects.

Oregon has an effective system for siting large energy facilities that balances the need for new energy resources effectively with environmental protection and adequate safety standards. That siting process effectively involves all interested Oregon natural resource agencies in the review of any facility. As a result of Oregon's unified siting process, state natural resource agencies have attained a high level of expertise in evaluating applications and contributing not only to the analysis of the environmental impacts but also to the design and adoption of appropriate mitigation measures. In fact, Oregon was in the midst of reviewing an application for the Bradwood Landing facility under the state siting process when the Energy Policy Act of 2005 was enacted, effectively ending state-level review. As a result of this experience and expertise, Oregon is uniquely situated to provide comments on this proposed facility.

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The State retains permitting authority over LNG terminals in the areas of water quality, air quality, and coastal zone management, and in cases where state approval is needed for construction of terminals or appurtenant structures on state lands. In many instances, the DEIS is the best evidence about the applicant's plans for compliance with those federally delegated programs. In their comments, the Oregon agencies involved have identified deficiencies that present hurdles to the ultimate approval of the project by those agencies.

As the specific comments will reflect, many conclusions in the DEIS are founded on assertions and promises, not on sound science, comprehensive analysis and empirical facts. The Commission should not make a decision to license this LNG terminal on the inadequate environmental record currently before the Commission.

Comments sent to state agencies by Northern Star late in the comment period suggest that there is information contained in the administrative record or currently circulating for review that may address some of Oregon's concerns. Because that information is not contained in the DEIS, we are compelled to assert those concerns. It is well-established that the final EIS, as the foundation for the licensing decision by FERC, must be complete. Thus, any mitigation plan or other document that will be relied on by FERC to determine that the facility meets licensing criteria must be included in the DEIS and circulated for meaningful review before adoption of the final EIS. Furthermore, such plans and documents must be referenced in license conditions in the final decision.

As an example of the inadequacy of the DEIS, large portions of the mitigation for habitat, wetlands, archaeological impact, landside protection and emergency planning are still unknown. Indeed, many supporting documents for the licensing decision will be produced after the opportunity for comment on the DEIS has closed. This is a fundamental process flaw. We recommend delaying the Final Environmental Impact Statement (FEIS) until the design is finalized, mitigation plans with metrics are written, and emergency response protocols can be defined, and after interested parties have had an opportunity to comment on the efficacy of those plans. We further recommend that, when the FEIS is presented, it clearly presents the required information used to develop and articulate measurable project specific conditions that demonstrate how the facility would meet Oregon's standards. Agreements made outside the FERC licensing process cannot be considered durable and therefore do not provide adequate assurance that the facility will be constructed, operated, maintained, and decommissioned as required by Oregon's Energy Facility Siting standards.

Liquefied Natural Gas terminals also introduce a companion suite of issues associated with natural gas pipelines that carry LNG from terminals to service areas, sometimes at great distances. The social and environmental impacts of these pipelines are of as much concern to the State as the terminals themselves. Accordingly, Oregon agencies have also identified and evaluated the environmental and social impacts of these pipelines through federal and state permitting processes. Further, because pipeline companies who obtain a FERC license have the power of eminent domain, I have insisted that that power be used carefully and with the utmost respect for property

SA1-A

We disagree that the EIS is either inadequate or flawed because mitigation plans for archaeological resources have not been finalized. As stated in section 4.9.4, the process of complying with the NHPA cannot be completed until after the FERC issues its Order authorizing the project, which would allow NorthernStar to use the power of eminent domain to acquire a right-of-way easement over parcels of land where access was previously denied so that the cultural resources inventory could be finished. Once the survey is done, the FERC would determine if any historic properties would be adversely affected. If there would be no impacts on historic properties, no mitigation plans would be necessary. If historic properties would be adversely affected, the FERC would consult with the appropriate parties to resolve impacts, and treatment plans would be formulated. It is standard FERC practice to condition an Order so that the process of complying with the NHPA can be completed after an Order is issued but before construction is allowed to begin. Also see our response to comment FA2-22.

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Secretary Bose
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rights that includes fair compensation and full mitigation of impacts to property owners, as well as recognition of the need to be responsive to citizens concerns and public requests for information and maps of these pipeline projects. I have recently communicated those expectations to pipeline project sponsors and will continue to monitor progress in this matter.

Northern Star has provided evidence that the proposed project will offer substantial economic benefits to the local community, including:

- Enhanced capacity for river commerce (new bar and river pilots, new tugs);
- Property tax revenue for Clatsop County and special districts (increase 92.4 percent);
- Construction jobs (331 per year for three years, 506 peak); and
- Operational jobs (50 FTE, average \$60K, 15 FTE security)

Those economic benefits must be balanced with the environmental impacts of the facility.

I highlight the following major concerns regarding the DEIS, which are addressed in more detail in the accompanying comments.

a. **The need for the facility has not been established and the alternative analysis is inadequate.** The DEIS does not adequately analyze market data and natural gas supply trends to support the claim by the developers that additional supplies of LNG are needed in the Pacific Northwest. Nor does the DEIS contain a comprehensive list of alternatives that include no action, energy conservation, expansion of existing infrastructure, and potential new sources of natural gas, including domestic, continental and offshore supplies.

b. **The DEIS needs to adequately reflect scientific information from geotechnical reports.** The state agencies have identified several instances where the DEIS provided incorrect technical statements and statements with no substantiating science. That failure undermines the credibility of the entire analysis.

c. **In many cases, the DEIS depends on assertions that mitigation will be provided, but the details of the mitigation are unknown.** For example, regarding mitigation for impacts to fish, although Northern Star has proposed to spend \$50 million over the 40 to 50 year life of the Bradwood Landing project on a Salmon Enhancement Initiative, the Initiative would be entirely voluntary (not regulatory), and its effectiveness is unknown. Similarly, the DEIS provides no clear compensatory mitigation plan for impacts from dredging or wharf construction activities.

d. **The proposed project would have adverse impacts on air and water quality in the Lower Columbia watershed.** Proposed dredging for the terminal, turning berth and pipeline will cause damage to watershed function, water quality and sensitive species and habitats, and those impacts have not been adequately evaluated or addressed in the DEIS. Supply ships and vaporizers will contribute air pollutants. Proposed mitigation measures are not sufficient to offset the damage that will be done, and cumulative impacts need to be thoroughly analyzed.

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Secretary Bose
December 13, 2007
Page Four

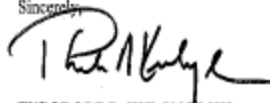
e. **The DEIS does not adequately recognize Oregon's role in emergency preparedness.** No enforceable commitment has been made for Emergency Response resources necessary to operate at the proposed facility, nor were safety and security impacts to the local communities adequately assessed. In addition, the DEIS does not recognize that the Oregon Department of Forestry (ODF) is an emergency responder to wildfires on private, rural and state owned lands, and that ODF needs to be consulted on emergency response planning.

f. **The DEIS does not contain mitigation recommendations requiring Northern Star to mitigate CO2 emissions and to provide financial assurance to retire the facility.** A detailed engineering estimate of site retirement costs should be required and assurances gained that those costs will be covered, before FERC issues a Final EIS. Without those assurances, Oregon has no protection against bankruptcy or abandonment of the facility.

In summary, I believe that the State of Oregon and the Commission must fairly address all the benefits and costs associated with LNG facilities and determine if LNG has a role as a "bridge" source of energy for Oregon and the Northwest. For the Commission to make LNG siting decisions in a vacuum, without the benefit of the best available information and scientific data, would do a huge disservice to the people of Oregon. Ultimately, the decision to site terminals requires the full engagement of the federal government, the state and the communities where facilities are proposed. But, as noted in paragraph four of this letter, Oregon holds authority in the important areas of air quality, water quality and coastal zone management. Only by working together through the siting, environmental assessment and permitting processes, with the benefit of a complete and substantial environmental impact statement, can we make sound decisions about the appropriateness of any proposed LNG terminal.

I look forward to your resolution of Oregon's concerns.

Sincerely,



THEODORE R. KULONOSKI
Governor

TRK:racjb
Enclosure

K-430

HARDY MYERS
Attorney General



PETER D. SHEPHERD
Deputy Attorney General

DEPARTMENT OF JUSTICE
GENERAL COUNSEL DIVISION

December 18, 2007

Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: Bradwood Landing LLC Docket No. CP06-365-000
NorthernStar Energy LLC Docket CP06-366-000
Nos. CP06-376-000
CP06-377-000

DOI File No. 330-050-GEN0560-06

Dear Secretary Bose:

Enclosed for filing in the above referenced proceedings are the State of Oregon's
Comments on Bradwood Landing Natural Gas Importation Terminal Draft Environmental
Impact Statement.

Sincerely,

Janet L. Prewitt
Assistant Attorney General
Natural Resources Section

Enclosures

JLP:jrs/GENW3156

c/ Service List:

Michael Graczyk, Oregon Department of Energy (electronic copy only)
Michael Carver, Governor's Office (electronic copy only)
Jan Adams, Natural Resources, DOI (electronic copy only)

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STATE OF OREGON COMMENTS ON BRADWOOD LANDING NATURAL GAS IMPORTATION TERMINAL DRAFT ENVIRONMENTAL IMPACT STATEMENT 12/18/2007

GENERAL COMMENTS

The Purpose and Need Analysis is Inadequate

- SA1-1 Oregon is disappointed with the level of detail in the document. Much of the Bradwood Landing draft environmental impact statement (DEIS) contains only general information and conclusions about environmental and resource effects. Specifically, the general nature of the Federal Energy Regulatory Commission (FERC or the Commission) review of the project "purpose and need" and related "alternatives" analysis is inadequate. The DEIS does not sufficiently describe the basis for determining the regional and national need for an LNG import terminal and pipeline project in this location or provide a clear set of objectives that provide a rational basis upon which need can be assessed.
- SA1-2 As a result, only general information about market demand for natural gas is included in the DEIS document. More importantly, there is no overall national or regional energy plan to guide the siting and construction of natural gas infrastructure that assures the economic and efficient provision of import terminal and pipeline facilities. Because of the absence of specific information documenting the need for terminal and pipeline facilities in this location and the Pacific Northwest and the FERC practice that relies on applicants to propose projects for case-by-case review, the DEIS does not adequately assess fundamental energy infrastructure planning issues. Such an approach could result in approval of several terminal and pipeline projects, each with significant environmental effects, that provide excess import terminal capacity, unnecessary pipeline infrastructure and unnecessary environmental effects. The public interest is best served by a meaningful analysis of need and alternatives.
- SA1-3 Currently, in Oregon, there are three active proposals for LNG import terminals and four active proposals for interstate pipeline projects. Although applicants understand that not all of the projects will be constructed, each is being pursued as if it will be constructed. The lack of specific guidance or planning policies at the federal level requires public and government agencies at all levels to devote resources to reviewing these projects, at a substantial cost.
- The DEIS concludes, without substantiation, that some alternatives are not feasible. The DEIS merely concludes that some alternatives do not meet the objectives of the Bradwood Landing project without assessing the validity of the stated objectives and that other alternatives do not provide significant environmental advantages without comparing specific economic and environmental costs and benefits. Without some commonly accepted set of criteria upon which to review each of the proposed LNG import terminal and pipeline projects currently proposed in the region (which would include other projects on the Columbia River and in Coos Bay), the State can not determine whether the Bradwood Landing LNG import terminal and pipeline represents a superior site for such a facility from an economic, environmental and social perspective. As was suggested in Oregon's March 3, 2006 letter:

SA1-1 See our response to comment FA4-1.

SA1-2 Section 1.1 presents a summary of project purpose and need, including some information about regional markets. However, market issues and the need for this project would be more fully developed in the Commission's Order.

SA1-3 We disagree. The EIS provides our reasons for finding some alternatives to not be feasible. The project objectives, and the criteria we used to evaluate alternatives, are clearly explained at the beginning of section 3.1. Further criteria we used to consider alternative LNG terminal locations are outlined in section 3.1.5.3. See our response to EPA (comment FA3-14). The State of Oregon does not have the authority to determine a superior site for such a facility. The FERC has sole authority to site onshore LNG import terminals under the NGA and EPCA 2005. We do not choose between alternative locations, but evaluate each proposal on its individual merits. See also our responses to comments PM2-23, PM2-27, PM2-29 and PM2-31.

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SA1-3 cont'd	<p>The alternatives analysis should include evidence and findings to support conclusions. At this point the resource report includes conclusory statements without clear findings that link evidence to applicable local, state and federal requirements. We recommend that the alternatives analysis be based on relatively clear standards. Objective standards tied to regulatory requirements and commonly recognized LNG import terminal needs are more useful than subjective or general standards.</p> <p>The DEIS continues to treat the need and alternatives analysis in a superficial manner.</p> <p>Geologic Site Stability</p>
SA1-4	<p>The DEIS should accurately reflect the content of geotechnical reports. Our review found several instances of incorrect technical statements and statements with no substantiating science in the DEIS. The DEIS should be reviewed by the contracted geotechnical authors to ensure proper incorporation of vital technical geological and engineering information and data. The contracted geotechnical reports should be reviewed by independent, qualified licensed or registered professionals. If this has been done then those reviews should be referenced and made available in appendices.</p>
SA1-5	<p>The DEIS did not adequately address mitigation of natural hazards including but not limited to:</p> <ul style="list-style-type: none"> • Adequate tsunami wave modeling • Liquefaction and ground stability • Landslide and debris flow characterization • Flooding
SA1-6	<p>In addition, there is no discussion of monitoring programs to accompany the operation of the facility. At the very least we recommend the facility emplace shoreline erosion monitoring.</p> <p>Fish Habitat Impacts</p>
SA1-7	<p>The DEIS does not include information on the amount of shallow-water fish habitat (habitat 20 feet in depth or less) that would be affected by the wharf structure, concrete berm, water intake etc. These impacts to shallow-water feeding and rearing habitat favored by juvenile salmonids such as chum, Coho and Chinook salmon need to be specifically defined and delineated.</p>
SA1-8	<p>The DEIS does not address how much shallow-water habitat may be adversely affected in areas below the dredging sites in the Clifton Channel. Quantifying the loss of shallow-water habitat from changes in hydraulic characteristics of the channel needs to take place and the number of juvenile salmonids affected by this loss of habitat should be estimated to determine appropriate compensatory mitigation. The anticipated reduction in the hydraulic characteristics, due to dredging 700,000 cubic yards of sediment to create turning basins, also suggests a likely reduction in juvenile salmonid shallow-water habitat and possibly an increase in habitat for predators like pikeminnow and bass.</p>
SA1-9	<p>Since initial dredging of the proposed turning basin and ship berth will remove approximately 45 acres of deep water (deeper than 20 feet) bottom habitat and maintenance dredging may need to</p>

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- SA1-4 The EIS is a summary document that is written for a general audience and is not intended to be highly technical in nature. Technical reports (i.e., geotechnical reports, geohazard reports, seismic hazard analysis reports) prepared by qualified engineers and geologists have been provided to ODE and DOGAMI and are available to the public in the FERC's eLibrary. This document is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range. This information has been reviewed by the FERC staff and its third-party contractor, including licensed professional geologists and engineers. The reports have also been reviewed by the FERC's consulting seismic design and geotechnical engineers.

These reports assess the site-specific earthquake probabilities, the geotechnical site conditions, and the site-specific effects of earthquake shaking on the proposed facility as required by NFPA 59A, and as further detailed in FERC's Seismic Design Guidelines (Jan. 2007).

The work performed to date is sufficient to characterize the major geological aspects of the site and to understand the significant geotechnical issues that must be addressed in the later, more detailed, design phase of the project. The facility must be designed to withstand a major CSZ earthquake, without loss of the storage tank contents as required by NFPA 59A. There is a high probability that underlying soils at the site, if unmodified, would liquefy during a significant earthquake and that vertical settlement and several feet of lateral spreading towards the river would occur. Proposed mitigation measures (including deep pile foundations and soil densification through vibroflotation) are included to minimize the liquefaction potential and large displacements.

Through the FERC Staff's Recommended Certificate Conditions, NorthernStar would be required to provide additional design details prior to initial site preparation and to demonstrate that the proposed site improvements achieved the necessary subgrade conditions prior to receiving approval to construct the remainder of the facility. The FERC Staff also recommends that NorthernStar be required to retain the services of an independent Board of Consultants, that would review and certify that all civil and structural detailed design calculations and construction documents are in compliance with all applicable codes, standards and project civil and structural design criteria, that all civil and structural construction is in conformance with the project construction documents, that all procured equipment has been properly seismic qualified in conformance with the project seismic qualification requirements, and that seismic detailing of structures has been properly implemented.

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- SA1-5 These topics are addressed in responses to comments appearing later in this comment letter.
- SA1-6 See our response to comment SA1-96.
- SA1-7 Section 4.5.2.1 has been revised to quantify direct impacts on shallow water habitats.
- SA1-8 Section 4.5.2.1 has been revised to quantify direct impacts on shallow water. Potential impacts on wetlands and wildlife due to construction and operation of the LNG terminal are described in sections 4.4.1.2 and 4.5.2. See also our response to comment FA2-11.
- SA1-9 The rationale for the predicted frequency of maintenance dredging is included in the Hydrodynamic and Sediment Transport Assessment that was conducted for the Bradwood Landing Project. This document was filed with the FERC as part of its Application on June 5, 2006. This document is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e. CP06-365), and putting in the proper date range. We agree that impacts on the berth and maneuvering area would be permanent, as is presented in both table 2.3-1 and in section 4.5.2.1.

- SA1-9 | occur every two years, and benthic communities that salmonids depend on for food may take as long as two to three years to recolonize (DEIS, page 4-135), the habitat in question should be considered permanently lost and not temporarily disturbed (Appendix G, page 103).
- SA1-10 | There are no estimates in the DEIS on the number of juvenile salmonids that rear in areas that would be affected by construction of the wharf structure, pilings, shoreline concrete berm, water intakes, etc. FERC did estimates of potential juvenile salmonid usage around those areas they suggested as mitigation sites (Svensen Island) (Appendix G, page 41), but not of areas to be disturbed by the activities proposed in the shallow-water fish habitat area. In order to make a fair comparison or assessment of the value of habitat around Svensen Island to that of Clifton Channel, sampling results from juvenile seining completed in the Clifton Channel or estimates of salmonid usage should be included in the DEIS.
- SA1-11 | FERC states that by restoring/enhancing habitat at Svensen Island, they will more than meet their mitigation requirement (DEIS, page 4-143, Appendix G, page 104). FERC suggests that by restoring and or enhancing a total of approximately 235 acres at lower and middle Svensen Island they would be meeting the compensatory mitigation requirement of three acres enhanced for every acre lost. Considering that the down-stream Clifton Channel shallow-water habitat lost from effects of the creation of the turning basin has not yet been determined, it is not possible to determine the adequacy of the proposed mitigation.
- SA1-12 | When discussing compensatory mitigation for loss of habitat, FERC needs to make a distinction between what they intend to restore and what they intend to enhance. If their intention is to restore habitat then the ratio of one acre restored for every acre lost needs to be applied. If enhancement is their intention, then the ratio of three acres enhanced for every acre lost would be the goal.
- SA1-13 | Within the Wildlife and Aquatic Resources section of the DEIS, the fish screening provisions for the LNG ships do not provide adequate detail. This section does state that the ships would be provided with filtered water however, there is no mention of "fish screens." There also is no mention that the screens for the ships will be designed to meet National Marine Fishery Service (NMFS) or Oregon Department of Fish and Wildlife (ODFW) fish screen criteria, or that NMFS and ODFW will review and approve screen designs. Fish screens for the ship ballast and cooling water intakes as well as for all other surface water uses must meet NMFS and ODFW standards. Oregon recommends that a condition be added to the final EIS stating that the screens for ship cooling and ballast water will meet NMFS fish screening criteria and the design will be approved by NMFS and reviewed by ODFW prior to installation. Oregon also recommends that a testing system be included as a condition in the final EIS to ensure that the screens work properly since this is an as-of-yet unproven screening system. Oregon believes that screening the ships' cooling and ballast water intakes on the wharf may be the best solution.
- SA1-14 | Oregon also requests that the Commission include a condition that allows Oregon to review, comment on and approve all design-level detail for fish screens for all surface water uses for the terminal site, ships and pipeline in Oregon. Screening of water intakes includes water use for the LNG ships' cooling and ballast water, hydrostatic testing of LNG tanks and pipelines, soil compaction and ground improvements, and the fire suppression system. Screening is also addressed specifically for the dam and pump method for pipeline water body crossings. If any

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- SA1-10 | Additional information has been provided in section 4.6 estimating the numbers of juvenile salmonids that rear in the vicinity of the LNG terminal site.
- SA1-11 | See our response to comment FA2-10.
- SA1-12 | Section 2.1.5 has been revised to clarify that the Hunt Creek Mitigation Site would be preserved; the lower Svensen Island Mitigation Site would be preserved and limited enhancement activities would be implemented by NorthernStar; and the middle Svensen Island, Delameter Creek, and Petersen Point Mitigation Sites would be restored as compensatory mitigation for unavoidable impacts associated with the Bradwood Landing Project.
- SA1-13 | See our response to comments PM1-31 and FA1-28.
- The FERC staff's recommendation in section 4.5.2.1 that NorthernStar conduct post-installation water flow mapping through all intake screens at the LNG terminal would provide adequate testing of the system. In addition, we have recommended that NorthernStar consult with the NMFS and ODFW to develop a monitoring program that would assess the effects of impingement and entrainment from use of the screened water supply system on juvenile salmonids during terminal operations.
- SA1-14 | As stated in section 2.1.3.6, all fixed intakes at the proposed LNG terminal that withdraw water from the Columbia River would be screened. In addition, as described in section 4.2.3 of the Waterbody and Wetland Construction and Mitigation Procedures Plan, screens would be installed on pump suction hoses to prevent the entrainment of aquatic species in waterbodies crossed using the dam and pump method.
- Because all intake screen designs have been reviewed and approved by the NMFS and comply with ODFW and NMFS regulations and fish design criteria, we do not feel that it is necessary to include a condition in the EIS that would require NorthernStar to submit all design-level detail for fish screens to the State of Oregon for review, comment, and approval.

SA1-14 | fish salvage operations that require pumping occur during pipeline construction, the pump intake should be screened.

cont'd

Environmental Impacts

SA1-15 | The federal agencies, including FERC, have little experience with siting this type facility in the Northwest. The few other LNG facilities that exist on the East Coast and Gulf Coast are in completely different environmental scenarios. Review and evaluation of such a project in the Northwest is complicated by the proposed location of this project far up within the riverine system (39 miles from the ocean) in a dynamic portion of the Columbia River estuary, in addition to the many endangered species listings, impaired status of the Columbia River, and lack of detailed information on cumulative impacts from activities in Oregon, Washington and Canada, which contribute to the River's listings and impairment.

The Lower Columbia River Estuary is one of 27 estuaries in the Environmental Protection Agency's (EPA) National Estuary Program and the Columbia River has recently been named by EPA a Nation's Great Water Body (one of seven in the country) and elevated to a national priority for addressing watershed health. EPA's two pronged focus for this priority is to address toxics and wetland loss. Impacts on the river environment that are contrary to these goals must be scrutinized and justified by projects that provide significant national gains to offset the regional impacts.

The West Coast Governor's Agreement on Ocean Health Draft Action Plan lists several goals related to water quality and its beneficial uses which may conflict with the proposed Bradwood Landing project. These include:

- SA1-16 | • "Restore estuarine habitats, including coastal wetlands, to achieve a net increase in habitat and their function by at least ten percent over the next ten years." – The Bradwood Landing project proposes enhancement of existing wetlands and habitat, yet there would be a net loss in the estuary of up to 58 acres of in-stream habitat and 33 acres of wetlands, as well as temporal losses from temporary impacts to 98 acres of wetlands.
- SA1-17 | • "Make Low Impact Development (LID) a priority for the West Coast." – The impacts of the proposed Bradwood Landing project are high, and no analysis or planning has gone toward applying LID techniques to manage polluted runoff, limit imperviousness or new surfaces, or reduce other impacts.
- SA1-18 | • "Urge the International Maritime Organization to adopt the U.S. proposal which sets stringent emission standards for ocean going vessels." – The proposed Bradwood Landing project would increase ocean going vessel traffic and associated emissions.
- SA1-19 | • "Develop regional sediment management plans to maximize beneficial use of sediments (i.e., sand) to protect and maintain critical community economic and environmental infrastructure." – Regional sediment management strategies should be in place to require the best re-use of material, limit the amount removed from the system, and protect downstream communities from having to deal with toxics.

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SA1-15 | We disagree. The FERC has a great deal of experience in the siting of LNG import terminals throughout the United States, and the regulation of jurisdictional LNG storage "peak shaving" plants, as the FERC is the lead federal agency authorizing onshore LNG import terminals. The FERC and other federal agencies with regulatory roles have reviewed many natural gas and hydroelectric projects in the Pacific Northwest. While this experience has been relied upon for preparing the EIS for this project, the FERC has also solicited and incorporated input from other agencies, various stakeholder groups and any member of the public interested in these proceedings.

SA1-16 | We agree that the Bradwood Landing Project would result in both temporary and permanent impacts on wetlands within the Columbia River estuary. Although compensatory mitigation is not required for temporary wetland impacts, temporary impacts would be mitigated through the implementation of NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan. Because the plan has not been finalized, we have recommended in section 4.3.2.4 that NorthernStar continue to consult with the COE, NMFS, FWS, and other appropriate federal and state agencies to finalize its Waterbody and Wetland Construction and Mitigation Procedures Plan. Permanent impacts on wetlands would be mitigated by restoring and preserving habitat with similar ecological function in the general project area. NorthernStar's stated intention is to provide mitigation in areas substantially larger than that lost to permanent impacts, and restore such areas to a higher level of ecosystem function. Because NorthernStar is currently revising its Compensatory Mitigation Plan, we have recommended in section 4.4.1.2 that NorthernStar continue to consult with the COE, FWS, NMFS, ODSL, WDE, and other appropriate resource agencies to finalize its Compensatory Mitigation Plan, prior to construction of the LNG terminal and pipeline facilities.

SA1-17 | Consistency with existing land use plans, policies, designations, and guidelines is discussed in section 4.7.2.2. Management of run-off and impervious materials is discussed in section 4.3.2.3.

SA1-18 | Emissions and a discussion of air quality impacts resulting from the ocean going vessel traffic associated with the proposed project have been included in section 4.10.1 of the final EIS.

SA1-19 | NorthernStar has proposed to place sediments dredged from the maneuvering basin at the Wahkiakum County Sand Pit site for beach replenishment. The Bradwood Landing Project would not subject downstream communities to toxics.

- SA1-20 • "Aquatic invasive species are considered one of the greatest threats to native species and habitats. The introduction of aquatic invasive species into West Coast waters threatens the ecological, social, public health, and economic integrity of the region's marine resources." –The Bradwood Landing project does not propose adequate measures to prevent the transport of invasive species on the LNG ships that would enter the Lower Columbia estuary.

Emergency Preparedness Planning

- SA1-21 The DEIS is predicated on the assumption that critical response assets are already approved and in place. This is a major flaw in the draft emergency response plan (ERP) for the proposed Bradwood Landing LNG terminal. Without commitment to provide this region the necessary resources, Oregon is unable to conduct a thorough evaluation of Bradwood Landing's draft ERP to ensure the plan is adequate and can be effectively implemented to protect the health and safety of Oregonians in the event of an LNG mishap at Bradwood or in transit to and from the importation terminal. Commitments made outside the NEPA process must be incorporated into the FEIS to assure that needed communication and emergency response infrastructure are approved and placed into service prior to facility operations.

Emission Offset/Facility Retirement

- SA1-22 The DEIS does not contain mitigation recommendations requiring Northern Star to offset CO₂ emissions and to provide financial assurance to retire the facility, both of which are required by Oregon's Energy Facility Siting Standards. The FEIS should contain a detailed engineering estimate of future site retirement costs and assurances gained that those costs will be covered, before FERC issues a Final EIS. Without those assurances, Oregon has no protection against bankruptcy or abandonment of the facility. Additionally, the facility will add an undefined amount of carbon dioxide (CO₂) to the lower Columbia airshed. The amount of CO₂ to be emitted cannot be calculated without a final design, and this impact cannot be quantified. The FEIS should provide appropriate conditions for offsetting the potential emissions, followed by conditions to "true up" the calculations such that mitigation can be meaningfully implemented.

Economic Impacts

- SA1-23 Knowing the impact of this new natural gas source on the regional energy situation would be helpful in determining if the project will benefit industries in the Pacific Northwest and specifically Oregon.
- This project will bring in a new supply of natural gas to the region and country. This fact is not addressed in the DEIS. The project may have connections to PGE production facilities at Port Westward and to Georgia Pacific Wauna Mill. These connections could prove valuable to those facilities over time as energy costs escalate. This is not mentioned in the EIS but may have significant long term positive impacts for GP Wauna Mill and ratepayers served by PGE. This of course depends on the details of the contracts that will be executed by the companies involved.
- SA1-24 FERC has asserted that this project will increase the capacity of ship piloting and tug capacity on the river to the benefit of all shipping operations. New bar and river pilots and tugboats will be

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- SA1-20 Additional information on the potential for the introduction of invasive species to the lower Columbia River through hull fouling has been added to section 4.5.1.1.
- SA1-21 See our response to comment PM1-1. As discussed in section 4.11.6, the ERP would need to be reviewed and approved by the FERC before any final approval to begin construction. The ERP must include a Cost Sharing Plan which must be approved by FERC before any final approval to begin construction. If the needed resources are not available and properly funded, construction and operation of the project would not be approved by the FERC.
- SA1-22 Section 4.10.1.2 of the final EIS has been updated to indicate that NorthernStar has agreed to voluntarily comply with the Oregon Department of Energy's siting requirements for non-generating energy facilities, including the CO₂ emission standards, for the proposed LNG import terminal.
- SA1-23 We have included in section 1.1 a discussion of the likely positive impacts of LNG on future natural gas prices.
- SA1-24 The EIS does discuss using additional tugs to assist with LNG marine traffic in the waterway. It also mentions that NorthernStar is considering using the existing PWRR to bring construction materials to the LNG terminal.

- SA1-24 | added as a result of this project. Additionally, it is projected that the project will generate increased rail traffic during construction and improve a portion of the rail through a required realignment at the project site.
- cont'd
- SA1-25 | It was estimated by Northern Star that based on current tax rates, property tax revenue for Clatsop County and special districts would increase by 92.4 percent upon completion of the LNG terminal and that construction jobs will average 331 per year over three years with an expected peak of 506. Northern Star has also committed to hiring at prevailing wages for all construction jobs. During operations the project is projected to generate 50 FTEs and will operate 24/7. Average salary at the terminal was estimated by the applicant at \$60,000/yr. based on prevailing wages. The project is also projected to require an additional 15 FTEs for security.

SPECIFIC COMMENTS ON DEIS

These comments follow the organization of the DEIS and include both comments on deficiencies in the evidentiary basis for the conclusions and specific recommendations for additional language or conditions. Recommendations for additional language or conditions are italicized. Oregon agencies whose comments are included here include Oregon Department of Energy (ODOE), Oregon Department of Environmental Quality (DEQ), Oregon Department of State Lands (DSL), Oregon Water Resources Department (WRD), Oregon Department of Forestry (ODF), Oregon Department of Fish and Wildlife (ODFW), Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon Department of Land Conservation and Development and Oregon Coastal Management Program (DCLD/OCMP), Oregon Department of Economic & Community Development (ODECD), and Oregon Department of Transportation (ODOT)

- SA1-26 | **Executive Summary, pg 3, paragraph 4**
Forest vegetation. Planting in clearing right-of-way will minimize the amount of area converted to a non-forest condition
- SA1-27 | **Executive Summary, pg 6**
Ignition and combustion potential, fire hazards. There is no acknowledgment in the Executive Summary that wildfire could potentially result from LNG or gas leak in forested settings. An analysis of this possibility should be added to the document.
- SA1-28 | **Executive Summary, pg 7**
Pipelines. The Palomar pipeline is addressed under Section 2, "Proposed Action" but is not mentioned in the Executive Summary. Please add a discussion of Palomar and how it relates to the Bradwood project.
- SA1-29 | **Executive Summary, page 9, 8th bullet**
Fire. Add language that says Oregon Department of Forestry is an emergency responder to wildfire in non-urban forested settings

1.0 INTRODUCTION**Section 1.1 Purpose and Need (p. 1-3)**

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- SA1-25 | Section 4.8 addresses socioeconomic impacts and benefits, including taxes that NorthernStar may pay to local jurisdictions.
- SA1-26 | See our response to comment SA3-9.
- SA1-27 | The Executive Summary is meant to be very brief and cannot discuss every topic that is covered in detail in the body of the EIS. Forest fires are discussed in section 4.0.
- SA1-28 | We only summarize the most important conclusions from our EIS in the executive summary.
- SA1-29 | The referenced bulleted items are taken from the Coast Guard's WSR, which does not include a discussion of the Oregon Department of Forestry or other specific resources relative to the need to augment shore side firefighting capabilities.

SA1-30 Purpose and Need is too general to be useful. The primary assertions are related to market demand and unsupported forecasts. Conclusions are based on assumptions that are not supported by evidence or analysis. DEIS should include information about regional or national energy infrastructure guidance or any planning to support a demonstrated need. Also, add an assessment of system capacity or potential to meet need through FERC approved projects that have not yet been constructed. More rigorous analysis is needed to support Purpose and Need conclusions.

Section 1.3.11 Other State Permits and Approvals (p. 1-11)

SA1-31 Paragraph 5 states "Any state or local permits issued with respect to jurisdictional facilities must be consistent with the conditions of any Certificate the FERC may issue." This statement is confusing because it is not clear how a certificate could even be issued if a state agency were to find that a needed resource was not available, or further use was prohibited or limited. This statement does not raise a particular issue at this time.

The FERC needs to consult with state agency experts prior to issuing any Certificate in order to preserve and protect valuable natural resources. The FERC cannot expect a state to make available resources in violation of its own rules and law. The State of Oregon has an established process under EFSEC that utilizes these agencies knowledge and expertise to site and certify energy projects. That process structure needs to be incorporated into the FERC siting process for LNG.

Sec 1.3.11, (p. 1-11)

SA1-32 State permits. All "forest operations" must comply with Forest Practices Act. Oregon Administrative Rules include notification of harvest, harvest plans, protection against wildfire, etc. (ODF)

Section 1.3.11, (p. 1-11 – 1-12)

SA1-33 State Approvals. Per ORS 509.585 and OAR 635-412-0020, fish passage approval from Oregon Department of Fish and Wildlife is required for stream crossings. The DEIS does not mention the need for approval by ODFW for pipeline crossings, potential lateral crossings, or other road crossings (e.g., Hunt Creek Bridge). Even though the pipeline will be placed beneath streams, it fully crosses them and has the potential to be an artificial obstruction if exposed through stream grade changes. The final EIS should include a condition requiring ODFW approval, prior to issuance of the Joint 404/Removal Fill permit, for all stream crossings. (ODFW)

Section 1.3.11, (p.1-12)

Removal-Fill Law Requirements. Required proprietary authorizations need to be indicated in the DEIS.

SA1-34 Add a more detailed justification on how the proposed project's purpose and need is the "best use of the water resources of this state" and within the public need.
Project will be reviewed per OAR141-085-0025, -0027, 0029, -0031, -0115 *et seq.* (mitigation) and ORS 196.825.

Per OAR 141-085-0029(3), "the Department must determine that the proposed removal-fill activity will not be inconsistent with the protection, conservation and best use of the water

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SA1-30 We have revised our discussion of purpose and need in section 1.0.

SA1-31 See our responses to comments PM06-94 and FA2-22. Table 1.3-1 lists the major federal, state, and local codes; ordinances; statutes; rules; regulations; and permits that would apply to the project. The Bradwood Landing Project is not being reviewed or authorized by the EFSEC. Under the EAct 2005, the FERC has sole authority to site onshore LNG terminals, and we review applications according to our regulations.

SA1-32 The Forest Practices Act has been added to table 1.3-4.

SA1-33 Fish passage approval from ODFW for stream crossings has been added to table 1.3-4.

SA1-34 We have expanded the discussion of the project purpose and need in section 1.1.

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SA1-34
cont'd resources of this state, and would not reasonably interfere with the paramount public policy of this state to preserve the use of its waters for navigation, fish and public recreation".
Removal-Permit permit will be contingent upon receiving all other local, state and federal authorizations and approvals.

Section 1.3.11, (p. 1-12) General Comments

SA1-35 Removal-Fill Law/Compensatory Mitigation Requirements. Compensatory mitigation is required for projects within both wetlands and waters of the state. Compensatory wetland mitigation (OAR141-085-0121, -0126, -0136, -0141, -0151), Compensatory mitigation (OAR141-085-0115) and mitigation for temporary impacts (OAR 141-085-0171) are needed.
Per OAR 141-085-0121 (4), for projects over 0.2 acres, on-site Compensatory wetland mitigation first has to be considered. Compensatory mitigation is also required for impacts to water resources per OAR 141-085-0115. There is not a clear compensatory mitigation plan for impacts from dredging or wharf construction activities that show an increase in function to offset impacts.
Complete compensatory wetland, compensatory non-wetland and temporary impacts mitigation plans are needed prior to issuing a Removal-Fill permit.

Section 1.4. Public Review and Comment, (p. 1-16)

SA1-36 Spill contingency planning. Need to add the State of Oregon requirement for preparation of vessel and facility spill contingency planning requirements. ORS 468B.300 *et seq.*, amended by 2007 Legislature, requires Oregon DEQ review and approval of LNG vessel and facility spill contingency plans.
Note that DEQ will need to amend existing spill contingency planning requirements to specify plan submittal requirements for LNG facilities and vessels. Plan approval is required prior to any delivery of LNG to Bradwood facility. (DEQ)

Section 2.0 DESCRIPTION OF PROPOSED ACTION

Section 2.1.1.5, Ballast and Cooling Water (p. 2-6)

SA1-37 With regard to obtaining water for ballast and cooling for LNG ships, Bradwood Landing has indicated its intent to apply for a water right for a fixed, on-shore or on-dock diversion system. If Bradwood does not apply for a water right for ballast and cooling, the state urges Bradwood to consult with OWRD in the near future to assure that water appropriation does not cause injury to existing uses or over-appropriation of the water resource. Wells appropriating ground water used for ballast and cooling must comply with OWRD's statutes and rules governing well construction. The state urges FERC to require a funding agreement for consultation with OWRD on water rights issues. (OWRD)

Section 2.1.1.7, Page 2-7

SA1-38 Fire Protection. Water used for actual firefighting is an exempt use of water and does not require a permit. Testing of firefighting systems does require a permit.
Add a statement that use of water for actual firefighting is an exempt use and a permit is not required, while testing of a firefighting system does require a permit, for which an application has already been submitted. This should be clarified prior to any FERC certification. (OWRD)

SA1-35 As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan based on input from agencies and stakeholders through site visits in both Oregon and Washington and through comments on the draft EIS and other comment periods associated with permits required for the project. However, because the plan has not been finalized, we have recommended that NorthernStar continue to consult with the COE, NMFS, FWS, ODFW, ODSL, WDE, and other appropriate agencies to finalize its Compensatory Mitigation Plan. See also the response to comment FA2-10.

SA1-36 The spill response plan has been added to table 4.6.2-1 as a minimization measure.

SA1-37 Wells would not be used as a primary or alternative source of water for vessel ballast water or engine cooling water.

SA1-38 We revised the EIS.

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2.1.3.6 Railroad Relocation (p.2-25)

2.4.1.1 Railroad Line Realignment (p. 2-41)

SA1-39 Railroad Relocation description is not adequate. The document should provide information about the environmental effects of this project element. The description should address potential for impacts based on potential for resumed service. (DSL)

Section 2.1.3.1, Maneuvering Area and Berth (p.2-13)

Sections 2.4.1.2, 2.4.1.3, Maneuvering Area and Ship Berth (p. 2-42)

SA1-40 Total Project Impacts within Wetlands/Waters. Per OAR 141-085-0029(4 and 5), "the Department will issue the practicable alternative with the least adverse effects." Alternative site designs and layouts with a smaller footprint are not discussed in adequate detail as to why the chosen alternative layout is the most practicable with least adverse effects.

Need more discussion on "possible future expansion". Add language that indicates whether future expansion will include the avoided wetland area. (DSL)

Alternative wharf designs and footprints. (See additional discussion of alternatives within Compensatory Wetlands Mitigation (CWM) plan, Appendix G)

SA1-41 Lack of analysis as to why in-water disposal is not a "practicable alternative". Identify the sites for the maintenance dredging.

SA1-42 DSL recommends that project impacts listed within the Removal-Fill permit application provide more specific discussion as to how each element of the proposed project represents the practicable alternative with the least impacts to the aquatic resources.

Figures documenting impacts in waters should include total impacts area of wharf and pilings.

Sec. 2.1.6, Palomar Pipeline (p. 2-28)

SA1-43 Palomar pipeline is addressed under section 2, "proposed action" but not analyzed in section 4, so then it seems it must not be a part of the proposed action.

If the Palomar line is part of the proposed action as is suggested by its mention in section 2.0, then ODF would have a substantially greater level of concern and would expect a suite of issues related to State Forest lands be analyzed in section 4 of the DEIS. (ODF)

Section 2.3.3, Pipeline and Associated Aboveground Facilities (p. 2-35)

SA1-44 Permanent maintenance corridor. DEIS states that the corridor will be 50 feet wide, but on Page E-3 it says 30 feet, section 4.4.2 also says 30 feet. Please revise for consistency.

Section 2.4 Construction Procedures

SA1-45 Pipelines. If the Palomar line is listed under Section 2 as a proposed action, then its route and construction specifics should be addressed including the private and state forest ownership it would cross.

1. Dredging. No new moorages have been proposed in Oregon that approach the scale of impact for the proposed Bradwood Landing project. Under Clean Water Act 401 Certification, DEQ has not been asked to review a project with in-water and wetland impacts of this magnitude in the history of the 401 Certification Program. The project proposes a deepening by about -10 feet in shallow water habitat, over 58 acres in-water, adjacent to the 600 foot-wide federal navigation channel which is slated for deepening

SA1-39 We disagree. The EIS presents a more than adequate description of the proposed railroad relocation and an analysis of the potential environmental impacts associated with that action. See sections 2.1.3.6, 2.4.1.1, 4.3.2.3, and 4.8.2.7.

SA1-40 The proposed action is the site layout with the smallest footprint because a smaller footprint was not feasible. See also our response to FA2-14.

SA1-41 The disposal site for the material removed during maintenance dredging is uncertain at this time. The material would either go to the Wahkiakum County Sand Pit site, if a permit is obtained by Wahkiakum County, or to another approved disposal site.

SA1-42 We consider the proposed project, as modified by our recommended conditions, to be the preferred alternative. An analysis of alternatives is provided in section 3. ODSL is responsible for reviewing NorthernStar's removal and fill permit application on its own merits, under state regulations.

SA1-43 We agree that the description of the Palomar pipeline project should not have been placed under the proposed action. The discussion of the Palomar pipeline project has been moved from section 2.1.6 to section 3.1.2.2 and revised.

SA1-44 The EIS has been revised to reflect 50 feet as the permanent right-of-way corridor width.

SA1-45 See our response to comment SA1-43. Construction specifics including the private and state forest ownership crossed by the Palomar pipeline will be addressed in the EIS for the Palomar pipeline.

K-441

(from -40 feet to approximately -51 feet, including over dredge), as well as over 30 miles of new pipeline to connect at multiple delivery points with existing pipelines. Initial dredging of the turning basin and berth at this single river mile will remove approximately 700,000 cubic yards (cy), which is equal to about 1/1000 of the total volume projected for Columbia River channel deepening project over about 190 river miles and tributary mouths.

- SA1-46 a. Impacts from the combined actions of this dredging of 58 acres adjacent to the federal navigation channel and deepening of that channel have not been analyzed by the applicant. It is possible that dredging a large area adjacent to the channel will cause the channel to shift, and this needs to be thoroughly evaluated and addressed.
- SA1-47 i. Further, this project is dependent on channel deepening occurring at this location and being maintained at new depths indefinitely, although funding and renewed 401 Certifications (from Oregon and Washington) for the United States Army Corps of Engineers (Corps) to complete channel deepening and maintenance have not yet been issued.
- SA1-48 ii. Channel deepening studies by the Corps have analyzed side slope sloughing and bank erosion as a result of deepening. These impacts must be looked at in the context of the berth and turning basin dredging as well as in relation to channel deepening. Sediment transport models have been used by the applicant to look at some aspects of the proposal, but these models are not well understood, require subjective interpretation as to predictions, and may lead to conclusions contrary to those found by the Corps initiated modeling and studies.
- SA1-49 iii. Although in-stream sediments proposed for removal have been tested for contaminants, bank materials which may be eroded inadvertently have not been tested. No information is provided as to the historical and current pesticide and fertilizer applications in areas potentially susceptible to erosion and which have been exposed to agricultural or silvicultural practices. Inadequate analysis of bank stability during dynamic adjustment of the river to dredging could introduce bioavailable toxics to the water column and sediments that were previously tied up in upland material. Precaution in this regard is particularly important as data is scarce and implications are just beginning to be studied through the initiatives of EPA's and DEQ's toxics reduction goals in the high priority Columbia River system.
- SA1-50 iv. Additionally, stability of the former log pond at various stages of fill has not been analyzed with regard to dynamic changes to the river induced by dredging at the berth/turning basin and for channel deepening. Side slope sloughing in-stream caused by dredging could result in bank failure, which may release dredged sediment to fill the former log pond. The DEIS needs to thoroughly evaluate and address the impacts to the stream and habitat from a sudden release of up to 300,000 cy of sediment under this potential scenario.
- SA1-51 b. Impacts to the hydrodynamic geomorphic changes in the river, both upstream and downstream, have not been fully analyzed by the applicant. These may contribute

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- SA1-46 Maintenance dredging of the navigation channel would maintain the channel position.
- SA1-47 The channel deepening project is being handled by the COE; it is not an activity regulated by the FERC.
- SA1-48 See our response to comment IND82-3.
- SA1-49 There is no indication of heavy pesticide or fertilizer use, such as would be typical of an agricultural setting, at the Bradwood site based on available historic information. Significant bank erosion at the LNG terminal is not anticipated; however, if it were to start occurring, mitigation measures would be required to stabilize the banks. Therefore, we do not believe that sampling and analysis of bank materials is warranted.
- SA1-50 The log pond is intended to be filled by sediment.
- SA1-51 See our responses to comments IND82-3, PM3-18, and IND82-5.

- SA1-51 cont'd
- SA1-52
- to unacceptable levels of erosion (banks on either side and around multiple in-stream islands), introduction of toxics to the waterway, habitat loss, and wetlands loss – all of which reduce water quality.
- c. DEQ does not have the technical capability to analyze fluvial geomorphic changes induced by the proposed project and how these will impact water quality. Initial review of the modeling presented raises questions about the appropriateness of the models used (e.g., why a 2-D model was used rather than a 3-D model which is available, lack of a physical basis for models used) and their predictive abilities given average results and highly complex relationships between erosion, sediment transport and deposition.
- i. This work must be contracted out by DEQ and management of the contractor coordinated internally by DEQ staff representing several programs to determine overall impacts on water quality.
 - ii. Additionally, there is no state or federal precedent to refer to for reviewing a project of this scale. DEQ will likely require the full time allowed for evaluation under the Clean Water Act for 401 water quality certification (365 days) of the proposed project.
2. Timing and Duration
- SA1-53
- a. Dredging is proposed to occur non-stop (24 hours per day, 7 days per week) for 2-3 months. No other proposal for dredging in the Columbia has operated 24-hours per day, 7 days per week for multiple months. Impacts to 13 listed salmonid species/ESUs, sturgeon (which are proposed for listing), resident aquatic organisms (mammals, fish, amphibians and reptiles, invertebrates, sediment dwellers), and terrestrial species are not fully identified or known based on non-stop action over this duration. Potentially debilitating impacts to these species include noise, continuous light, suspension of sediment, turbidity, loss of salmonid habitat and ability to rest or avoid predation, and potential attractant for sturgeon to a dangerous construction zone.
- SA1-54
- b. Pile driving and other in-water activities (with similar impacts as dredging) may occur simultaneously with dredging, dredge disposal, and upland construction. The cumulative effects of these actions on water quality “beneficial uses” (particularly listed salmonids, which are the most sensitive beneficial use) have not been analyzed or accounted for.
- SA1-55
3. Disposal of dredged material. The project proposes to dispose of dredged material either nearshore, in-stream, or use the material as fill on the terminal site, both after dewatering the materials back into the Columbia River. This discharge of return water to the Columbia may create high levels of suspended solids and turbidity in violation of water quality standards. In addition, accomplishing dewatering for use as fill on-site is proposed at the expense of the existing former log pond, which is currently connected to the mainstem Columbia and functions as a wetland and off-channel habitat for fish. Nearshore placement of dredged materials on Puget Island is at a currently eroding site. No analysis is offered as to erosion acceleration at this location due to the dynamic adjustment of the river in response to dredging. This may lead to a perpetual disturbance of the area during cycles of continual placement and erosion, as well as uncertainty of the fate of eroding material. It is possible that material will be deposited in the navigation

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- SA1-52
- The EIS discuss studies undertaken to assess water quality and channel flow as a result of the dredging to create the turning basin at the Bradwood Landing terminal.
- SA1-53
- Potential impacts on aquatic resources and federally listed salmonids due to dredging are discussed in sections 4.5.2.1 and 4.6.2.2, respectively.
- SA1-54
- Dredging would not occur concurrently with other in-water activities associated with construction of the LNG terminal. Depending on the construction schedule, some in-water activities may occur simultaneously with upland construction activities at the LNG terminal site; however, NorthernStar would implement BMPs to protect water quality. Therefore, the additive impacts of these activities on water quality are expected to be short term and minor. Impacts of in-water construction activities on aquatic species are discussed in more detail in section 4.5.2.1. Impacts on listed salmonids in particular are discussed in detail in section 4.6.2. We are currently revising our BA and EFH Assessment in compliance with section 7 of the ESA and have recommended that NorthernStar not begin construction until formal consultation with the NMFS is completed.
- SA1-55
- As described in section 4.3.2.3, water removed from the dredged material is expected to infiltrate into the ground. During rain events, the decant would be routed to a holding pond. Compensatory mitigation is proposed for the unavoidable loss of the log pond. NorthernStar completed a modeling study of the impacts of dredging. These results are summarized in section 4.2.2.2.

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SA1-55
cont'd

channel, resulting in an increased need for maintenance dredging, and these issues need to be thoroughly analyzed and addressed.

SA1-56

4. On-going maintenance dredging. Continual disturbance of the area will occur for the life of the LNG facility, every 2-4 years to maintain adequate depth by removing approximately 80,000 cy and disposing the material at Puget Island, which may be continually eroding due to the dredging. Another comparison of scope of this project is Oregon's largest port facilities at the Port of Portland: The Port of Portland maintains five berth areas at Terminal 6 on the Columbia River at the confluence with the Willamette River (a much larger system than the Clifton Channel where Bradwood is proposed); all five Port of Portland T-6 berths span about 1.5 river miles, are dredged to approximately -51 ft and require removal of only about 2,000 cy to 40,000 cy for maintenance on a similar time frame as the proposed Bradwood Landing project, which is projected to require approximately 80,000 cy removal.

SA1-57

5. Proposed equipment may be inadequate. All dredging is proposed to be accomplished via hydraulic suction. However, 12 of 31 cores planned for sediment sampling to depth (-43 ft) hit refusal before reaching proposed depth. The contractor's assumption was that obstructions were caused by dense gravel layers, wood and densely packed sand comprising an identified layer of consolidated sediments. No information is offered as to the ability of the proposed hydraulic equipment to penetrate the consolidated materials. Procedures proposed by the Corps for removing obstructions in channel deepening include using a clam shell bucket and blasting. Both of these methods may result in significantly deeper disturbance and greater impact to remove erratic materials. Further analysis and justification is required for such contingency measures. (DEQ)

SA1-58

Section 2.4.1.1, Site Preparation (p. 2-41)

Blasting. No statement is included that the applicant and the construction contractor will be aware of sensitive wildlife sites located near blasting. ODFW recommends that the applicant and the applicant's consultants/contractors consult with ODFW, prior to blasting, regarding sensitive wildlife site locations and timing of blasting in order to minimize impacts to sensitive wildlife. (ODFW)

Section 2.4.1.4, (p. 2-43)

Hydraulic Testing of the LNG Storage Tanks. Water Resources discusses its issues with use of water for testing in Sections 4 and 5. (OWRD)

Section 2.4.1.4, (p. 2-44)

Hydraulic/Pneumatic testing of Piping Systems. Water Resources discusses its issues with use of water for testing in Sections 4 and 5. (OWRD)

Section 2.4.2.1, (p. 2-47)

General Pipeline Construction Techniques, Hydrostatic Testing. Water Resources discusses its issues with use of water for testing in Sections 4 and 5. (OWRD)

SA1-59

Section 2.4.2.1, page 2-44

General Pipeline Construction Techniques. No statement is included that construction will occur after review of sensitive wildlife sites. ODFW recommends that the applicant and consultants

SA1-56

The EIS discusses maintenance dredging anticipated during operation of the Bradwood Landing LNG import terminal.

SA1-57

Hydraulic suction dredging would be adequate for removing consolidated sediments identified during sediment sampling by core refusal. The vibracore sampler, which met refusal, is not very robust. The other sampler that was used for the project did not have difficulty penetrating any of the sediments.

SA1-58

Section 4.5.2.3 has been revised to include a recommendation that NorthernStar consult with the NMFS, FWS, ODFW, and other appropriate agencies in developing its Blasting Management Plan.

SA1-59

Based on the analysis provided in the EIS, we believe that with the implementation of our recommendations, impacts on sensitive wildlife sites in the vicinity of the proposed project would be temporary and minor. In addition, potential impacts on federally listed species will be analyzed in detail during formal consultation with the NMFS and FWS. Therefore, we do not believe that additional consultation between NorthernStar and the ODFW regarding potential impacts on sensitive wildlife sites is warranted.

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consult with ODFW on sensitive wildlife sites near the Liquefied Natural Gas (LNG) terminal and pipeline. (ODFW)

Section 2.4.2.2, Special Pipeline Construction Techniques (p. 2-49)

Section 4.4.1-3, Pipeline Facilities (pp. 4-98 - 4-105)

SA1-60 **Temporary Impacts.** Conversion of wetlands is not a temporary impact, i.e. Palustrine Forested wetland converted to Palustrine Emergent.

If there is a conversion of wetland types, this is a permanent wetland impact and Compensatory Wetlands Mitigation is needed. Clear explanation if the conversion of 5.0 acres of Palustrine Forested wetland is accounted for within the Compensatory Wetlands Mitigation plan. (Proposed temporary impacts at terminal is 15 acres).

Oregon has recommend that adequate CWM be identified. If Palustrine Forested wetland is being converted, the mitigation needs to be "in-kind" replacement. More detail is needed on what the width of the maintained right-of-way will be along pipeline. This is not clear if it will be 10 feet for all wetland crossings.

Authorization will be conditioned to require pipeline right-of-way restoration activities for the temporary impacts to wetlands be monitored for at least five years.

Finalized and complete Compensatory Wetlands Mitigation and Compensatory Mitigation Plans are required prior to any authorization from DSL. (DSL)

Section 2.4.2.2, Special Pipeline Construction Techniques (p. 2-53)

K-445 SA1-61 **Roads and Railroads.** Five foot depth is insufficient along or under any State Highway, or for any pipes within the Potential Impact Radius. ODOT needs a minimum of 10 foot depth below bottom of ditch or below surface grade to protect the integrity of the State Highway System.

ODOT has the responsibility to preserve the operational safety, integrity, and function of the highway facility. ODOT must also ensure that improvements to the highway system can be accomplished without undue impacts or damage to utilities within the highway right-of-way.

The developer must obtain a permit from ODOT to work within the highway right-of-way. The developer shall meet the requirements in Oregon Administrative Rule 734 Division 55 through special provisions.

The following conditions must be fulfilled before a permit to work in ODOT right-of-way will be issued.

- Developer must notify and work directly with ODOT where the proposed location of the pipeline is shown to be within the Potential Impact Radius (PIR) of any state highway. The PIR is based on minimum federal safety standards found in 49 CFR Part 192.
- Developer shall provide ODOT with a set of plans which include, but not limited to, detailed pipeline route maps and construction staging plans. Developer will work with ODOT to develop design standards for all pipes within the PIR of a state highway. Design requirements include the following:
- Minimum of 10 feet of cover from the top of the pipe will be the norm unless special acceptance of a lesser amount is authorized for a specific reason. A minimum of 10 feet of cover should be used as the standard within ODOT right-of-way.
- All pipeline crossings of the highway shall be properly cased or for uncased pipeline crossings, a substantial increase in the pipeline design standards will be required
- In no instance shall the pipeline attach to or be suspended within highway bridge structures.

SA1-60 As stated in section 4.0, FERC considers resources requiring more than 3 years to recover from construction activities to be a long-term impact. Palustrine forested wetlands within temporarily impacted areas would return to their preconstruction condition during the life of the project (approximately 40 years); therefore, although impacts on palustrine forested wetlands are considered long term, they are not considered a permanent impact. Conversion of forested wetlands to emergent wetlands would be mitigated through the implementation of NorthernStar's Compensatory Mitigation Plan.

Section 4.4.1.3 discusses wetland monitoring along the right-of-way. In addition, we have recommended that NorthernStar consult with appropriate federal and state resource agencies to develop a Waterbody and Wetland Construction and Mitigation Procedures Plan that includes measures to appropriately monitor the success of revegetation.

Right-of-way widths that would be maintained within wetlands and uplands are described in detail in sections 4.4.1.3 and 4.4.2.3, respectively.

See also our response to comment SA1-16.

SA1-61 Table 1.3-1 lists the major federal, state, and local codes, ordinances, statutes, rules, regulations, and permits that would apply to the project. NorthernStar would apply for permits to cross state and county roadways and adhere to the conditions of these permits. Section 2.4.2.1 has been revised.

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SA1-61
cont'd

- Highway access to all pipeline surface structures and assemblies such as, but not limited to, gate valves and monitoring equipment, shall comply with Oregon Administrative Rule 734 Division 51. A preferred location for pipeline surface structures and assemblies is to be placed outside highway right-of-way.
- Annually, updated emergency contact information (names and phone numbers) shall be delivered to each District Manager in which the pipeline may affect highway operations and maintenance activities.

It is the sole responsibility of the developer to ensure that all required environmental statutes and codes are completely met. The developer is responsible to secure all state, federal and local permits and clearances as required under federal, state and local statutes or codes for all areas within ODOT right-of-way that are impacted by the development. (ODOT Region 2)

Section 2.4.2.2 . Special Pipeline Construction Techniques (pp. 2-49 – 2-51)
Waterbody Crossings, paragraph 2.

SA1-62

(1) In discussing the flume and pump methods for stream crossings, no mention of fish salvage actions or reference to a fish salvage plan is made. The dam and pump method would also require proper fish screening. Since there is a high likelihood that the pipeline crosses fish-bearing streams with the potential for stranding of fish, the DEIS needs to include a fish salvage plan, or identify where/if one is available.

SA1-63

(2) This section discusses cleaning and inspection of flume pipe for dirt, grease, oil, and other pollutants. Consideration needs to be given to inspection of flume and equipment for invasive mussels. It is unknown if invasive mussels are present in the water bodies that are crossed, however, they are present in the Youngs Bay watershed downstream. In light of unknown distribution, a proactive approach for control of invasive species should be taken. ODFW recommends that equipment and materials used in and moved between waterways be inspected and cleaned (i.e., power wash those portions in contact with stream substrate). This recommendation should be added either in this section or as a part of the Environmental Compliance Inspection section (2.6). (ODFW)

Section 2.4.2.2. (p. 2-55)

SA1-64

Blasting. No statement is included that the applicant and the construction contractor will be aware of sensitive wildlife sites located near blasting. ODFW recommends that the applicant and the applicant's consultants/contractors consult with ODFW on sensitive wildlife sites and incorporate impact minimization measures. (ODFW)

Section 2.7.3, Pipeline and Associated Aboveground Facilities (p. 2-59 – 2-60)

SA1-65

Maintenance of Pipeline. Per ORS 509.610, pipeline crossings must be maintained as approved. This section should mention that exposure of the pipeline in streams will be monitored and addressed as a potential maintenance need. (ODFW)

Sec. 2.8.2.2 Emergency Response Procedures

SA1-66

Emergency response plan. Plan should include coordination with ODF on wildfire issues. (ODF)

Sections 2.1.5, Wetland and Habitat Mitigation Sites; 2.2.3, Salmon Enhancement Initiative; 4.6.2, Impacts and Mitigation; and 5.2 FERC's Staff Recommended Mitigation)
Mitigation

- SA1-62 As described in section 4.2.3 of the Waterbody and Wetland Construction and Mitigation Procedures Plan, screens would be installed on pump suction hoses to prevent the entrainment of aquatic species in waterbodies crossed using the dam and pump method. NorthernStar filed its Work Area Isolation and Fish Salvage Plan for the Bradwood Landing pipeline as Appendix K of its JPA on November 22, 2006. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.
- SA1-63 Section 4.5.3.1 has been revised to include a recommendation that NorthernStar's final Waterbody and Wetland Construction and Mitigation Procedures Plan include measures to prevent the spread of invasive species due to construction activities within waterbodies.
- SA1-64 See our response to comment SA1-58.
- SA1-65 The pipeline would be installed and maintained in accordance with DOT standards, as explained in section 4.11.9. Pipeline crossings of waterbodies are discussed in section 4.3.2.4.
- SA1-66 NorthernStar has filed a draft ERP. It will be revised after review by the FERC, and other appropriate federal, state, and local agencies.

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- K-447
- SA1-67 1. The majority of mitigation proposed (for both in-water and wetlands impacts) will occur off-site at an existing island 14 miles downstream of the proposed Bradwood Landing project. On-site mitigation is proposed by preserving existing wetlands and riparian area at Hunt Creek. All mitigation proposed would preserve and enhance existing areas which already provide functional water quality and habitat benefits. Although the targeted areas may function better if mitigation actions are successful, the project will still result in a permanent loss of 33 acres of wetland and 58 acres of in-stream areas, as well as temporal losses from an additional 98 acres of temporary wetland impacts. Not only is this contrary to both the intent and requirements for mitigation to fulfill permit requirements under the Clean Water Act, but it is of additional significance under the recent EPA elevation of the Columbia River to a national priority. EPA's strategic targets are to protect and restore 13,000 acres of wetlands and 3,000 acres of upland habitat, clean up toxic sediments, and reduce toxics concentrations in the water column and in fish tissues.
- SA1-68 2. Proposed off-site mitigation is too distant and not representative of all the impacts of the proposed Bradwood Landing project. The DEIS is inconsistent in some analysis related to this point. For example, the applicant notes that the closest other development in the area (12 miles away) which may contribute to cumulative impacts is too far away to have an effect. Yet off-site mitigation for impacts of the project is proposed at an island 14 miles from the terminal site and up to 30+ miles from the pipeline impacts. This proposed mitigation would not compensate for impacts at the project site. Additionally, any water quality and habitat benefits will be isolated to an area downstream of the impacts and at the lowest point in the watershed. Impacts are proposed in uplands, forested wetlands, tidal wetlands, and in-stream, and these will have cascading impacts to water quality and species in all levels of the watershed. Mitigation is proposed at only one level and will not fully replace the lost functions over the diversity and wide variety of areas affected.
- SA1-69 3. Upland impacts – Associated with the pipeline and powerline corridors will be the permanent removal of mature trees aging 20-80 years old, as well as old growth stands and other vegetation. This could potentially contribute to reduced infiltration and additional erosion leading to water quality problems nearby. This is also contrary to EPA's strategic target to protect and restore 3,000 acres of upland habitat in the Columbia River basin. These significant impacts will not be mitigated along the corridors, nor will mature trees be replaced, resulting in spatial and temporal losses which have not been addressed.
- Other Water Impacts
- SA1-70 1. Groundwater – The applicant has provided extensive information as to the location and capacity of groundwater which would serve the intended industrial uses. However, no information is provided as to potential impacts to groundwater as a result of operation of the proposed facility. In order to insure that infiltration of sanitary waste and stormwater would not pollute groundwater, details on the depth to groundwater, aquifer type, and infiltration media are required. DEQ permits for on-site septic proposals must be obtained. Adequate treatment of stormwater to remove pollutants is required – infiltration through sand alone for a short distance to shallow groundwater is not adequate to insure that groundwater will not receive pollutants. Withdrawal of large amounts of groundwater (approximately 12 million gallons for construction and 1 million gallons

SA1-67 See our response to comment FA2-10.

SA1-68 Adequacy of the Compensatory Mitigation Plan is discussed in the response to comment FA2-10. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.

The FERC staff does not feel that the EIS is inconsistent in differentiating what is considered a cumulative impact and what can be considered mitigation for project impacts. Cumulative impacts are defined as those impacts resulting from other projects that are constructed at or close to the same time. The distance from the project within which cumulative impacts may occur varies based on the environmental resource being considered. For example, as described in section 4.12, impacts on geology and soils from construction activities are highly localized; therefore, cumulative impacts on near-surface geology and soils would only occur if other projects are constructed in the immediate vicinity of the proposed project. In contrast, cumulative impacts on federally or state-listed species could result if other projects would affect the same species or their habitats; therefore, cumulative impacts could occur within a much larger area. Alternatively, the driving factor in selecting a site for mitigation is the ability of a given site to replace functions that would be lost due to the proposed project. NorthernStar's rationale for selecting the proposed mitigation sites is described in detail in its Preliminary Engineering Design Draft Mitigation Plan.

SA1-69 Potential impacts on water quality due to clearing of trees and vegetation are discussed in section 4.3.2.4. Although operation of the pipeline and power line would result in permanent impacts on 125.3 acres of upland vegetation, it is important to note that all upland areas would be revegetated as described in sections 4.4.2.2 and 4.2.2.3. Old-growth forest would not be cleared as a result of the Bradwood Landing Project.

SA1-70 Groundwater characteristics at the terminal site, impacts and mitigation of water discharged to the ground, and associated permits are discussed in section 4.3.1.3. Based on the characteristics of the aquifer in which the on-site well would be completed and its location, we do not believe the volumes of water proposed to be used during construction and operation would adversely impact the aquifer, Hunt Creek, or the Columbia River (see section 4.3.1.3).

State Agencies

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SA1-70
cont'd
SA1-71

annually) from below sand may result in subsidence, prohibit recharge of the Columbia River or Hunt Creek, overdraw a confined aquifer, or result in a cone of depression drawing potential pollutants into the groundwater or streams.

2. Oregon Water Resources Department (OWRD) licenses for water withdrawals from surface waters and groundwater – Though some licenses may have been applied for from OWRD (groundwater withdrawals for pipeline hydrostatic testing and terminal construction), it is unclear whether these have been or will be granted or if surface water withdrawals (75 million gallons for terminal construction and ongoing withdrawals for fire suppression system) have been applied for. Further, it is unclear how review of these withdrawals will be coordinated with the Oregon Department of Fish and Wildlife, DEQ and others as needed to evaluate impacts and integrate permit requirements (DEQ National Pollution Discharge Elimination System (NPDES) or Water Pollution Control Facility (WPCF) permits are needed for the discharge of water withdrawn) and TMDL considerations.

SA1-72

3. Post-Construction Stormwater Management Plan – The plan provided is inadequate. Although a conceptual plan is presented, critical details are not provided which are necessary to determine that pollutant removal will be accomplished to the maximum extent practicable such that reasonably expected pollutants (sediment, metals, hydrocarbons, nutrients, etc.) in runoff from all associated impervious surfaces will not be discharged to waters of the state. Lacking information includes specifications for proposed facilities such as size of ponds, dimensions (length, width, side slope, depth) of swales, vegetative components, filtration media, distance of overland flow through vegetation, gradient of flow-paths, and chronology of a train of treatment features which addresses each reasonably expected pollutant. Additionally, there are inconsistencies with the conceptual plan, including proposed infiltration of all stormwater runoff despite compaction of fill areas for seismic stability for the facility. Finally, merging conveyance of runoff with spill containment/catchment facilities is not permissible. Minimizing potential pollutants to stormwater through separate conveyance from potential industrial spills is considered a best management practice.

SA1-73

4. National Pollution Discharge Elimination System (NPDES) permits - A recent ruling by the 9th Circuit Court may be a critical factor in deciding whether or not DEQ can issue a NPDES permit for the proposed Bradwood Landing facility. The case is *Friends of Pinto Creek et al v. EPA et al*, 504 F3d 1007 (9th Cir. 2007) (filed October 4, 2007). In brief, the 9th Circuit vacated a permit that EPA issued to Carlot Copper Company because the permit allowed discharges of copper into Pinto Creek, which was already exceeding water quality standards for copper. EPA contended that partial remediation of a discharge from another facility would offset the pollution going into Pinto Creek. The court ruled that 1) compliance schedules designed to bring the segment into compliance must be established for existing dischargers before a new permit can be issued, and 2) "there is nothing in the Clean Water Act or the regulation that provides an exception for an offset when the waters remain impaired and the new source is discharging pollution into that impaired water."

For wastewater discharges from the Bradwood Landing facility, temperature will probably be the only issue. Columbia River TMDLs are already in place for dioxin and total dissolved gas, but TMDLs are still needed for temperature, arsenic, DDT, and

SA1-71

Table 1.3-1 lists the major federal, state, and local codes, ordinances, statutes, rules, regulations, and permits that would apply to the project. Coordination of permit review within state agencies is not relevant to the EIS.

SA1-72

NorthernStar's Stormwater Management Plan provides the requested detail and is available via the eLibrary as described in the response to comment PM1-4.

SA1-73

This case is for a different project.

K-448

State Agencies

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SA1-73
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Polychlorinated biphenyls (PCBs). Bradwood Landing's NPDES permit application showed non-detect levels for arsenic, but the detection limit was probably too high (this can be easily remedied). EPA is in the lead on developing the Columbia River temperature TMDL, but work has been stalled for several years. Bradwood Landing's NPDES application lists the following three outfalls and maximum expected temperatures: 1) LNG vaporization discharge, 68 °F summer and winter, 2) Firewater system testing, 47 °F winter, 74 °F summer, and 3) Hydrostatic testing, 60 °F winter, 75 °F summer. Outfall 1 would be the ongoing LNG operation discharging 0.2 million gallons per day (MGD). The firewater system would be tested for one hour each week with a maximum flow of 4,400 gallons per minute (GPM). Hydrostatic testing of tanks would occur once during the construction period using 30 million gallons for each of two tanks. Hydrostatic testing of piping would occur once during the construction period. A total of 1.5 million gallons would be discharged in several episodes over a 2 year period.

DEQ's understanding of the *Friends of Pinto Creek* ruling suggests that we could not issue a permit without requiring that temperature water quality standards be met at the end of the pipe before a TMDL was issued. Outfall 1 discharges may not need any cooling according to the application. However, for outfalls 2 and 3, it might be possible and necessary to cool the water before discharge.

SA1-74

5. Ballast water - No analysis is offered as to impacts of reduced water flows for withdrawal of up to 6.3 billion gallons annually of ballast water from the Columbia River at the berthing area. The applicant proposes contract incentives to LNG ships outfitted with appropriate screening to reduce impacts to organisms and recirculating capabilities to address ship cooling issues and prevent additional withdrawals as well as discharges of heated water. However, this is not standard equipment on the existing LNG ships worldwide and no assurance is given that these retrofit measures will be required. The 9th Circuit Court recently ruled that NPDES discharges to a stream cannot be permitted prior to analysis and load allocations being finalized under a TMDL when the stream is limited for a parameter in the discharge. As the Columbia River temperature TMDL has not been completed, there are no load allocations and therefore no discharge of heated water can be allowed.

SA1-75

6. Invasive organisms - No measures are provided to prevent transfer of non-native species from ship hulls, anchors, propeller, incidental ballast, etc., other than rinsing of anchors and chains prior to leaving the port of origin. These measures would not be adequate to remove organisms from the vessel hull, its components or incidental ballast that were acquired at the port of origin or other waters encountered on the journey to Oregon.

SA1-76

7. Railroad Realignment - Hunt Creek is proposed as a mitigation area through preservation. However, realignment of the railroad will position it only 30 feet from the creek, which is an insufficient buffer area to protect water quality. Typical riparian buffers for water quality protection are at least 100 feet of densely vegetated, low gradient buffer area (or wider where slopes are steep). Additionally, no information is provided as to protection of Hunt Creek's water quality from loss of riparian vegetation and inputs of runoff from potentially chemically treated wood railroad ties, sediment and gravel, train related hydrocarbons, metals, etc. Details for protection measures during construction, as well as post-construction stormwater management measures are required. Mitigation for impacts to Hunt Creek resulting from inadequate buffers must be provided,

SA1-74

As described in section 4.5.2.1, water withdrawals associated with operation of the project would average less than 80 cfs. More specifically, water withdrawals for ballast and engine cooling water would occur at a rate of about 95 cfs. This is a small fraction of the average annual mean streamflow of the Columbia River as measured at the Beaver Army Terminal, which is 233,575 cfs. Therefore, although reduced downstream flows as a result of the proposed project are expected, the reduction would not be significant. See also our response to comment PM1-31.

SA1-75

Additional information on the potential for the introduction of invasive species to the lower Columbia River through hull fouling has been added to section 4.5.1.1.

SA1-76

As described in section 4.3.2.3, approximately 2,000 feet the rerouted railroad line would parallel Hunt Creek. For most of this length, the creek and the edge of the railroad right-of-way would be between 50 and 400 feet apart. However, for about 50 feet, the edge of the railroad right-of-way and Hunt Creek would be less than 50 feet apart. NorthernStar's terminal ESC Plan describes measures that would be taken to prevent construction materials and eroded soil from entering Hunt Creek during construction. Section 4.3.2.3 has been revised to include additional information on the potential impacts on water quality from the portion of the railroad realignment that is located within 50 feet of Hunt Creek.

There may be potential for impacts from run-off containing train related hydrocarbons and metals, but a 2-foot-high berm of earth covered with native grass would be constructed between the Hunt Creek oxbow and the railroad tracks; this would buffer impacts on Hunt Creek if the railroad is used temporarily during construction for delivery of materials. The berm would extend for 100 feet centered on the apex of the oxbow. There is currently no traffic on the tracks and the PWRR has no plans to operate trains west of Wauna (Wauna is east of Bradwood). Treated railroad ties would not be used within 100 feet of any wetland or waterway. Adequacy of mitigation is addressed in the response to comment FA2-10. Section 4.3.2.3 has been revised to include this information.

SA1-76
cont'd

and no mitigation credit should be considered for preservation of the creek riparian areas which are, in fact, being impacted.

SA1-77

8. Erosion due to ship wake – The analysis of potential for erosion due to 125 visits per year of ships larger than those that currently access the Columbia is not representative of proposed ship size and makes favorable conclusions based on lack of information. More information is needed to determine the level of potential effects. Corps studies related to channel deepening in the proposed reach have found wake from current ship traffic to be largely responsible for erosion at Puget Island. The DEIS incorrectly identifies speed as the most important influencing factor in ship wake erosion. The Corps studies have found vessel hull shape to be the contributing factor for ship wake erosion with severity dependent on tidal stage during travel. No information on vessel hull shape and tidal stage correlation is provided in the DEIS analysis. Additionally, tug boat wake from multiple boats during berthing and unberthing should be analyzed in combination with wake and propeller wash from the vessels. (DEQ)

Section 3.0 ALTERNATIVES

SA1-78

Alternatives analysis is not supported by adequate information that relates reasonable alternatives to a demonstrated purpose and need. This section of the DEIS should be more detailed and include a set of criteria that includes commonly accepted import terminal requirements and environmental/permit requirements that can be uniformly be applied to all reasonable build and no-build alternatives. There should be a rigorous analysis of alternatives and more consideration of conservation and renewable energy. The analysis of alternatives is too general to be helpful. Other sites proceeding through the FERC process should be more carefully analyzed and the DEIS should provide more guidance about all of the relative advantages and disadvantages of each project. (DLCDD)

Section 3.0

Also Section 3.1.6.2, p.3-41, Section 3.1.9, p. 3-52 through 3-58 and Table 3.1.9-1

See applicable comments at DSL Section 2.1.3.1, p.2-13 and Sections 2.4.1.2, 2.4.1.3, p. 2-42. (DSL)

Alternatives Analysis

SA1-79

1. Other potential locations within the region have no impacts from dredging or to wetlands at the terminal site. Despite acknowledging that 58 acres of dredging impacts are the most significant and least well understood environmental impact from the proposal, FERC does not find that options with no dredging or wetland impacts are less environmentally impactful.

SA1-80

2. Tribal nations have expressed concerns with the location of the proposal. Although supportive of LNG in Oregon as a “bridge” energy source to reduce dependence on salmon impacting hydropower, such facilities should not be sited in sensitive estuarine areas such as the Columbia River estuary, though which many declining salmonid species must pass in order to access traditional fishing areas. (DEQ)

Section 3.1.9.2

Dredged Material Placement Alternatives

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SA1-77

See our response to comment FA4-14.

SA1-78

We disagree. The EIS provides adequate information about alternatives. Our analysis discusses the relative advantages and disadvantages of various alternatives. In the beginning of section 3.1 we explain the project objectives and our criteria for evaluating alternatives. We address the no action alternative in section 3.1.1, and discuss conservation and renewable energy alternatives in section 3.1.1.3. See our response to comment SA1-3. The purpose and need for the project is briefly summarized in section 1.1 of the EIS. The Commission Order for this proposal will present a more detailed analysis and conclusion about project need.

SA1-79

It is not true that other potential locations for LNG import terminals in the region would have no impacts from dredging or no impacts on wetlands (see section 3.1.3.4). The proposed Jordan Cove LNG terminal would need to excavate or dredge about 4.3 million cubic yards of material, and its associated sendout pipeline would potentially impact about 406 acres of wetlands. The proposed Oregon LNG terminal would need to dredge about 1.3 million cubic yards of material, and its associated sendout pipeline would cross 11.5 miles of wetlands. The EIS has been revised to explain that NorthernStar intends to dredge about 46 acres within the 58-acre turning basin, producing 700,000 cubic yards of material, the majority, or all, of which would be disposed of on site. Only one of the alternative LNG terminal locations would not require much dredging (Tansy Point). However, that site has no project sponsor, and an LNG terminal at Tansy Point may impact other resources, associated with a higher population density, and a longer sendout pipeline. We have not characterized dredging as “the most significant impact

SA1-80

Section 4.9.3 discloses that Indian tribes have expressed concerns about potential project impacts on the lower Columbia River estuary, federally-listed threatened and endangered salmon species, and tribal fishing rights, due to the proposed location of the LNG import terminal. As explained elsewhere, the project proponent selected the location for its facilities, and the FERC analyzed the environmental impacts the project may have at that location. Our alternatives analysis did not identify another LNG import terminal location that was vastly superior to NorthernStar's location in terms of potential environmental impacts. In fact, several other locations may have greater impacts; especially those projects with longer pipeline routes. However, the FERC usually does not choose between various project locations. If environmental impacts can be mitigated, the FERC could authorize several projects at different locations within the same region, and let the market decide which projects are viable. The EIS for the Bradwood Landing Project discusses the lower Columbia River estuary in section 4.3.2, threatened and endangered salmon species in section 4.6, and tribal fishing rights in section 4.8.1.7.

- SA1-81** Upland placement of dredged sediments. DEQ's Solid Waste Program's comments are on the upland placement of dredged sediments, page 3-53. DEQ has the authority to issue a disposal permit for the disposal of materials that do not meet the definition of clean fill.
- The DEIS does not recognize the role that the DEQ Solid Waste Program plays in the approving the disposal of waste that is not clean fill. There is reason to believe that the sediments will not be clean fill and thus subject to DEQ Solid Waste Program regulations.
- Missing is a discussion of the process that will be used and the interaction with DEQ's Solid Waste Program if the sediments do not meet the definition of clean fill. Add the following text as a new paragraph to page 3-53, under the first paragraph under the heading "Dredged Material Placement Alternatives."
- The Oregon DEQ Solid Waste Program has the authority to issue a disposal permit for the disposal of materials that do not meet the definition of clean fill. To make this determination, the program looks at analytical results from a totals tests (EPA method 6020, as used for the results shown in table 4.2.2-2) to determine if contaminate levels are above DEQ's screening levels. Table 4.2.2-2 shows levels that appear to be above these screening levels for some constituents. In this case, the project proponents and DEQ will work together to determine options for upland disposal of sediment.
 - Suggested deadline for compliance with condition: The project should work with DEQ as soon as practical to determine how sediments will be disposed of. If the dredged materials meet in-water disposal criteria (Sediment Evaluation Framework, Port of Portland criteria, etc.), it is a "clean fill" for upland disposal, and no permit from DEQ's Solid Waste Program is needed. If the method used to determine that sediment meets in-water disposal is a bioassay and/or bioaccumulation test, the sediment may not be appropriate for upland disposal. If it fails in-water disposal criteria but passes screening criteria, it is considered "clean fill" and no Solid Waste Letter of Authorization (SWLA) is needed from DEQ. If the contaminate levels are close to our screening level, more sampling may be required. If sediment fails the screening criteria, a SWLA will be required to dispose of the material on land, except at an approved and permitted landfill. Processing of a SWLA or other permit can take six months, depending upon the associated work load. (DEQ)

Sec 4.0 Environmental Analysis

- SA1-82** If Palomar is listed as a component of the proposed action, then there are many issues/effects that could be associated with it that are not analyzed/disclosed (ODF)

Section 4.0

- SA1-83** Much of the information in the Environmental Analysis is too general. There are general assertions about project effects, but these conclusions are not tied to environmental data and information. The information on dredging impacts generally discusses alterations in flow, but does not discuss the long term impacts on habitat or species in the vicinity of the project or in the downstream areas of the main navigation channel or Clifton channel. While there is good modeling information, the information needs to be tied to a better analysis of effects on key environmental conditions.

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- SA1-81** The dredged material would meet the definition of clean fill (see section 4.2.2.2).
- SA1-82** See our response to comment SA1-43.
- SA1-83** Potential long-term impacts of alterations created by dredging on habitat and species will be discussed in more detail in the FERC's revised BA and EFH assessment.

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SA1-83 cont'd Have previously asked for additional information about resource effects.

SA1-84 Information is too general. Need additional detail about habitat impacts of dredging and long term effects of channel modification. (DLCD/OCMP)

Section 4.10, Air Quality and Noise

SA1-85 • The DEIS summary of Air Quality permitting issues for this facility is adequate. Permitting should be able to proceed when a Land Use Compatibility Statement, the permit application materials, and the appropriate fees are submitted to DEQ.
• In the previous Resource Report for Air Quality, an emissions inventory of temporary and mobile sources was included. There was a change in the sulfur content of the fuel used aboard the LNG tanker ships that was not explained in the DEIS, which significantly decreased the estimated emissions. An explanation of why this change was made would be helpful.

SA1-86 • Although DEQ does not have the authority to regulate ship emissions in the Columbia River, the emission inventory submitted in the DEIS represents the potential for a very significant risk to residents in the Lower Columbia area. The State of Oregon currently lacks the resources to adequately monitor and analyze ambient conditions in this area, and therefore does not have information to answer questions from citizens about whether or not the area meets National Ambient Air Quality Standards. Of greatest potential concern are emissions of sulfur oxides and nitrogen oxides.

SA1-87 • The emissions inventory does not contain information on air toxics or hazardous air pollutants, or specifically, diesel particulate matter. All 36 counties in Oregon exceed health benchmarks for diesel particulate matter, including Clatsop County where the proposed Bradwood Landing project would be located. Even though DEQ's air toxics program would not require mitigation at this time, we would encourage Northern Star to voluntarily mitigate its diesel particulate matter emissions including but not limited to:
o installing electrification at the dock to reduce ship hotelling emissions;
o switching to cleaner fuels on all diesel engines;
o installing retrofit devices on all diesel engines; and
o reducing idling for all diesel engines at the facility during construction or operation.
(DEQ)

Section 4.1 GEOLOGY

Global Concerns

SA1-88 1. High (severe) geologic hazards. A hazardous facility proposed at the site and the site is potentially subject to severe geologic hazards.
No mention of technical peer review of the submitted detailed geotechnical and seismic reports to ensure technical competency.
Reference to or completion of technical peer review of the detailed geotechnical and seismic reports.
An independent (non-government agency) technical peer review should be performed on the detailed geotechnical and seismic reports to ensure technical competency. Review should be done by qualified and licensed geologists and engineers.(DOGAMI)

SA1-84 See our response to comment IND82-5.

SA1-85 The EIS addresses air quality issues in section 4.10.1.

SA1-86 Emissions of SO₂ from the LNG carriers shown in table 4.10.1-4 have been updated to reflect a fuel sulfur content of 4.5 weight percent, the international sulfur limit, for ship main engines and generators in transit. In addition, clarifying information documenting the basis for the emissions estimates has been added to table 4.10.1-4.

SA1-87 As documented in table 4.10.1.4 in the final EIS, the annual particulate matter estimated to be emitted from the hotelling LNG carriers is less than 0.5 tpy. Mitigation measures, such as cold ironing were evaluated and were found to not be technically practicable due to limitations in the electrical distribution grid. In addition, internationally flagged LNG carriers in general are not designed to accept shore power and would have to be specially built or retrofitted to accept it.

The diesel engines used during the construction would comply with all state and federal regulations, including the use of cleaner fuels. Additional measures would be employed such as requesting that idling be limited to short durations.

SA1-88 The preliminary design of the Bradwood Landing LNG facility has accounted for the major geologic hazards at an acceptable level of detail at the current time. See also our response to SA1-4 and LA7-25. The FERC staff intends to ensure that NorthernStar consults with the designated state agencies regarding all aspects of the seismic design and geologic hazard mitigation measures.

K-452

- SA1-89** 2. Erroneous technical statements within the DEIS. Erroneous technical statements raise overall concerns about the qualifications of the applicant with respect to technical issues.
No reference to detailed geotechnical and seismic reports (URS reports) on some very complicated geotechnical issues (specific examples are given below). Also erroneous statements which do not match the URS reports.
Reference to detailed geotechnical and seismic reports (URS reports) on some very complicated geotechnical issues. Adequate integration of technical issues into the DEIS.
A technical review of the DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results. (DOGAMI)
- SA1-90** 3. High risk because of the combination of a proposed hazardous facility and the high (severe) geologic hazards. The site has very poor foundation soils, is in a high seismic hazard area, and potentially subject to other severe geologic hazards.
The role of the geotechnical and geologic hazard information and project members appears to be inadequate.
The geotechnical and geologic hazard information has not been fully considered in the DEIS.
Effectively integrate geotechnical/geologic hazard project members into the design, construction, inspection and operations so that the site's severe geologic hazards are mitigated adequately. (DOGAMI)
- Section 4.1.1, Regional Geologic Setting (p.4-2, para, 7)**
- SA1-91** "In recent time, the coastal regions of..." Discussion of vertical deformation rates appear only to consider long-term rates (hundreds of thousands of years) based on geologic studies. Contemporary vertical deformation rates may be different.
- SA1-92** Evaluation of Contemporary vertical deformation rates. The DEIS should differentiate between long-term and short-term (contemporary) uplift rates at the site and evaluate the potential for earthquake-related subsidence at the site. (DOGAMI)
- Section 4.1.1, (p.4-3, para 9)**
- SA1-93** "Erosional features formed along the northern..." Erosion features do not form deposits. Example of global item #2.
Erroneous technical statement. Such erroneous technical statements raise overall concerns about the qualifications of the applicant with respect to technical and public safety issues
A technical review of the DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results. (DOGAMI)
- Section 4.1.2.3 Geologic Hazards (p.4-3, para. 1)**
- SA1-94** "The only geologic hazard that would affect or be influenced..." Since significant dredging is proposed, shoreline erosion may not be the only geologic hazard affected or influenced along the waterway. Does not consider other hazards such as slope stability. Need scientific data to support the statement. Increase in depth of channel may cause slope instability along with shoreline erosion.

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- SA1-89** URS reports are cited and complete references are provided in Appendix H. See also our response to comment SA1-4.
- SA1-90** See our response to SA1-4.
- SA1-91** The EIS discusses geological issues in section 4.1.
- SA1-92** Vertical deformation rates are provided as general geologic background information. Because such rates are relatively slow and not significant over the lifetime of an LNG facility, the contemporary uplift rate at the LNG terminal site was not evaluated. Although liquefaction and lateral spreading of soils may cause subsidence during an earthquake, the treatment of soils at the site by vibroflotation would minimize such potential.
- SA1-93** The referenced statement has been corrected. See also our response to comment SA1-4.
- SA1-94** Dredging is proposed only at the LNG terminal site, not at other locations along the LNG marine waterway. There would be no deepening of the navigation channel associated with the project.

- SA1-94 cont'd Need detailed study or evaluation by a qualified and licensed geologist or engineer. Evaluate potential slope stability due to increase channel depth. (DOGAMI)
- SA1-95 **Section 4.1.2.3, (p. 4-3, para. 3)**
 “Most of the natural shoreline is resistant to erosion...”. This statement is unsubstantiated and may be inaccurate. May not consider geologic processes and hazards such as river course migration and slope stability. Need scientific data to support the statement. Analysis is missing. Increase in depth of channel may cause slope instability along with shoreline erosion.
 Need detailed study or evaluation by a qualified and licensed geologist or engineer. Evaluate historic current shoreline stability (including potential slope stability). Evaluate shoreline with proposed facilities and channel modifications. (DOGAMI)
- SA1-96 **Section 4.1.2.3 (p. 4-5, para. 7)**
 “NorthernStar commissioned a study of wave...”. DEIS reports that LNG tanker wave heights would be “slightly larger” than other smaller, but similar sized tankers and does not report on the resulting erosion potential from this generalized wave height.
 Does not report how big the resulting waves will be and the erosion potential from these waves. Need scientific data to support the statement.
 Need detailed study or evaluation by a qualified and licensed geologist or engineer. Study that provides specifics about the boat wakes generated by the vessels, their impact at the shore (which is currently vague as it stands). Also baseline study and monitoring at the site. (DOGAMI)
- SA1-97 **Section 4.1.2.3, (p. 4-5, para. 9)**
 “Therefore, it is difficult to determine what additional impacts on shorelines...”. Since it is difficult to determine before hand, some sort of baseline study and monitoring program should be implemented. (DOGAMI)
- SA1-98 **Figure 4.1.3-1, Known faults in the Bradwood Landing Project Area (p. 4-10)**
 This is not a map of known faults. It is simply a copy of the USGS fault and fold map, which identifies only certain types of faults. Example of global item #2.
 Detailed geotechnical evaluation for pipeline indicates that the pipeline will cross four mapped faults. These four faults are not shown on the map.
 Such erroneous technical statements raise overall concerns about the qualifications of the applicant with respect to technical and public safety issues
 Need a technical review of the DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results. Show ALL faults on the map or indicate map is not complete. (DOGAMI)
- SA1-99 **Section 4.1.3.2, Mineral Resources (p. 4-8, para. 2)**
 “Before operation of the LNG terminal...”. Since there is a hazardous facility proposed at the site, reclamation should be performed to adequate standards for this type of facility.
 DEIS proposes standard reclamation. Reclamation should be performed with the proposed hazardous facility in mind. Reclamation should be performed with the proposed hazardous facility in mind. Propose reclamation not to standard regulations, but to levels so that

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- SA1-95 See our response to comment FA4-14.
- SA1-96 See our response to comment FA4-14.
- SA1-97 See our response to comment FA4-14.
- SA1-98 Figure 4.1.3-1 depicts Quaternary faults from the USGS database of Quaternary faults. The figure and text in section 4.1.3.3 have been modified to include this information. The faults crossed by the pipeline are not known to be “active” but will be further investigated prior to construction.
- SA1-99 The quarry is not located within the permanent area of the LNG terminal and would not operate after LNG is put into the terminal. NorthernStar would design the quarry reclamation so that it would not affect the terminal facilities under the same magnitude earthquakes as used for designing the terminal facilities.

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SA1-99
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a hazardous facility can operate without influence in any way from the reclaimed area.
(DOGAMI)

SA1-100

Section 4.1.3.3, Geologic Hazards (p. 4-9, para. 4)

"Debris flows or landslides initiated within Hunt Creek drainage..." Significant landslide hazards like debris flow impact, should be evaluated in detail by a qualified licensed geologist or engineer. There is no reference to a detailed study or evaluation by a qualified geologist or engineer. Need scientific data to support the statement and modeling to show debris flow won't impact the site. (DOGAMI)

SA1-101

Section 4.1.3.3 (p. 4-9, para. 6)

"The risk of rock fall runout proceeding north..." Significant landslide hazards like rock fall impact should be evaluated in detail by a qualified geologist or engineer. No reference to a detailed study or evaluation by a qualified geologist or engineer. Need scientific data to support the statement. a detailed study or evaluation by a qualified licensed geologist or engineer, and modeling to show rock fall won't impact the site. (DOGAMI)

SA1-102

Section 4.1.3.3 (p. 4-11, para. 10)

"Seismic risk can be quantified by the motions..." Ground motions are not expressed in terms of "acceleration due to gravity" as stated in the DEIS. Example of global item #2.

Ground motions are not expressed in terms of "acceleration due to gravity." Ground motion maps are usually expressed in terms of a "percent of gravity". Such erroneous technical statements raise overall concerns about the qualifications of the applicant with respect to technical and public safety issues

Please add a technical review of the DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results. (DOGAMI)

SA1-103

Section 4.1.3.3 (p. 4-11, para. 14)

"The OBE is controlled by earthquakes that have..." This does not address earthquakes between 8.0 and 8.5 nor does it address earthquakes occurring outside the Cascadian subduction zone (CSZ). DEIS lacks references to magnitudes of earthquakes for operating basis earthquake (OBE) and safe shutdown earthquake (SSE) in the URS reports. FERC's draft seismic design guidelines on OBE (section 5.2) are based on probabilistic ground motions (not maximum earthquakes).

Add evaluation of OBE-SSE between 8.0 and 8.5. Evaluate earthquakes not on CSZ. Substantiate approach. A technical review of DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results. Provide consistent statements based on URS analyses. (DOGAMI)

SA1-104

Section 4.1.3.3, (p. 12, para. 15)

"Lateral spreading generally develops on gentle slopes..." The susceptibility, severity, extent and risk of lateral spreading was not discussed. The global stability of the site was not discussed with respect to lateral spreading, including the extent inland, the potentially impacted area, and the associated risks. The site requires safety and stability from damaging permanent ground deformation from lateral spreading.

SA1-100

NorthernStar reviewed site specific Lidar topography and proposed layout of the site facilities. The potential for debris flows impacting the facility is estimated to be very low due to the shallow Hunt Creek stream profile (average gradient from the mouth to 1 mile upstream is approximately 6 percent), lack of topographic evidence of past debris flows at the mouth of the creek, an approximate 1,000-foot setback of the proposed perimeter berm from the mouth of Hunt Creek, and the height of the proposed berm above the surrounding topography (greater than 10 feet). The creek profile includes a 44-foot-high vertical waterfall at the mouth of the creek that, combined with loss of stream confinement, would effectively dissipate horizontal energy as any debris flow exits the incised portion of the drainage and moves onto the 2,000-by-1,000-foot flat area between the mouth of the creek and the perimeter berm. See also our responses to comments SA1-4 and LA7-25.

SA1-101

As indicated in section 4.1.3.3, we do not believe that there is significant risk to the site due to rockfall runout emanating within the Hunt Creek drainage. A detailed study is not warranted due to the large setback of the facility from the base of the bluff (rockfall source area) combined with the proposed perimeter berm. See also our response to comment SA1-4.

SA1-102

Our discussion regarding seismic design and earthquakes in section 4.1.3.3 has been revised. Additional details regarding the "design earthquake" ground motions have been added to the text. URS is the technical consultant hired by NorthernStar to perform the necessary studies documenting the seismic design requirements for the proposed facility. Any "technical review" of the draft EIS by URS would be largely irrelevant as it is the URS studies and recommendations that form the basis for NorthernStar's proposed design. Any short-comings or errors in describing the proposed mitigation measures and the findings of our reviews of the proposal are those of the FERC staff. Also see our response to comment SA1-88.

SA1-103

See our responses to comments SA1-4 and SA1-102.

SA1-104

Liquefaction and lateral spread analyses were performed for the site and are discussed in the Preliminary Geotechnical Report and the Berthing Facility Geotechnical Data Reports. Lateral spreads of up to 6.5 feet have been conservatively estimated. This information has been added to section 4.1.3.3. As discussed in section 4.1.3.3, mitigation measures would include soil treatment such as vibroflotation to strengthen site soils and deep foundation systems.

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- SA1-104 cont'd Add discussion of the global stability of the site with respect to permanent ground deformation from lateral spreading including severity, extent and risk. Discuss mitigation measures that specifically address lateral spreading risks. (DOGAMI)
- SA1-105 Section 4.1.3.3, (p. 4-12, para. 3)
"The LNG storage tanks would also be supported on deep foundations." Additional parts of the support facility should be considered for ground improvements against liquefaction in addition to the tanks. Support facilities are important and deep foundations should be considered as well. (DOGAMI)
- SA1-106 Section 4.1.3.3, (p. 4-14, para. 4)
"The DOGAMI has prepared tsunami hazard maps for the shoreline of the Columbia River..." The proposed facility should be evaluated on a site-specific basis. Regional maps developed over 10 years ago are cited. Site should be re-evaluated on a site-specific basis and include recent scientific data. (DOGAMI)
- SA1-107 Section 4.1.3.3, (p. 4-14, para. 5)
"However, should one occur, the raised elevation of the site..." Conclusions like impacts to the site from locally derived tsunamis should be from qualified professionals. DEIS contains no reference to a detailed study or evaluation by a qualified geologist or engineer. Need scientific data to support the statement and modeling to assess local tsunami impact to the site. Should include detailed landslide map of the area and dynamic slope stability analysis. (DOGAMI)
- SA1-108 Section 4.1.3.3, (p. 4-14, para. 7)
"Federal Emergency Management Agency (FEMA) (1995) insurance rate maps..." This does not consider that the FEMA maps may be out of date and/or simply incorrect because they are based on old topographic data. Also does not consider a potential dam break and subsequent inundation/flooding levels. Need scientific data to support the use of old FEMA maps and evaluation of a dam break. (DOGAMI)
- SA1-109 Section 4.1.3.3, (p. 4-16, para. 6)
"The project would not likely result in land surface subsidence and settlement..." URS report (Dec 2005) indicates "softer compressible soils" and significant settlement. DEIS does not consider regional seismic induced subsidence. Need a technical review of DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results. Provide consistent statements based on URS analyses. Also, consider settlement monitoring during operation. (DOGAMI)
- SA1-110 Section 4.1.3.3, (p. 4-17, para. 3)
"Significant geological hazards are unlikely to be present in the vicinity of the proposed electric..." Pipeline report indicates significant landslides adjacent to the site. Need scientific data and a detailed study or evaluation by a qualified geologist or engineer to support statement. (DOGAMI)
- Section 4.1.4.3 Geologic Hazards (p. 4-20, para. 3)

- SA1-105 Text has been added to section 4.1.3.3 to indicate that all structures integral to the operation of the facility would be founded on deep foundations or designed to function in the case of large displacements. FERC's Seismic Design Guidelines (Jan. 2007) specifies a comprehensive approach to the seismic design of LNG facilities. The FERC staff is not necessarily in agreement with NorthernStar at this time regarding certain preliminary design concepts and other statements made on the record. Appropriate measures would be worked out later in the detailed design process.
- SA1-106 The previously published tsunami maps indicated insignificant effects downstream of the Bradwood Landing location. Given that the berm surrounding the LNG terminal would be at a minimum elevation of 25 feet NAVD (more than 15 feet above high tide level) and the site is located at CRM 38, we do not believe that a site-specific tsunami analysis is warranted.
- SA1-107 We have included additional text regarding NorthernStar's analysis of local tsunami risk in section 4.1.3.3. See also our response to SA1-4.
- SA1-108 Given that the site elevation would be 12 feet above the 100-year flood level based on the FEMA flood maps used, we do not believe further analysis is warranted. The design is not sensitive to the accuracy of FEMA maps. The 100-year flood level is 13.23 feet NAVD and the 500 year flood level is below 14 feet NAVD. The finished site elevation would be 20 feet NAVD and the 5 ft perimeter berm would give additional protection.
- We have added discussion of a potential dam break to section 4.1.3.3.
- SA1-109 Settlement would be mitigated at the site with ground improvement and deep foundations, as stated in the section 4.1.3.3, and therefore is not expected to occur. Earthquake-induced regional subsidence is not expected to be a factor for the project.
- SA1-110 The landslide described in the Pipeline Geohazards Report (URS, 2007) is the Wauna landslide, between about 1.4 and 4.0 miles from the facility. The proposed powerline towers would not cross the Wauna landslide but would tie into existing BPA powerlines north of the landslide.

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- SA1-111 "Northern Star indicated it would install automated vibrating...". The DEIS does not indicate how "lack of recent (landslide) activity" was determined. There is no reference to a detailed study or evaluation by a qualified geologist or engineer or scientific data to support the statement. Developer should plan to install inclinometers or some type of monitoring to determine it is not currently moving. (DOGAMI)
- SA1-112 Section 4.1.4.3, (p. 4-23, para.3)
"The 1980 eruption of Mount St. Helens will likely reduce...". This statement and the sentence after are inaccurate and is inconsistent to the references referred. DEIS states that future Mt. St. Helens eruptions will be reduced because of the explosion in 1980 thereby precluding lahars over the design lifetime of the pipeline. A detailed study or evaluation by a qualified geologist or engineer is needed to support statement. (DOGAMI)
- Sections 4.2.3 Pipeline Facilities (Soils and Sediments),
4.3.2.4 Pipeline Facilities (Water Resources)
4.4.1.3 Pipeline Facilities (Wetlands and Terrestrial Vegetation)
4.4.2.3 Pipeline Facilities (Upland Vegetation)
- SA1-113 Pipeline Facilities. There are 94 stream crossings and 24 wetland area crossings proposed to accommodate 30 miles of new pipeline. Associated with these disturbances to the streams and wetlands themselves, are significant impacts to riparian and wetland vegetation. For instance, a full ½ of the existing riparian trees will be removed. Even with total replacement by replanting (which is not proposed because a vegetation free right-of-way is required for 25-feet on each side of the pipeline), temporal losses of wetland and water quality function will be experienced for 1-3 years for wetland shrubs and up to 20 years for trees in forested wetland areas and riparian areas. This riparian vegetation, and in particular trees, is essential to providing water quality and habitat function. Such services as shade to reduce stream temperature, pollutant uptake, stormwater treatment and infiltration, and bank stabilization through root structure and evapotranspiration will be lost in the impacted areas for years to decades. The sensitivity of these areas is not accurately described in the DEIS. The route of the pipeline parallels the Columbia River through tidal wetlands and tributary mouths, which are important spawning, rearing and predator avoidance areas for listed as well as resident species. Loss of riparian vegetation in these areas is directly contradictory to the applicable Water Quality Management Plan for the North Coast Total Maximum Daily Load (TMDL), which requires preservation and restoration of riparian areas in tributaries to address temperature and other water quality parameters. (ODEQ)
- SA1-114 Section 4.3.1, LNG Terminal (p. 4-52 and 4-54)
Groundwater Uses, and Withdrawals. The LNG Terminal must obtain water rights from OWRD for terminal uses listed in the DEIS. With regard to obtaining water for ballast and cooling for LNG ships, Bradwood Landing has indicated its intent to apply for a water right for a fixed, on-shore or on-dock diversion system. If Bradwood does not apply for a water right, the state urges Bradwood to consult with OWRD in the near future to assure that water appropriation does not cause injury to existing uses or over-appropriation of the water resource. Wells appropriating ground water used for ballast and cooling must comply with OWRD's statutes and rules governing well construction. The state urges FERC to require a funding agreement for consultation with OWRD on water rights issues.

- SA1-111 NorthernStar has indicated that it would conduct further investigation of the activity of the Wauna Landslide prior to final design of the pipeline (Pipeline Geohazards Report; URS, 2007). The need for instrumentation would be evaluated based on the results of this investigation.
- SA1-112 The discussion in section 4.1.4.3 regarding Mount St. Helens and lahars has been revised.
- SA1-113 Potential impacts on wetlands and water quality due to clearing of trees and vegetation are discussed in sections 4.4.1 and 4.3.2, respectively. These sections also describe measures to avoid, minimize, and compensate for tree clearing in riparian and wetland habitats. To reduce impacts on riparian vegetation, a riparian strip at least 25 feet wide would be allowed to permanently revegetate with native woody plant species across the entire right-of-way, except for trees greater than 15 feet tall or deep-rooted shrubs within 15 feet of the pipeline. Upland forested communities would be replanted in-kind with trees, with the exception of the portion of the right-of-way within 15 feet of the pipeline. Forested wetlands would be replanted with in-kind wetland tree specimens, with the exception of the portion of the right-of-way within 5 feet of the pipeline. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Procedures. Permanent impacts on wetlands would be mitigated by restoring sites in the general project area that would be set aside and/or developed as compensatory mitigation. A goal of NorthernStar's proposed compensatory mitigation is to reestablish functioning forested wetland and riparian habitat and improve other wetland functions, including water quality improvement, buffer functions, and wildlife habitat. Impacts on listed species resulting from riparian and wetland clearing will be addressed in additional detail in the revised BA and EFH Assessment. See also the response to comment SA1-16.
- SA1-114 See our response to comment IND106-76

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SA1-114 cont'd A limited License application for construction water would need to be submitted or wait to see if permits are granted and use industrial manufacturing water under a permit. In any event, authorization to use water will be required before construction may begin. This should take place before any FERC Certification. (OWRD)

Section 4.3.1.4, (P. 4-56)

SA1-115 **Pipeline Facilities.** Pipeline excavation and installation, including horizontal drilling activities may adversely affect shallow wells, springs, and surface water in the vicinity. There may well be old wells and home sites that are using springs that are not on any database due to their age. How would adverse effects be handled?
A plan to identify any of these old wells or spring uses needs to be developed and implemented. In addition, a plan to mitigate any impacts needs to be in place before any FERC Certification. (OWRD)

Section 4.3.2.2 (p. 4-67)

SA1-116 **Waterway for LNG Marine Traffic.** This is not an OWRD permitting issue as the intake system is currently described. The DEIS should mention that a permit is not required as the system is currently designed. However, if they change to a specific diversion and piping system, a permit would be required. This should be done prior to any FERC Certification. (OWRD)

Section 4.3.2.3 (p. 4-73)

SA1-117 **Bridge Replacement, first bullet.** The in-water work period is correct but ODFW further recommends (but does not require) work below the ordinary high water (OHW) mark be scheduled (as feasible) to coincide with the low tide series during the in-water work period as an additional environmental precaution. (ODFW)

Section 4.3.2.3 (p. 4-75)

SA1-118 **Railroad Line Realignment, top of page.** This section discusses the railroad right-of-way and its close proximity in one section (50 feet) to Hunt Creek and ditch/ buffer. ODFW's earlier comments requested that "the long-term protection should be addressed also (permanent berm at toe of slope to collect any stray ballast material, or to collect any storm-water and direct it to a more suitable area, etc.)". This section indicates that a 5-foot wide ditch will be used, but does not indicate depth or slope. Within the section in close proximity to Hunt Creek, a ditch may not be sufficient to keep material from working into the buffered area. The DEIS also appears to assume the railroad company will maintain the ditch in the right-of-way, which may be questionable since the line is in service but not currently in use (page 2-41). ODFW proposes that the 50-foot area in question have a small berm (2 feet or so high) incorporated into the south side of the ditch along the narrow area of encroachment as additional protection. (ODFW)

Section 4.3.2.4 Pipeline Facilities and

Table 4.3.2-4 Waterbodies Crossed by the Bradwood Landing Project), (p. 4-78 – 4-82)

SA1-119 **Pipeline facilities crossing streams.** Methods for crossings described here and in section 2.4.2.2 are not being questioned. However, each crossing listed here will need ODFW approval as to the type of crossing method, timing horizontal directional drilling especially, as the DEIS states that this will be outside the in-water work window), and pipeline depth. In addition, it does not appear that adequate coordination with ODFW has occurred in order to provide designation of

SA1-115 See our responses to comments PM6-85 and PM1-40.

SA1-116 We have revised portions of the EIS. It may not be necessary for NorthernStar to acquire a permit from OWRD before the Commission issues its Order.

SA1-117 It is anticipated that working during low tide would be the preference of the construction contractor as well, in that fewer complications can be expected.

SA1-118 Section 4.3.2.3 has been revised to indicate that a small berm would be incorporated into the south side of the ditch adjacent to the railroad tracks as additional protection.

SA1-119 Because the Waterbody and Wetland Construction and Mitigation Procedures Plan has not been finalized, we have recommended in section 4.3.2.4 that NorthernStar continue to consult with the COE, NMFS, FWS, and appropriate federal and state agencies to finalize its Waterbody and Wetland Construction and Mitigation Procedures Plan.

Designation of fish use at waterbodies impacted by the proposed pipeline in Oregon was determined based on the NMFS's Atlas of Salmon and Steelhead Habitat in the Oregon Lower Columbia and Willamette Basins (2005). NorthernStar has also consulted with the ODFW regarding the occurrence of federally listed species at proposed pipeline crossings described in section 4.6.2.3.

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SA1-119
cont'd

fish use at each crossing location. (Note: only crossings at which native migratory fish are or were historically present require ODFW approval).

SA1-120

Timing of Stream Crossings, other than the Columbia River, using horizontal directional drilling. In regard to horizontal directional drilling and timing of the work on streams other than the Columbia River, ODFW will not support horizontal directional drilling activities outside of the in-water work period in waterways containing native fish species. Non-fish bearing stream crossings may be considered for out of in-water period work but ODFW's recommendation on these streams must be determined on a site by site basis.

The rationale for this recommendation is as follows: a frac-out or other drilling-related accident outside of the in-water work period could have serious impacts to native fish which spawn and rear in the vicinity of the stream crossing. ODFW is responsible for more than just salmonids (listed or otherwise), and therefore makes this recommendation for all native fish. Greatest impacts would likely be related to spawning areas and activities, but ODFW must also consider juvenile fish that may be rearing in the area. A frac-out during higher flows may be harder to control/repair and clean up, and may involve a much larger area of impact due to higher flows, either from the material itself or from the clean up process. It would seem reasonable to consider out of period work on non-fish bearing streams but ODFW's recommendation will be dependent on distance from fish-bearing water, size, access to site, etc. There may also be amphibian and other wildlife issues that would remove the possibility of working outside of the in-water work period on non-fish bearing streams.

ODFW understands the project sequencing and delivery delay implications that this and the Columbia River HDD crossing (next section) recommendations have for the applicant, but without assurance that no frac-outs will occur, this is the best stance ODFW can take. ODFW's Northwest Region has dealt with frac-outs in the Tualatin basin on past HDD natural gas pipeline projects and frac-outs can indeed cause substantial aquatic impacts. There is no guarantee as to where frac-outs will actually surface, and what quantities of lubricant or bentonite will burst out in a stream before the contractors can act and stop the flow. Mobilizing heavy mop-up rigs across the landscape to find and clean up the mess during the wetter phases of the year is also an access concern. What the in-water work recommendation will mean for the contractor is redesigning the approach to completing all the various elements of the project. This very well might mean longer work hours and extra equipment to conduct horizontal directional drilling under sensitive stream environments only during ODFW-approved in-water work timing months. ODFW would be open to a meeting with the applicant, FERC and National Marine Fisheries Service (NMFS) to discuss all stream and Columbia River horizontal directional drilling crossings.

SA1-121

Timing of HDD for the Columbia River Crossing. ODFW recommends restricting in-water work associated with the Bradwood Landing HDD in the Columbia River to the month of December due to concerns over chum salmon, smelt, and spring Chinook. Normally the recommended in-water work period for the Columbia River is from November 1 through the month of February. Due to the potential of a frac-out occurring during drilling, ODFW recommends the HDD operation not be conducted during the month of November because of potential negative impacts to Endangered Species Act (ESA)-listed chum salmon. Returning chum salmon are most active in the Columbia River during the months of November and December. The chum salmon populations in Oregon on the Columbia River are in an area between two and ten miles below Bonneville Dam around Ives and Pierce islands, near the mouth of Multnomah Creek and at the mouth of McCord Creek. Returning chum salmon adults

SA1-120

Waterbody crossings using the HDD or conventional bore method may be performed outside of the in-water work windows during suitable construction seasons, typically from April through November, depending on the weather. Construction during the rainy season would increase safety concerns and make compliance with NPDES permits more difficult. Waterbody crossings using the HDD or bore method would not involve construction below the ordinary high water mark or MHHW. Waterbody crossing methods, timing, species and life stage occurrence, and potential impacts will be discussed in detail in the revised BA and EFH Assessment.

SA1-121

The crossing of the Columbia River using the HDD method would take 3 months to complete and is currently scheduled to occur during the summer months. On the Oregon side of the river, laydown areas are located in wetlands and the Washington side of the river is relatively hilly; therefore, the HDD crossing of the Columbia River would occur during the dry season. See also our response to comment SA1-120.

Potential impacts on aquatic resources (including salmonids) due to a frac-out are summarized in section 4.5.3.1 and will be discussed in detail in the revised BA and EFH Assessment.

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SA1-121 cont'd begin returning to spawning grounds beginning the first week of November and continue to be present in the Columbia River through December with peak spawning taking place in the above areas in mid-December. A frac-out at River Mile (RM) 53 could have the effect of delaying adult chum salmon migration to spawning grounds. Since typically the bulk of adult chum salmon migration occurs during the month of November, we recommend that no HDD be done during that month.

Smelt begin returning to spawn in the Columbia River and tributaries in December with the majority of mainstem spawners being caught in commercial fisheries in January and February. Commercial smelt fisheries operate in the mainstem Columbia River below the Clatskanie River (RM 50) around Wallace and Puget islands. Should a frac-out occur during January or February it may not only interfere with an important fishery but also negatively impact mainstem spawning in this reach of the river. In addition, spring Chinook salmon begin migrating through this reach of the Columbia River on their way upriver to spawning grounds. Commercial fisheries in the lower Columbia River catch spring Chinook salmon in January and February. Should a frac-out in the Columbia River occur during January or February, it could not only have detrimental effects on an important winter commercial fishery but also disturb and delay migration of ESA-listed upriver spring Chinook salmon.

Because of the above concerns for returning spawners and fisheries in the lower Columbia River and the unpredictable nature of HDD with the possibility of frac-outs taking place while drilling, ODFW recommends that any HDD below the Columbia River be limited to only the month of December when there is the least amount of migration of salmon and smelt occurring in the Columbia River. (ODFW)

Section 4.4.1.2 LGN Terminal (p. 4-96, p. 4-153 of DEIS) and Compensatory Wetlands Mitigation plan (p. 73)

SA1-122 Terminal site Impacts and Compensatory Wetlands Mitigation/Compensatory Mitigation Proposal. Need to clarify mitigation plans for water impacts on the Hunt Creek/Clifton Channel site. The Compensatory Wetlands Mitigation plan lists the acreage to be preserved at Hunt Creek/Clifton Channel is 57 acres (p. 73), but the DEIS states 61 acres.

Preservation may not be adequate to fit within the CIL per OAR 141-085-0131(4). DSL recommends that additional compensatory mitigation measures need to be considered for impacts to waters, including annual maintenance dredging and aquatic impacts.

A finalized and complete Compensatory Wetlands Mitigation and Compensatory Mitigation plan is required prior to any authorization from DSL. As part of Removal/Fill permit, there will be specific success criteria that will need to be met for the Compensatory Mitigation and Compensatory Wetlands Mitigation monitoring report. (DSL)

SA1-123 Section 4.4.1.2 (p. 4-95) LNG Terminal Compensatory Mitigation. There is no discussion about the methodology that will be used to measure function (baseline functions, changes in function, replacement of function at mitigation sites). ODFW recommends that the DEIS refer to a methodology and address this in detail in the Mitigation Plan. (ODFW)

SA1-124 Section 4.4.1.2 (p. 4-96) LNG Terminal Compensatory Mitigation, 3rd paragraph. The on-site biologist that is described in this section as being present during construction of the mitigation site should also be assigned

SA1-122 See our responses to comments FA2-10 and FA3-3.

SA1-123 See our response to comment FA2-10.

SA1-124 As described in section 2.1.6, NorthernStar is currently revising its Compensatory Mitigation Plan based on input received through agencies and from comments on the draft EIS. Therefore, it is anticipated that this comment will be addressed in the final Compensatory Mitigation Plan. See also our response to comment FA2-10.

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- SA1-124 cont'd to ensure that negative impacts to wildlife are avoided (i.e., not just for fish impact avoidance). ODFW recommends that the responsibilities of the on-site biologist include wildlife minimization and avoidance responsibilities (e.g., assuring that timing of blasting avoid sensitive wildlife sites and nesting times). (ODFW)
- Section 4.4.1.3 Pipeline Facilities (p. 4-98)**
- SA1-125 **Pipeline Facilities Impacts and Mitigation, 4th paragraph.** Horizontal directional drilling is addressed with no mention of potential frac-outs and mitigation that would occur in the event of frac-outs. ODFW recommends that this section address what will be done to avoid the potential for frac-outs and then mitigate for impacts in the event that frac-outs do occur. (ODFW)
- Section 4.4.1.3 (p. 4-107)**
- SA1-126 **Pipeline Facilities Compensatory Mitigation.** Regarding the Delameter Creek wetland mitigation site, information is lacking about whether or not the landowner is amenable to a Conservation Easement. ODFW recommends that the DEIS provide this information and clarify how the property will be protected in the long-term. A third-party should hold this CE to ensure long-term protection. (ODFW)
- Section 4.4.2.2 LNG Terminal (p. 4-110 – 4-111)**
- SA1-127 **LNG Terminal Impacts and Mitigation.** Regarding the tree inventory, although tree species other than cottonwood are “not abundant”, it is unclear if any of these are proposed to be removed. It is also unclear if the replacement trees would replace what would be lost. (ODFW)
- Section 4.4.2.2 (p. 4-112)**
- SA1-128 **LNG Terminal Impacts and Mitigation.** Regarding the management of trees within 25 feet of the security fence, topping of trees may not effectively limit the height of some tree species. ODFW suggests that, in addition to topping, girdling trees will limit tree growth and promote development of snags. Also, ODFW recommends placing cleared vegetation on mitigation sites for habitat enhancement (e.g., brush piles). (ODFW)
- Section 4.4.2.2, page 4-112**
- SA1-129 **LNG Terminal Impacts and Mitigation.** It is unclear what seeding with “conservation grasses” means. Please explain this. ODFW recommends coordination with ODFW’S Tillamook Office regarding a grass seed mix that would be acceptable for revegetating the project’s disturbed areas. (ODFW)
- Section 4.4.2.3 (p. 4-115)**
- SA1-130 **Pipeline Facilities General Impacts and Mitigation, Pipeline Right-of-Way.** Final disposition of woody vegetation/ trees removed from the workspace is discussed in this section. Is there an opportunity to reach a similar agreement with ODFW for use of debris/trees for on-site mitigation? Please explore this option and address in the Final EIS. (ODFW)
- Table 4.5.1-2, (p. 4-130)**
- SA1-131 Bullfrog, nutria, house sparrow, rock dove are non-native, invasive species. ODFW recommends removing these species or acknowledging in a footnote that these are not species of concern because of their non-native status. (ODFW)

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- SA1-125 Section 4.4.1.3 has been revised to include a discussion of the potential for frac-outs in wetlands crossed using the HDD method as well as NorthernStar’s HDD Contingency Plan, which includes mitigation measures to be implemented in the event of a frac-out. Directions for accessing NorthernStar’s HDD Contingency Plan (Frac-out Plan) via the eLibrary can be found in the response to comment FA3-13.
- SA1-126 See our response to comment FA2-10.
- SA1-127 Section 4.5.2.2 has been revised to include the number of trees other than cottonwoods included in the tree inventory conducted by NorthernStar in June 2007. Although the precise number of non-cottonwood trees that would be cleared as a result of terminal construction was not quantified, it did state that most of the trees to be removed would be located along the Hunt Creek estuary, where about 40 red alder, Oregon ash, Sitka spruce, and bigleaf maple are located. NorthernStar proposes to plant 1,895 replacement trees within the LNG terminal site consisting of cottonwoods and other species based on soil and hydrology suitability (e.g., Sitka spruce, red alder, Pacific willow, and other native tree species).
- SA1-128 Although we agree that girdling trees would be an effective method of limiting the height of trees, we are not aware of any environmental advantages to girdling the trees for security reasons.
- Because the Compensatory Mitigation Plan has not been finalized, we have recommended that NorthernStar continue to consult with the COE, FWS, NMFS, ODSL, WDE, and other appropriate resource agencies to finalize its Compensatory Mitigation Plan. The placement of cleared vegetation on mitigation sites for habitat enhancement purposes could be considered as NorthernStar finalizes its plan. Directions for accessing NorthernStar’s Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.
- SA1-129 The term “conservation grasses” generally refers to a mixture of grasses, legumes, and forbs. Because the first use of the term “conservation grasses” occurs in section 4.3.2.4, that section was revised to include a definition of the term.
- We have recommended in section 4.4.2.3 that NorthernStar continue to consult with the COE, FWS, NMFS, Oregon and Washington Departments of Agriculture, and other appropriate resource agencies to revise its Noxious Weeds and Soil-borne Plant Disease Control Plan. Included within this plan is a description of the species that would be used for revegetation in areas impacted by project activities. Directions for accessing NorthernStar’s Noxious Weeds and Soil-borne Plant Disease Control Plan via the eLibrary can be found in the response to comment PM6-60.
- SA1-130 Specific mitigation measures regarding the use of debris/trees for on-site mitigation are beyond the technical scope of the EIS. See also our response to comment SA1-128.
- SA1-131 A footnote has been added to table 4.5.1-2 indicating the non-native, invasive species that occur along the waterway or at the LNG terminal site.

- Section 4.5.2.1, page 4-139 – 4-140.**
SA1-132 Aquatic Resources Log Pond Filling and page 4-141 Hunt Creek Bridge Replacement. Aquatic wildlife may also be present at these locations. A wildlife salvage plan should be prepared and implemented. ODFW permits are needed to conduct fish and wildlife collection/relocation. (ODFW)
- Section 4.5.2, LNG Terminal (p. 153, para. 3, Hunt Creek; Section 4.5.3.1)**
SA1-133 The project proposal claims that preserving Hunt Creek is mitigation. ODFW does not consider preservation as mitigation but it is a good thing to do. Preservation does not replace lost habitat. There will still be habitat lost even with Hunt Creek preserved. Again, ODFW allows preservation but does not count it as mitigation for lost habitat. (ODFW)
- Section 4.5.2.2 (p. 4-154)**
SA1-134a Essential Fish Habitat. ODFW is aware that this section refers to NMFS' Essential Fish Habitat designations. In regard to Oregon Department of State Lands' (DSL) Essential Fish Habitat designation, the applicant/FERC should keep the following information in mind. This section suggests that only two species of Pacific salmon (Chinook and Coho) may be negatively affected by the Bradwood Landing project. Since the Columbia River estuary is known to be an area where not only Chinook and Coho, but also chum salmon and steelhead rear and migrate through, chum and steelhead should be included in the list of fish species Essential Fish Habitat (according to DSL definition) that will be impacted by an LNG project at Bradwood Landing. (ODFW)
- Section 4.5.2.3 Terrestrial Wildlife (p. 4-156 – 4-159)**
SA1-134b ODFW believes this section provides a thorough description of general impacts on terrestrial wildlife. (ODFW)
- Section 4.5.2.3, page 4-158**
SA1-135 Terrestrial Wildlife General Impacts on Terrestrial Wildlife. Wildlife could become entrapped inside the terminal facility's fence. ODFW recommends development of a contingency plan for wildlife trapped inside the facility's fence. (ODFW)
- Section 4.5.2.3, page 4-161**
SA1-136 Terrestrial Wildlife Active Osprey Nest. Regarding relocation of the old osprey nest onto a new platform, it may not be feasible to keep the old nest intact. ODFW recommends that the Final EIS clarify that this will be attempted, but in the event it is not feasible, portions of the old nest will be used to construct a nest start on the new platform with guidance from ODFW. (ODFW)
- Section 4.5.2.3 (p. 4-161)**
SA1-137 Terrestrial Wildlife. This section includes bullfrog, and nutria and these are non-native, invasive species. Either remove these species or acknowledge in a footnote that no mitigation will occur for these species because of their non-native status. (ODFW)

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- SA1-132 NorthernStar's Fish Salvage Plan includes a statement that all work would be performed under an ODFW/NMFS scientific collection permit. We believe that wildlife concerns related to salvage activities will be adequately identified and addressed through the scientific collection permit process.
- SA1-133 See our response to comment FA3-3.
- SA1-134a We believe that the impacts of the project on EFH, as it is defined under the MSA, are adequately addressed in the EIS. A detailed description of potential impacts on federally listed salmonids occurring in the vicinity of the Bradwood Landing Project is included in section 4.6.2.
- SA1-134b We agree.
- SA1-135 As described in section 4.5.2.3, the fencing that would surround the proposed LNG terminal site would be 10-foot-high woven wire topped with barbed wire. At this height, the fence would effectively preclude most if not all wildlife from jumping over the fence, thus minimizing or eliminating the risk of wildlife being trapped within the LNG terminal site. Therefore, we feel that the development of a contingency plan for wildlife trapped within the LNG terminal site is not necessary.
- SA1-136 Section 4.5.2.3 has been revised to reflect the osprey nest relocation recommendations included in this comment.
- SA1-137 Within section 4.5.2.3, the discussion of wildlife species occurring at the Peterson Point Mitigation Site has been revised.

Section 4.5.2.3 Terrestrial Wildlife (p. 4-172)

- SA1-138 **General Impacts on Terrestrial Wildlife.** The statement in this section that impacts on wildlife from construction of the pipeline are generally short-term is not entirely accurate. Some of the habitat impacts are long-term. (ODFW)

Table 4.5.3-4 Wild Life Species Occurring . . . Pipeline Area(p. 4-173)

- SA1-139 Bullfrog, nutria, house sparrow and rock dove which are non-native, invasive species are included. Either remove these species or acknowledge in a footnote that these are not species of concern because of their non-native status. (ODFW)

Section 4.5.3.3, (1) pages 4-172 -4-175; (2) page 4-174

- SA1-140 (1) The section on General Impacts on Terrestrial Wildlife is a rather abbreviated description of impacts. ODFW recommends expanding the narrative in this section to a similar depth as done on p 4-156 (see comment above).
(2) This section contains a good description of the anticipated re-vegetation and monitoring plan. (ODFW)

Section 4.6.1.1 Federally Listed Threatened and Endangered Species (p. 4-182, last paragraph on Chinook Salmon)

- SA1-141 The statement "Because of their large body size (over 100 pounds and up to 58 inches in length), Chinook tend..." is incorrect and misleading. The statement infers this is a common size for Chinook which was probably not true even in the period before Columbia River dams. Although there were fish of this size, they were still the exception rather than the norm. A better assessment would be "(average size of 20 pounds and average lengths of 34 – 38 inches, and a few over 40 pounds)..." This wording would be more reflective of current physical attributes for Columbia River Chinook. (ODFW)

Section 4.6.1.2 State Listed T&E Species (p. 4-197)

- SA1-142 **Western Pond Turtle.** The status of western pond turtle in Oregon as State sensitive-critical is not mentioned in Section 4.6. Please include this species, its status and information. (ODFW)

Section 4.6.1.2 State Listed T&E Species. (p. 4-198)

- SA1-143 **Columbia Torrent (seep) Salamander.** The status of the Columbia torrent salamander in Oregon as State sensitive-critical is not mentioned in Section 4.6. Please include this species, its status and information. (ODFW)

Section 4.6.1.2 State Listed T&E Species (p. 4-199)

- SA1-144 **American Peregrine Falcon.** The status of American peregrine falcon needs to be corrected. The American peregrine falcon was de-listed in April 2007. (ODFW)

Section 4.6.1.3 Other Special Status Species (p. 4-199)

- SA1-145 **Townsend's Big-eared Bat.** The status of the Townsend's big-eared bat in Oregon as State sensitive-critical is not mentioned in Section 4.6. Please include this species, its status and information. (ODFW)

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- SA1-138 Section 4.5.2.3 has been revised to provide additional information on potential long-term impacts on wildlife due to construction of the pipeline.
- SA1-139 A footnote has been added to table 4.5.3-4 indicating the non-native, invasive species that occur along the proposed pipeline route.
- SA1-140 Section 4.5.3.3 has been revised to include additional discussion of the potential impacts on terrestrial wildlife due to construction and operation of the pipeline facilities.
- SA1-141 Section 4.6.1.1 has been revised to reflect the typical body size of Chinook.
- SA1-142 The western pond turtle is discussed in section 4.6.1.2. The section has been revised to reflect the State of Oregon's classification of the western pond turtle as sensitive-critical.
- SA1-143 The Columbia torrent (seep) salamander is discussed in section 4.6.1.3. The section has been revised to reflect the State of Oregon's classification of the Columbia torrent salamander as sensitive-critical.
- SA1-144 The American peregrine falcon was removed from the Oregon Threatened and Endangered Species List on April 13, 2007. Therefore, the species has been removed from section 4.6.1.2 of the EIS and is now included in section 4.6.1.3 (Other Special Status Species).
- SA1-145 Townsend's big-eared bat is discussed in section 4.6.1.3. The section has been revised to reflect the State of Oregon's classification of Townsend's big-eared bat as sensitive-critical.

- Section 4.6.1.3 Other Special Status Species (p. 4-201)**
SA1-146 Olive-sided Flycatcher. The status of the olive-sided flycatcher in Oregon is not clear if that listing comes from Oregon's State Sensitive Species List. Please clarify. (ODFW)
- Section 4.6.1.3 Other Special Status Species (p. 4-201)**
SA1-147 Lewis' Woodpecker. This is more of an eastside species. Please double check to see if the project is within this species' range. (ODFW)
- Section 4.6.1.3 Other Special Status Species (p. 4-201)**
SA1-148 Northern Goshawk. The status of the northern goshawk in Oregon as State sensitive-critical is not mentioned in Section 4.6. Please include this species, its status and information. (ODFW)
- Section 4.6.1.3 Other Special Status Species (p. 4-201)**
SA1-149 Purple Martin. The status of the purple martin in Oregon as State sensitive-critical is not mentioned in Section 4.6. Please include this species, its status and information. (ODFW)
- Section 4.6.1.3 Other Special Status Species (p. 4-202)**
SA1-150 Northern Red-legged Frog. The status of the northern red-legged frog in Oregon is State sensitive-undetermined within the Coast Range Ecoregion. The information in the DEIS needs to be corrected. (ODFW)
- Section 4.6.1.3 Other Special Status Species (p. 4-203)**
SA1-151 Tailed Frog. It is not clear in this section that the listing comes from Oregon's State Sensitive Species List. Please clarify. (ODFW)
- Section 4.6.1.3 Other Special Status Species (p. 4-202)**
SA1-152 Western Painted Turtle. It is not clear in this section that the listing comes from Oregon's State Sensitive Species List. Please clarify. (ODFW)
- Section 4.6.1.3 Other Special Status Species (p. 4-204)**
SA1-153 Migratory Bird Treaty Act. Regarding the authority of the Migratory Bird Treaty Act (MBTA), please clarify that the MBTA applies to active nests, eggs, and young. (ODFW)
- Table 4.6.2-1 Summary of Potential Impacts and Mitigation Measures (p. 4-210)**
SA1-154 Action: accidental spill or leak of hazardous materials. There is no "if" scenario included. Please add and include what compensation would occur. The spill response plan should be mentioned. (ODFW)
- Table 4.6.2-1 (p. 4-210)**
SA1-155 Action: Filling log pond. The fish salvage plan needs to include obtaining necessary ODFW fish salvage permits. (ODFW)
- Section 4.6.2**
SA1-156 Impacts and Mitigation. For many federally listed species, there seems to be a lack of mitigation discussion. This section needs to include more information of mitigation measures that would be implemented. (ODFW)

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- SA1-146 The status of the olive-sided flycatcher as vulnerable on Oregon's State Sensitive Species List has been clarified in section 4.6.1.3.
- SA1-147 As the comment noted, Lewis' woodpecker generally occurs in the eastern portions of both Oregon and Washington. However, due to scoping comments received, the Lewis woodpecker was included in the sensitive species analysis conducted for the Bradwood Landing Project. The text in sections 4.6.1.3 has been revised to clarify that the species is not known to occur within the proposed project area.
- SA1-148 The status of the northern goshawk as critical on Oregon's State Sensitive Species List has been clarified in section 4.6.1.3.
- SA1-149 The status of the purple martin as critical on Oregon's State Sensitive Species List has been clarified in section 4.6.1.3.
- SA1-150 The status of the northern red-legged frog designated by the State of Oregon has been revised in section 4.6.1.3.
- SA1-151 The status of the tailed frog as vulnerable on Oregon's State Sensitive Species List has been clarified in section 4.6.1.3.
- SA1-152 The status of the western painted turtle as critical on Oregon's State Sensitive Species List has been clarified in section 4.6.1.3.
- SA1-153 The text within section 4.6.1.3 relating to the Migratory Bird Treaty Act has been revised to clarify that the Act extends protection to any part, nest, or egg of any such bird (16 USC. 703).
- SA1-154 The spill response plan has been added to table 4.6.2-1 as a minimization measure. We could not speculate what compensation would be appropriate in the event of a spill at this time.
- SA1-155 Section 4.5.2.1 has been revised to clarify that NorthernStar's Fish Salvage Plan includes a statement that all work would be performed under an ODFW/NMFS scientific collection permit.
- SA1-156 As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. The revised plan will be submitted to the NMFS and FWS as part of the FERC's BA and EFH Assessment. The FERC would not allow construction to begin until after we have completed formal consultation with the FWS and NMFS.

Section 4.6.2.2, LNG Terminal (pp. 4-242 – 4-246)

- SA1-157 **Salmon Enhancement Initiative.** The applicant has proposed to implement a Salmon Enhancement Initiative that would be entirely voluntary, amounting to \$50 million over the life of the project (40 – 50 years). In and of itself, this plan could be a big plus if there were guarantees that it will be completely and successfully implemented, over and above successfully implemented compensatory mitigation. The DEIS does not address specifics of the plan or environmental impacts from its implementation. Because the plan is voluntary and not regulatory and because little detail is given on its specifics, ODFW continues to have many questions about it. ODFW suggests that the applicant first assure successful avoidance, minimization and compensatory mitigation for the project before undertaking the SEL. (ODFW)

Section 4.6.2.2 LNG Terminal (p. 4-258)

- SA1-158 **MBTA.** This section addresses vegetation clearing period to avoid impacts to nests. The proposed start is in mid-July. This section needs to acknowledge that active nests might still be found and address avoidance of impacts to any active nest. ODFW also recommends that the DEIS amend the vegetation clearing start date to August 1 (see comment below). (ODFW)

Section 4.6.2.3 Pipeline Facilities (p. 4-270)

- SA1-159 **MBTA.** This section proposes a vegetation clearing period to avoid impacts to nests as starting August 1. This date is inconsistent with the start date given in Section 4.6.2.2 (i.e., mid-July) and again, needs to address avoidance actions that will be taken if an active nest site is found during vegetation clearing. (ODFW)

Sec 4.7.1.4 (p. 4-277)

- SA1-160 **Publicly owned forest.** Add language on the project's proximity to and potential impacts on the Tillamook State Forest, another publicly owned forest in northwest Oregon. (ODF)

Sec 4.7.1.4 (p. 4-277 & 293)

- SA1-161 **Recreation.** ODF has a Recreation Management Plan for the Astoria District (dated 2000), and recreation on the Clatsop SF is recognized and actively managed in coordination with local user groups and citizen advisory committees. Please consider this in your analysis. (ODF)

Section 4.7.1.4 (pp. 4-279 – 4-280) and**Section 4.8.1.7 Transportation and River Traffic (p. 4-328 – 4-330)**

- SA1-162 **Commercial and Recreational Fishing Use of Columbia River.** The moving 500-yard safety and security zone around 125 LNG ships per year (2 – 3 per week) as they move up the Columbia River will be very disruptive to commercial and recreational fishing boats. The applicant has stipulated in meetings with ODFW and other agencies that ships would ingress/egress the Columbia at night during key fishing seasons such as the Buoy 10 fishery (August – September). This commitment appears to be missing in the DEIS. ODFW recommends that the applicant/FERC include the commitment that ships will ingress/egress the Columbia River at night during key fishing seasons (see attached table for fishing boat numbers on the Columbia River below the proposed Bradwood Landing LNG Terminal site). (ODFW)

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- SA1-157 We agree. The FERC staff will continue to work with the resource and other regulatory agencies to ensure that the project includes appropriate measures to avoid, minimize, and compensate for environmental impacts.
- SA1-158 Section 4.6.2.2 has been revised to address vegetation clearing timeframes and impacts on active nests.
- SA1-159 Section 4.6.2.3 has been revised to address vegetation clearing timeframes and impacts on active nests.
- SA1-160 Based on a review of State Forest maps, it appears that the Tillamook State Forest is over 60 miles south from Astoria, and well outside the project area.
- SA1-161 Section 4.7.1.4 has been revised to include a reference to the Clatsop State Forest's Astoria District Recreation Management Plan.
- SA1-162 The moving safety and security zone is expected to have a minor impact recreational and commercial fishing. Because of this, restrictive scheduling of LNG ship transits to nighttime hours does not appear justified. Furthermore, the Coast Guard has restricted the LNG ships to daytime transits for the first 6 months of operation to allow the Columbia River Pilots to become accustomed to the vessels.

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Section 4.7.2.7 (p. 4-294-5)

SA1-163 **Visuals.** ODF's Forest Management Plan for NW OR has Land Management Classification (OAR) designations which include areas where of visual concerns are designated. There is a visual designation along the Columbia River on the Clatsop State Forest directly west of the Bradwood site. Visual impacts from the designated areas on the Clatsop State Forest should be considered in this section. (ODF)

Section 4.8.3.6 Local Infrastructure and Public Services

Table 4.8.1-4 Existing Economic Conditions (p. 4-324)

SA1-164 **Emergency Services.** ODF is an oversight agency to Rural Fire Protection Districts and is a responder to forest and brush fires on private, rural, and state owned lands
Emergency and evacuation plans should be coordinated with ODF, particularly any emergency route across State Forest lands. (ODF)

Section 4.8.2.7 Transportation and Traffic (p. 343-345)

SA1-165 **Transportation and Traffic.** The DEIS understates the importance of US Route 30. "Highway 30 is a two-lane east-west highway that connects Astoria to Portland."

US Route 30 is the only highway serving the Lower Columbia corridor between Portland and Astoria. US Route 30 serves as the "Main Street" for most communities in the corridor and it is the primary facility for freight traffic serving industry in the corridor. The importance of US Route 30 for passenger and freight traffic is reflected by its designation as part of the National Highway System, a State Freight Route, and a Federally Designated Truck Route. ODOT has informed Northern Star's Engineering Firm CTS Engineering and Clatsop County that a Road Approach Permit will be required for Clifton Road at U.S. 30 and OAR 734 Division 51 requirements shall be met; mitigation will be identified during the road approach permitting process. Cost for all highway mitigation as determined by OAR 734 Division 51 due to the development impacts will be the sole responsibility of the developer.

ODOT will need to re-evaluate all traffic impacts at the Clifton Road intersection, once a road approach application has been submitted. Based on a preliminary review of the information supplied to ODOT as of this date, the required mitigation at the U.S. Highway 30/Clifton Road intersection will be:

1. Construction of a left turn refuge on Highway 30 at Clifton Road. This mitigation is based on safety and operational concerns, and is supported by turn-lane warrants being met during the 3-5 year construction period;
2. Widening of the highway shoulder in the southeast quadrant to accommodate right turning vehicles; and
3. Radii improvements.

CTS Engineering was informed that any other mitigation will be identified during the application process.

Currently, a Park & Ride is being proposed at a location approximately 2 miles east of the original location. A right turn lane may be required in lieu of the previously mentioned shoulder widening, due to the location of the Park & Ride, and its potential to increase the number of right turning vehicles.

SA1-163 Section 4.7.1.5 has been revised to include the Clatsop State Forest's Land Management Classification of "Visual" along the Columbia River just west of the proposed LNG terminal.

SA1-164 See our response to comment PM1-1.

SA1-165 The FERC acknowledges the ODOT's concerns regarding Highway 30 and its road approach application process. We will require that NorthernStar's proposed improvements to Clifton Road be reviewed and approved by ODOT prior to construction.

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- The new Park & Ride location proposal does not alter ODOT's decision on requiring a left turn lane on US30 at Clifton Road or the Radii improvements..

SA1-166

Due to public safety and operational concerns, ODOT recommends inclusion of the following as a condition of approval: All improvements on U.S. Highway 30 and on Clifton Road shall be completed before any permits will be issued allowing construction at the terminal site which would result in increase traffic at the intersection of Clifton Road. (ODOT, Region 2)

Sec 4.9 Cultural Resources (p. 4-357 – 4-457)

SA1-167

Geologic hazards. The Wauna slide feature and associated Clatsop crest is a very large deep seated feature (portions of which exhibit active slopes) that maybe should be mentioned here (it is mentioned in other sections) (ODF)

Section 4.11.2 Cryogenic Design and Technical Review and Staff Recommended Mitigation # 93 (p. 5-33-5-340)

SA1-168

Reporting Events. All incidents (minor or otherwise) at LNG facilities in Oregon require the Oregon Department of Energy (ODOE) to respond by providing initial notifications to the Governor's office and other response organizations as appropriate. FERC Staff Recommended Mitigation #93 does not require the state be notified immediately of all non-scheduled events at Bradwood Landing.

FERC should revise the DEIS to include language about including the notification of the Oregon Department of Energy immediately of all non-scheduled events at Bradwood Landing in Staff Recommendation Mitigation #93.

Recommended Condition Language - As a condition of the permit, Northern Star will immediately notify the Oregon Department of Energy of all non-scheduled events at Bradwood Landing (Staff Recommendation Mitigation #93). (ODOE)
ODOE

Section 4.11.5.5, Requirements for LNG Carrier Operation and FERC Staff Recommended Mitigation #87 (p. 5-32)

SA1-169

Implement Measures as Outlined in the WSR. A major flaw in the U.S. Coast Guard's (USCG) Waterway Suitability Assessment (WSA) process was that the WSA Validation Committee failed to include members from the cities of Knappa, Astoria, Warrenton, and Clatsop County. Without representation from the host county and local fire and law enforcement officials from the affected communities, it is difficult to adequately assess safety and security issues in this region. Missing is critical safety and security input from local fire and law enforcement experts giving credibility to the USCG WSA process and the final recommendations to FERC in the Waterway Suitability Report.

SA1-170

FERC should require USCG to reconvene a new WSA Validation Committee for the proposed Bradwood Landing Import Terminal with the appropriate local, county, and state emergency response officials to review and discuss appropriate safety and security measures as a result of the new modeling completed for the larger (260,000 cm) LNG vessels. We expect the three zones of concern would likely be expanded for the larger vessels. This could have significant impacts for the city of Astoria. Reconvening the USCG WSA in light of this new information is both timely and protects the integrity of the WSA process.

Recommended Condition Language - As a condition of the permit, USCG will reconvene a new WSA Validation Committee for the proposed Bradwood Landing Import Terminal with

SA1-166

See our response to comment SA1-165. We have included a recommendation that NorthernStar file a final transportation plan, formulated in consultation with Clatsop County and ODOT, that pertains to proposed modifications to Highway 30 and Clifton Road.

SA1-167

We have not added a discussion of the Wauna slide feature and the associated Clatsop Crest to section 4.9. At this time, no cultural resources related to those geological features have been identified within the APE. If, during the course of future investigations for this project, cultural resources are found at those geological features, the FERC would assess their eligibility for nomination to the NRHP, and, if any of the sites are eligible, would consult with the appropriate parties about the resolution of adverse effects. As discussed in section 4.9.2, NorthernStar would implement the measures in its Discovery Plan if any previously unidentified cultural resources are encountered during construction.

SA1-168

If authorized, NorthernStar would have to comply with 49 CFR 193. Section 193.2509(b)(2) requires NorthernStar to have procedures for dealing with an emergency which includes notification of local officials.

SA1-169

The WSA Validation Committee members included appropriate stakeholders that were selected based on their technical expertise. There is no requirement for local government representatives and in fact, including local government units might constitute a conflict of interest. Input from local fire and law enforcement experts was obtained during the WSA process through other measures.

SA1-170

The WSA for the Bradwood Landing Project took into account larger LNG vessels. We recommend in section 4.11.5.5 that NorthernStar annually review and update their WSA to reflect changing conditions at which time the Coast Guard would review and validate.

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SA1-170 cont'd the appropriate local, county, and state emergency response officials to review and discuss appropriate safety and security measures as a result of the new modeling completed for the larger (260,000 cm) LNG vessels.

Northern Star will revise the 38 miles transit maps for the three zones of concern to include an increase based on modeling results. Northern Star will provide an updated list of safety and security resource commitments for review and discussion by the WSA Validation Committee.

Northern Star will implement measures as outlined in the revised WSR. (ODOE)

Section 4.11.6 Emergency Response and Evacuation Planning and FERC Staff Recommended Mitigation #62 (p. 5-29 to 5-30)

SA1-171 Bradwood Emergency Response Plan. A major flaw in the draft emergency response plan (ERP) for the proposed Bradwood Landing LNG terminal is that it assumes critical emergency response assets are already committed, in place, and approved by state and local emergency response organizations. Without Northern Star's commitment to provide this region the necessary resources, the state and the Federal Energy Regulatory Commission (FERC) are unable to conduct a thorough evaluation of Bradwood's draft ERP to ensure the plan is adequate and can be effectively implemented to protect the health and safety of Oregonians in the event of an LNG mishap at Bradwood. Specific problems include:

➤ 1 - Local emergency responders currently lack the resources to launch a timely and effective response to a Bradwood Landing emergency. Significant portions of the draft Bradwood ERP cannot currently be implemented, due to lack of resources and insufficient commitments from Northern Star. This includes the incident command structure and the fire response portions of the draft Bradwood ERP.

FERC should require Northern Star to provide fire resources to first responders that meet state and National Fire Protection Association (NFPA) standards for a four-minute response to a 1st Alarm Fire at an industrial facility. In addition, FERC should acknowledge Northern Star's commitment to provide an onsite fire brigade, which will supplement, but not replace or offset, the offsite response. Oregon expects that the fire brigade would operate consistent with NFPA standards.

Recommended Condition Language - As a condition of the permit, Northern Star will meet state and NFPA standards for response to an industrial facility fire. This includes providing adequate fire resources to ensure a four-minute response to a 1st Alarm Fire for an industrial facility as shown in Table 7.2.1.

Table 7.2.1 - Required Resources for a "Medium-Hazard Occupancies" Response. This includes apartments, offices, mercantile and industrial occupancies not normally requiring extensive rescue or fire-fighting forces.

- At least 3 pumpers
- 1 ladder truck (or combination apparatus with equivalent capabilities)
- Other specialized apparatus as may be needed or available
- No fewer than 16 fire fighters, 1 chief officer, 1 safety officer, and a Rapid Intervention Team (4 - 5 fire fighters on standby at event scene).

SA1-171 Development and finalization of an ERP and Cost Sharing Plan are not required prior to completion of the final EIS. However, NorthernStar has developed these plans and they are currently undergoing review. See response to SA1-21

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Note: Refer to Volume 1 - NFPA Handbook, 19th Edition, Chapter 2, Section 7, Organizing for Fire and Rescue Services

Northern Star will work with state and local emergency response organizations to determine the appropriate location and facility design for the fire station and placement of personnel and equipment resources. Upon commencement of this work, Northern Star will provide a comprehensive resource list of fire resources and placement with state and local signature approval with the draft Bradwood ERP to be submitted to FERC for final review.

2 - While the U.S. Coast Guard has broad authority over the waterways, it lacks resources to respond to LNG vessel fires traveling the 38 mile channel to the Bradwood Landing Import Terminal. The Coast Guard issued its Waterway Suitability Report approving LNG vessel transit for Bradwood Landing without resolving this critical issue leaving Oregon citizens along the 38 miles channel vulnerable to potential vessel mishaps. See "Concern 3" for details concerning the Coast Guard's Waterway Suitability Assessment process.

In addition, Northern Star's draft Bradwood ERP fails to address the issue adequately. In the draft ERP, Northern Star proposes a three tiered response to in-transit fire fighting.

Tier 1: Local Fire Agencies - Local fire agencies are to protect citizens and waterfront property from vessel fire only.

Concern - Stretched resources to protect citizens and waterfront property along the 38 mile channel and no ability to support shipboard fires.

Tier 2: Maritime Fire & Safety Association (MFSA) - The MFSA has 24 members made up of public and private companies including fire agencies, ports, and private companies along the Lower Columbia and Willamette Rivers. The purpose is to set forth a comprehensive system which ensures fast, well-coordinated and effective response to ship fire incidents in the Lower Columbia region.

Concern - MFSA is not a viable option for Bradwood Landing's proposed Tier 2 response to shipboard fires. In this region, any available MFSA resources would be exhausted in the Tier 1 response because fire resources are so limited. Many local fire agencies also choose not to be a MFSA member. Only members can benefit from MFSA resources both in personnel and equipment when available. MFSA member agencies can only respond to shipboard fires that are docked at a port. It is generally agreed that in this region that it would be unlikely for any port to allow a burning vessel to approach their docks.

It is also important to recognize that MFSA resources belong to the respective member fire agencies. This means any resources Northern Star provides to the MFSA cannot be dedicated to Bradwood Landing emergencies alone. Also, response and support from MFSA members is optional. Both fire fighters and equipment may be busy elsewhere and unavailable when needed. As a result, the MFSA is not a reliable system to support Bradwood Landing's Tier 2 response.

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Tier 3: Contractors Companies - Northern Star proposes contacting with private agencies out of Portland to provide the Tier 3 response to shipboard fires in the channel.

Concern - Significant delay in response.

FERC should require Northern Star to develop a shipboard fire response plan that can actually be implemented in the region for review and approval by the Coast Guard, state, and local agencies. This includes requiring Northern Star to provide the necessary resources to implement the plan.

Recommended Condition Language - As a condition of the permit, Northern Star will work with the U.S. Coast Guard, state, and local emergency response agencies to develop a detailed response plan to effectively address ship board fires along the 38 mile channel. This includes re-considering Tiers 1, 2, and 3 to ensure adequate resources are committed and dedicated for response to Bradwood Landing emergencies only. Upon commencement of this work, Northern Star will provide a comprehensive resource list for response to shipboard fires with Coast Guard, state and local signature approval with the draft Bradwood ERP to be submitted to FERC for final review.

- 3 - The draft Bradwood ERP fails to address response actions for fighting forest and brush fires as a result of a facility emergency. The proposed site is surrounded by forest timber. Without a detailed plan to identify possible scenarios and proposed response actions and coordination to fight such a blaze, the state and FERC are not able to determine whether the region has adequate resources to contain a forest or brush fire as a result of a Bradwood mishap. Additional fire resources may be needed in addition to the resources required for response to an industrial facility fire discussed in problem 1.

FERC should require Northern Star to work with state and local emergency response organizations to develop a detailed draft plan in response forest and brush fires as a result of a Bradwood Landing emergency. This will allow state and local emergency responders to assess whether additional fire resources are needed in response to forest and brush fires.

Recommended Condition Language - As a condition of the permit, Northern Star will provide a detailed draft plan for response to forest and brush fires as a result of a Bradwood Landing emergency for state and local review and approval. This includes information on likely scenarios, response actions, and resources needed to implement response actions. Upon commencement of this work, Northern Star will provide a comprehensive resource list for response to forest and brush fires with state and local signature approval with the draft Bradwood ERP to be submitted to FERC for final review.

See also Oregon Department of Forestry (ODF) comments Section 4.8.3.6, Emergency Services and Section 2.8.2.2, Emergency Response Plan. ODF has oversight for rural fire protection districts and responds to forest and brush fires on private, rural, and state owned lands.

- 4 - While Northern Star has provided verbal commitment to provide a public warning system, no detailed description or proposal has been submitted to the state and local emergency response organizations for review and approval. Without a proposed plan for a

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public warning system in the region, it is impossible for the state and FERC to determine whether the draft Bradwood Landing ERP can be implemented effectively to provide timely notifications to Oregonians living, recreating, and working near Bradwood Landing or along the 38 mile transit route in the event of an LNG incident.

FERC should require Northern Star to provide a draft detailed plan for a public warning system for the region. This will ensure that FERC and the state have adequate information to evaluate the effectiveness of the procedures for alerting and notifying the public of an LNG incident in the draft Bradwood Landing ERP.

Recommended Condition Language - As a condition of the permit, Northern Star will provide a public warning system for the region that includes the following alert and notifications systems, but is not limited to:

- Reverse 911 (24-Port) System for Clatsop County - The system will include the following capabilities: high volume calling; compatible with major mapping systems; E911 data ready; multiple devices (recorded voice messages, text messages to wireless receivers, and digital pagers); geo-dimensional calling; full networking capabilities; off-site back-up notification; remote launching capability; and other capabilities as appropriate.
- Sirens - Outdoor siren system throughout the entire 38 miles transit route covering all three zones of concern up to the Bradwood Landing Terminal. The system will include the following capabilities: multiple high intensity warning signals; live and digital voice messaging with flat frequency response from 200 - 2000 Hz for clear voice reproduction; 360-degree coverage with no sound variation in the horizontal plane (106 to 125 dBc at 100ft/30m); continued emergency operation regardless of primary power outages, and other capabilities as appropriate. Northern Star will include a map of the proposed number and locations of sirens showing the coverage area of each proposed siren for state and local review and approval.
- Reader Boards - Reader boards located along Highway 101 and Highway 30 in Clatsop County to provide event information, direct traffic, and facilitate evacuations. Northern Star will include a map of the proposed number and locations of reader boards for state and county approval. Reader board specifications must be consistent with the Oregon Department of Transportation reader boards located throughout the state.

Upon commencement of this work, Northern Star will provide a comprehensive resource list for a public warning system with state and local signature approval with the draft Bradwood ERP to be submitted to FERC for final review.

5 - While Northern Star has provided a verbal commitment to provide a remote gas detection system for the region, no plans have been submitted for state and local review and approval. Without a proposed plan for offsite gas detection, the state and FERC are unable to determine whether the draft Bradwood Landing ERP can effectively warn emergency responders of an LNG release in high risk and populated areas along the 38 mile transit route.

FERC should require Northern Star to provide a draft detailed plan for a remote gas detection system for the region. This will ensure that FERC and the state have adequate information to

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evaluate the effectiveness of the remote gas detection system to detect LNG concentrations threatening high risk or populated areas in the draft Bradwood Landing ERP.

Recommended Condition Language - As a condition of the permit, Northern Star will provide a draft detailed plan for a remote gas detection system for the region. The proposed remote gas detection system plan will include information about the following systems, but is not limited to:

- Fixed Gas Detectors - Fixed gas detectors will be provided in all high risk and high population areas along the entire 38 mile transit route in Clatsop County. Fixed gas detector capabilities will include remote wireless operations and the ability to provide readouts in multiple locations. Northern Star will include a map of the proposed fixed gas detector locations along the 38 mile transit route for state and local review and approval. Fixed gas detector locations include, but are not limited to:

Oregon:

Hammond, Tansy Point, Warrenton, Astoria (3 detectors), Tongue Point, Settler Point, Long Island, Knappa, and Puget Island (3 detectors).

Washington:

Ruby Island, Ilwaco, (2 detectors total - 1 at airport), Chinook, Elliot Point, Middle Valley, and Cathlamet.

- Portable Gas Detectors - Northern Star will provide three layers of portable gas detectors.
1) All emergency responder vehicles in the region will be provided a methane gas detector. 2) Methane gas and oxygen meters will be assigned to all fire trucks, and 3) Multi-meters will be provided to hazardous materials responders.

Northern Star will include a list with a breakdown of all proposed fixed and portable gas detectors and designated locations for the equipment for state and local review. Upon commencement of this work, Northern Star will provide a comprehensive resource list for a remote gas detection system with state and local signature approval with the draft Bradwood ERP to be submitted to FERC for final review.

- 6 - While Northern Star has provided a verbal commitment to develop an interoperable communications system, no plans have been submitted for state and local review and approval. Without a proposed plan for emergency response communications, the state and FERC are unable to determine whether the draft Bradwood ERP is adequate and can be effectively implemented to ensure interoperable communications across jurisdictions and between all responding agencies throughout the duration of an LNG emergency at the facility or along the 38 mile transit route.

FERC should require Northern Star to provide a draft detailed plan for an interoperable communications system for the region. This will ensure that FERC and the state have adequate information to evaluate the effectiveness of the communications plan in the draft Bradwood Landing ERP.

Recommended Condition Language - As a condition of the permit, Northern Star will provide a draft detailed plan for an interoperable communications system for the region. The

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proposed interoperable communications system plan will include information about the following systems, but is not limited to:

- Repeaters and Cell Towers - Specify the number of repeaters and cell towers needed to ensure uninterrupted cell and radio coverage along the 38 miles transit route to the Bradwood Landing facility, covering all three zones of concern. Include a map of the proposed repeater and cell tower locations showing the coverage area of each proposed repeater and cell tower location for state and local review and approval.
- Incident Command - Specify the number and locations of intrinsically safe handheld radios to be provided to fire, law enforcement, and other responders to a Bradwood Landing mishap. Include information on FCC licensing requirements and proposed frequencies, antenna system, base station console, and other pertinent information.
- Emergency Operations Centers - Multiple federal, state, and local emergency operations centers (EOCs) may be activated in response to a Bradwood Landing mishap. Emergency Operations Centers support the incident command. Specify the primary and redundant backup communications systems to be used to ensure uninterrupted communications between Bradwood Landing and the federal, state, and local EOCs. This includes, but is not limited to a dedicated phone system, video teleconference system, satellite phones, Internet, e-mail, and other technology as appropriate.

Upon commencement of this work, Northern Star will provide a comprehensive resource list for an interoperable communications system with state and local signature approval with the draft Bradwood ERP to be submitted to FERC for final review.

- 7 - The Clatsop County EOC is currently located at 355 Seventh Street in Astoria at the Clatsop County Sheriff's Office. The Clatsop County EOC is within zone 1, the highest impact zone. The potential exists that an LNG vessel mishap while passing through the Astoria waterfront could directly impact county response operations from the EOC. In addition, the current Clatsop County EOC is neither large enough nor equipped to support affected federal, state, and local emergency organizations reporting to Clatsop County to respond collectively to an LNG emergency at Bradwood. Northern Star has made no commitment to relocate or expand, modify and equip the existing Clatsop County EOC to support an LNG response to Bradwood Landing.

FERC should require Northern Star to work with the Clatsop County Sheriff's Office to identify an alternate EOC outside of the three zones of concern. This includes requiring Northern Star to equip the pre-designated alternate EOC with the same capabilities as the primary Clatsop County EOC. This will ensure a seamless transition to the alternate EOC if a LNG mishap prevents the use of the primary Clatsop County EOC. FERC should also require Northern Star to expand the existing primary Clatsop County EOC to ensure sufficient work space for affected federal, state, and local emergency responders as well as Bradwood Landing personnel reporting to Clatsop County to respond collectively to an LNG emergency at Bradwood Landing.

Recommended Condition Language - Alternate Clatsop County EOC - As a condition of the permit, Northern Star will work with the Clatsop County Sheriff's Office to identify a

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location for an alternate EOC outside of the three zones of concern. Northern Star will ensure the pre-designated alternate EOC has sufficient work space to accommodate affected federal, state, and local emergency responders reporting to Clatsop County to respond collectively to an LNG emergency at Bradwood Landing. This includes equipping the pre-designated alternate EOC with the same capabilities as the primary Clatsop County EOC to ensure a seamless transition to the alternate EOC if a LNG mishap prevents the use of the primary Clatsop County EOC. Pre-designating and equipping an alternate EOC ensures Clatsop County can maintain direction and control of county protective actions and decisions, providing a sustained response throughout the duration of a Bradwood event.

Primary Clatsop County EOC - Also as a condition of the permit, Northern Star will expand, modify, and equip the existing Clatsop County EOC located at 355 Seventh Street in Astoria at the Clatsop County Sheriff's Office to ensure sufficient work space to accommodate affected federal, state, and local emergency responders reporting to Clatsop County to respond collectively to an LNG emergency at Bradwood Landing.

Northern Star will work with the Clatsop County Sheriff's Office to determine the appropriate location, design and layout, and equipping of the primary and alternate Clatsop County EOCs for response to a Bradwood emergency. Upon commencement of this work, Northern Star will provide a comprehensive resource list for both facilities with state and local signature approval with the draft Bradwood ERP to be submitted to FERC for final review.

➤ 8 - Clatsop County does not have a pre-designated Joint Information Center (JIC) to coordinate and release event information to the news media and the public in the event of a Bradwood Landing emergency. The purpose of the JIC is to ensure Bradwood and all federal, state, and local agencies responding to the event provide a consistent message to news media and the public. The JIC will be the location for news conferences; coordinating news releases from responding federal, state, and local jurisdictions; addressing public and media inquiries; and other public information activities as appropriate. Failure to have a central clearing house to manage the receipt and dissemination of emergency information may result in misinformation, inconsistent information, and unconfirmed information getting out to the public and news media creating public panic, confusion, and mistrust.

FERC should require Northern Star to provide a Joint Information Center in Clatsop County outside the three zones of concern. Providing a JIC ensures terminal operators and all federal, state, and local response agencies impacted by a Bradwood Landing emergency can provide a consistent message to the news media and public.

Recommended Condition Language - As a condition of the permit, Northern Star will designate and equip a JIC in Clatsop County outside of the three zones of concern. The JIC will provide adequate work space and access to communications and information systems to support public information officers from Bradwood as well as federal, state, and local public information officers responding to the event. The JIC will also be designed to accommodate news conferences and phone teams addressing public concerns.

Northern Star will work with state and local emergency response organizations to determine the appropriate location, design and layout, and equipping the facility for response to a

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Bradwood emergency. Upon commencement of this work, Northern Star will provide a comprehensive resource list for the Clatsop County JIC with state and local signature approval with the draft Bradwood ERP to be submitted to FERC for final review.

- 9 - While Northern Star has provided a verbal commitment to provide LNG training to first responders, county officials, and state officials in the region, no plans have been submitted for state and local review and approval. Without a proposed training plan, the state and locals are unable to determine whether Northern Star's training program is adequate for preparing this region's emergency responders and decision-makers for an LNG emergency at Bradwood.

FERC should require Northern Star to provide a draft detailed training plan for state and local review and approval. This will help state and local emergency response organizations determine whether Northern Star's training program is adequate for preparing this region for an LNG emergency at Bradwood.

Recommended Condition Language - As a condition of the permit, Northern Star will provide a draft detailed training plan designed to meet the specific needs of this region's first responders and decision-makers. This includes, but is not limited to:

- Construction of an LNG Fire Training Center in Clatsop County - It is likely more cost effective to build an LNG training facility locally and bring in instructors from Texas A & M or other accredited training institutions than to send fire fighters to training in Texas or elsewhere in the country. Northern Star will work with state and local emergency responders to determine location and facility design and layout.
- Type of training to include, but is not limited to: 1) Incident Command System; 2) facility security; 3) oil & hazmat spill response; 4) LNG for fire fighters, emergency responders, and law enforcement; 5) marine fire fighting; 6) general LNG training; 7) advanced LNG fire fighting; 8) hospital training; 9) tabletops, drill, and exercises and other training as appropriate.
- Schedule of training detailing the type of training, required training hours, and number of anticipated trainees from Bradwood Landing, state, and local agencies.

Northern Star will provide the detailed draft training plan for state and local review and approval. Northern Star will also provide this plan with state and local signature approval with the draft Bradwood ERP to be submitted to FERC for final review.

- 10 - Clatsop County does not have adequate personnel nor funding to develop and maintain the Clatsop County Emergency Response Plan or Annex for the Bradwood Landing Import Terminal. Northern Star has made no commitment to provide funding for a Clatsop County LNG Planner.

FERC should require Northern Star to provide the Clatsop County Sheriff's Office with funding for a County LNG Planner/Fire Response Coordinator. This will ensure Clatsop County can develop and maintain the county's emergency plan for Bradwood Landing.

Recommended Condition Language - As a condition of the permit, Northern Star will provide funding to the Clatsop County Sheriff's Office to hire a full-time County LNG

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Planner & Fire Response Coordinator. The County LNG Planner & Fire Response Coordinator will work with first responders to prepare for LNG vessel arrivals and departures, work with first responders, the state, and Northern Star to conduct plan review, coordinate training, exercises, public outreach, and perform other LNG emergency preparedness activities as appropriate.

- 11 - While Northern Star has discussed with hospital officials and local emergency responders regarding the region's capabilities to transport burn victims to Columbia Memorial Hospital, triage burn multiple victims, and airlift burn patients to the Oregon Burn Center at Legacy Memorial Hospital in Portland, no written commitment has been made and submitted to state and local officials for review and approval. Without a draft detailed plan to address burn victims, the state and FERC are unable to determine whether the region's medical services sector are sufficiently equipped, have the necessary resources, and are prepared to receive and treat burn victims from a Bradwood Landing mishap.

FERC should require Northern Star to provide a draft detailed plan for state and local review and approval. This will help state and local emergency response organizations determine whether the region has sufficient capabilities at Columbia Memorial Hospital to triage, provide treatment, and transport burn victims to a nearby burn center if needed.

Recommended Condition Language - As a condition of the permit, Northern Star will work with Columbia Memorial Hospital to draft a detailed draft plan to address burn victims as a result of a Bradwood emergency for state and local review and approval. The plan will be consistent with the capabilities outlined in the Burn Mass Casualty Plan for the Oregon Burn Center at Legacy Emanuel Hospital. Specifically, Northern Star will provide Columbia Memorial Hospital with the personnel and resources necessary to implement the Burn Mass Casualty Plan's 72 Hour Burn Plan - Care of Burn Patients in a Non-Burn Hospital. This includes, but is not limited to:

- Identifying resources and procedures necessary for treating burn victims if immediate transfer to a regional burn center is not feasible. This includes ongoing resuscitation and care.
- Identify medical supplies, pharmaceuticals, and equipment needed to support a triage station capable of treating 5 victims with severe burns. This includes pre-packed medical resources.
- Communications capabilities including 800 mhz trunked radio and web-based client/server applications to coordinate communications between the event scene and the Columbia Memorial Hospital and serve as the patient information tracking mechanism in events involving multiple burn victims.
- Staffing requirements for care of burn patients in a non-burn hospital.

Upon commencement of this work, Northern Star will provide a comprehensive resource list for Columbia Memorial Hospital with state and local signature approval with the draft Bradwood ERP to be submitted to FERC for final review. (ODOE)

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Section 4.11.6, and FERC Staff Recommended Mitigation #63 (p. 5-30)

SA1-172 **Bradwood Emergency Response Plan Cost Sharing Plan** While the site meets the national security requirements as a viable location for an LNG import terminal, like all rural communities, it lacks the basic safety and security infrastructure required to protect public health and safety in the event of an LNG emergency.

FERC should require Northern Star to pay all project specific safety, security, and emergency preparedness and management costs imposed on the state and local agencies as a result of the proposed Bradwood Landing Import Terminal. This will ensure the state and local emergency response organizations have the ability to develop and maintain a level of readiness to ensure the protection of public health and safety in the event of a Bradwood emergency.

Recommended Condition Language - As a condition of the permit, Northern Star will cover all project specific safety, security, and emergency preparedness and management costs imposed on the state and local emergency response organizations as a result of the proposed Bradwood Landing Import Terminal. (ODOE)

Section 4.12 Cumulative Impacts

SA1-173 1. The section is exceedingly short and dismissive of impacts to water quality. The Columbia River is classified as "water quality limited" under Section 303(d) of the Clean Water Act, for the parameters of Temperature, DDE (DDT metabolite), Polychlorinated biphenyls (PCBs), and Arsenic. An EPA approved TMDL has been developed for Dioxin and Total Dissolved Gas parameters. Other parameters listed for potential concern include Cadmium, Copper, Iron, Lead, Mercury, Nickel, Silver, Tributyltin, Zinc, Aldrin, Alpha-BNC, Benzo(a)anthracene, Benzo(g, h, i)perylene, Bhc, Chlordane, Chrysene, Cyanide, DDD, DDT, Dieldrin; Endrin, Hexavalent Chromium, pH, Phenol, Polynuclear Aromatic Hydrocarbons (PAHs), Pyrene, and Radionuclides. This status requires particular attention so as not to allow exacerbation of listed parameters and further impairment of water quality. FERC and the applicant take the converse opinion in stating that because the water is already impaired, further cumulative impacts are not important. This is completely contrary to DEQ's mission (and TMDL development) and EPA's National Priority strategies, which limit actions that impair water quality and implement actions to reverse the impairments.

SA1-174 2. Cumulative effects to water quality are not adequately identified or analyzed. Although additional dredging is identified as a potentially significant cumulative effect, it is dismissed as not occurring. The timelines and duration of dredging that are identified are incorrect. For instance, channel deepening by the Corps will not be completed in the subject reach by 2007. Renewal of 5 year authorizations to continue the deepening are currently being considered by DEQ and the Washington Department of Ecology and total project duration or completion is not currently known. Multiple other dredging projects are permitted and considered for permit in the Columbia River estuary (from the Mouth to Bonneville Dam). These include Corps actions, sand/gravel mining operations, and port and marina maintenance dredging. Although some of these actions are considered minor, in total they are of significant amounts and the impacts are not well understood. The cumulative impacts of these actions need to be thoroughly evaluated and addressed in the EIS. (ODEQ)

SA1-172 See our response to comment SA1-21

SA1-173 We believe the analysis of cumulative impacts on water quality have been addressed adequately in section 4.12. Potential cumulative impacts on water quality are recognized, but not considered significant due to implementation of BMPs. In addition, NorthernStar has committed to providing an overall significant net benefit to the environment of the lower Columbia River ecosystem by implementation of its Compensatory Mitigation Plan and SEI. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.

SA1-174 Phase 3 of the COE's Columbia River Improvement Project is expected to be completed April 2008. Section 4.12 has been updated to reflect the updated COE schedule. The revised section also includes data about the proposed dredging for the Oregon LNG Project, which has not yet been authorized, and smaller maintenance dredging projects at the Port of Astoria, Port of Ilwaco, and at the mouth of the Skipanon River.

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Section 5.0 Conclusions and Recommendations

Section 5.1.8 Socioeconomics (p. 5-11)

- SA1-175 This project will bring in a new supply of natural gas to the region and country. This fact is not addressed in the EIS. The project will have connections to PGE production facilities at Port Westward and to Georgia Pacific Wauna Mill. These connections could prove valuable to those facilities over time as energy cost escalate. This is not mentioned in the EIS but may have significant long term positive impacts for GP Wauna Mill and Ratepayers served by PGE. This of course depends on the details of the contracts that will be executed by the companies involved.
- SA1-176 There is no needs assessment associated with this project. Knowing the impact of this new natural gas source on the regional energy situation would be helpful in determining if the project will benefit industries in the Pacific Northwest and specifically Oregon. Such an analysis would assist us greatly in developing a policy towards LNG terminals locating in the state.
- SA1-177 This project will increase the capacity of ship piloting and tug capacity on the river to the benefit of all shipping operations. New bar and river pilots and tugboats will be added as a result of this project.
- Based on current tax rates, property tax revenue for Clatsop County and special districts would increase by 92.4 percent upon completion of the LNG terminal. This is a very positive affect locally.
- The project will generate increased rail traffic during construction and improve a portion of the rail through a required realignment at the project site. Currently, there are few customers using rail services west of Clatskanie.
- The project will generate 50 FTEs and will operate 24/7. Average salary at the terminal is estimated at \$60,000/yr. based on prevailing wages. The project will also require an additional 15 FTEs for security.
- Construction Jobs will average 331 per year over three years with an expected peak of 506. The company has committed to hiring at prevailing wages for all construction jobs.
- The Company has already aligned itself with the community college(s) to provide training for certain construction and permanent jobs at the site. They are currently subsidizing a welding class at Clatsop Community College directed at non traditional workforce participants.
- The method used to measure economic impacts using IMPLAN appears to be reasonable and the conclusions also seem realistic.
- The area has been able to absorb the impact of having large construction projects being built in the rural region. Projects such as PGE Port Westward and Cascade Grain along with Lines 6 and

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SA1-175 Please read sections 1.1 and 2.1.4 of the EIS.

SA1-176 We discuss the need for additional sources of natural gas in section 1.0.

SA1-177 Currently there are no customers and no rail traffic on the PWRR west of Clatskanie.

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SA1-177
cont'd 7 TAD paper towel machines at Georgia Pacific will be completed before the construction starts at Bradwood Landing. The workforce will be available for construction. (ODECD)

Section 5.1.3 Water Resources (p. 5-4, para. 2)

SA1-178 "NMFS" should be changed to "NMFS".(ODFW)

Section 5.1.3, Water Resources (p. 5-3)

SA1-179 The water uses mentioned are not wholly authorized at this time. References to the status of applications with OWRD are not accurate. Limited Licenses for the temporary use of water have been issued for hydrostatic testing of the tanks and pipeline, and the dredging of the turning basin. These limited licenses do not allow use of water for other construction purposes. Applications for permits for permanent use of water have been submitted. These applications propose to use water for fire protection and industrial manufacturing. These permit applications have yet to be authorized. Limited license short term authorizations have been issued, while permanent permits have been applied for but not granted at this time. Construction water authorization has not been obtained at this time.

A limited License application for construction water would need to be submitted or wait to see if permits are granted and use industrial manufacturing water under a permit. In any event, authorization to use water will be required before construction may begin. This should take place before any FERC Certification. (OWRD)

Section 5.0, 5.1.12 Alternatives

SA1-180 Conclusions related to alternatives are not supported by adequate criteria, relevant data and information, a rigorous analysis and a clear explanation about why the evidence and information supports the conclusion. Alternatives are dismissed or not considered based on conclusions that do not adequately address basic need and effects issues. All of the proposed projects should be carefully analyzed against a common set of criteria to determine the best project. This analysis should consider the need for the terminal and pipeline infrastructure based on demonstrated long term planning and an analysis of which project can most economically and efficiently meet regional/national needs with the least long term environmental and social consequences. (DLCD/OCMP)

COMMENTS ON APPENDICES

Appendix B

SA1-181 Wetland Delineation for Pipeline Route. Sheet 1 of 11, Appendix B: Is "minor route variation included in delineation for the pipeline?"

Prior to any construction activity, an on-site wetland delineation, and delineation concurrence by DSL, of entire approved pipeline route is needed. (DSL)

Appendix G and DEIS p. 4-151, last paragraphs:

SA1-182 1. Compensatory Wetlands Mitigation on Svensen Island. Lower Svensen Island Wetland Delineation and use within the Compensatory Wetlands Mitigation plan. It is not clear if this area is proposed for enhancement credit.

SA1-178 Section 5.1.3 has been revised to correct this typographic error.

SA1-179 Issuance of the EIS does not imply that pending permit applications are approved. See also our responses to comments PM6-94, SA1-31, and LA12-3.

SA1-180 The intent of the alternatives analysis is not to compare the proposed LNG projects in the region and pick the "best" project. The FERC's evaluation criteria for the alternatives analysis is described in the introduction to section 3.1.

SA1-181 The final proposed route has been completely delineated for wetlands, including minor route variations.

SA1-182 See our response to comment FA3-3.

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SA1-182 cont'd If Lower Svensen Island is proposed as part of Compensatory Wetlands Mitigation site, a wetland delineation may be needed. The wetland delineation for Middle Svensen Island is currently being reviewed by DSL. (DSL)

SA1-183 2. The Compensatory Wetlands Mitigation ratios listed are not in accordance with the Estuarine Mitigation rules. See OAR 141-085-0256.
Additional detail on the placement of fill material for berm construction around existing home site. If this fill material is within wetlands, the total acreage needs to be accounted for and included as part of Compensatory Wetlands Mitigation. (DEIS, p. 4-152)
It is not clear whether the culverts, tidegate and other removal/fill activity being placed within the Compensatory Wetlands Mitigation site are accounted for as fill and removal activity on the JPA.
At the end of monitoring period for the Compensatory Wetlands Mitigation site, a wetland delineation will be required. This will be at least a 10-year monitoring period with annual reports through year 5. Temporary impact monitoring reports for 5 years.
The permittee will be responsible for submitting yearly monitoring reports on the Compensatory Mitigation and Compensatory Wetlands Mitigation plans.
Conservation easement (or other protection instrument) for the Compensatory Mitigation / Compensatory Wetlands Mitigation sites will need to be in place prior to any construction activity within wetlands or waters. Also, long-term responsible party needs to be identified and a financial security instrument is needed prior to authorization (p.72) (DSL)

SA1-184 3. Compensatory Wetlands Mitigation Plan, p. 13, also page 18-20 and 67 of Compensatory Wetlands Mitigation plan:
Terminal and Pipeline Temporary Impacts. The DEIS states that there are 15 acres of temporary impact at terminal and 98 acres with the pipeline, and p. 13 of the Compensatory Wetlands Mitigation plan states that terminal has up to 1.5 acres and pipeline has up to 75.64 acre of temporary impact. Also, the permanent impacts are not consistent within the DEIS (12.9) and Compensatory Wetlands Mitigation plan (13.7).
Prior to construction activity, the wetland mitigation site will need to be constructed either prior to or concurrent with the wetland/waters impacts authorized within the Removal-Fill Permit. (DSL)

Appendix G, Revised Preliminary Design Draft Mitigation Plan Feb 07¹

SA1-185 General Comments
The terms "weeds" and "noxious weeds" are sometimes used throughout the mitigation plan. Suggest changing the wording to "non-native invasive vegetation" or, at least be consistent with terminology throughout the plan.

The vegetation descriptions include several non-native invasive plant species (e.g., reed canary grass, yellow flag iris, Himalayan blackberry). Some of these species are acknowledged as non-native invasive species, but others are not. ODFW suggests providing clarification identifying all non-native invasive species.

¹ These comments on Appendix G of the mitigation plan were provided by the Oregon Department of Fish and Wildlife.

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SA1-183 See our response to comment FA2-10.

SA1-184 See our response to FA3-1.

SA1-185 See our response to comment FA2-10.

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cont'd

Page 13, Section 2.1 - Oregon Wetland Mitigation

General Comment – The focus of the mitigation discussion is on aquatic resource values for fish. Discussion on wildlife issues is generally weak. Wetland/waterway habitats also provide habitat values for wildlife, but these are not well recognized. Later in Section 3.0 (Wildlife Mitigation) there is a statement about how mitigation for wildlife habitat losses caused by impacts to wetland/waterway habitats are addressed in Section 2.1, but ODFW's Fish and Wildlife Habitat Mitigation Policy does not appear to be specifically addressed in Section 2.1; the focus is on the Army Corps of Engineers/Oregon Department of State Lands mitigation requirements.

Page 14, Section 2.1.2

Mitigation goals and objectives should apply not only to "endangered species", and it is unclear how this term is defined in this context. Mitigation should apply to state and federal threatened and endangered species as well as to State Sensitive Species and other species of concern.

Page 24, first paragraph after bullets

This paragraph provides an example of how wildlife habitat values are not thoroughly addressed in this Section 2.1. In the sentence about presence of large wood debris around the perimeter of the log pond, there is no mention that the logs also provide wildlife value/benefits.

Page 26, Section G

This section provides an example where one species (Scott's broom) is recognized as a non-native invasive species and where others (yellow flag iris, purple loosestrife, and reed canarygrass) are not.

Page 28, Section I Existing Fish and Wildlife

This section needs to clarify that nutria is a non-native, invasive species. The impacted wetland also likely provides habitat for riparian songbirds and various small mammals (e.g., mink).

Page 40, Section 2.1.4 Site Selection

There is no mention of restoration of wildlife habitat or ODFW's Fish and Wildlife Habitat Mitigation Policy as being even minor driving factors in mitigation site selection.

Page 49, Section G, first paragraph, last sentence

What about provision of wildlife habitat? Wildlife habitat is a function in the Hydrogeomorphic Assessment (HGM) and Section 3.0 states that mitigation for wildlife-related wetland impacts is addressed in Section 2.0.

Page 53, third bullet

What will be done with the roots and stumps that would be removed in areas of the pipe trench? ODFW suggests using this material on-site or on mitigation sites for wildlife habitat enhancement (e.g., brush piles for wildlife cover).

Page 59, Herbivore Control

ODFW suggests trapping/removal of nutria to help control herbivory.

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cont'd

Page 59, Section 2.1.7

General Comment: Planned restoration activities will also benefit wildlife, but this is not thoroughly addressed. For example, this section could discuss how restored off-channel habitat, large wood, and restored tidal influence will benefit wildlife (e.g., waterfowl, shore birds, secretive marsh birds, etc.).

Pages 60, 105 Large wood features

- (1) The large woody debris (LWD) discussion lacks information/detail associated with the six proposed structures. Figures are referenced but not provided as part of the document. The document should at least contain a "typical" structure detail listing numbers of key large wood pieces, species of wood (conifer), size of key pieces, and general complex design. There needs to be at least some minimum key size and composition criteria for evaluation.
- (2) The mitigation plan calls for structures to be placed in tidal channels. Consideration should be given to placing some additional structure(s) on the flats that would be used by fish during high tide inundation periods. Productivity of the flats would likely be increased with addition of LWD in these areas also. Some of the large wood slated for removal from the terminal site may be suitable for these additional structures, if not being otherwise used.

Page 61, Wildlife Habitat Feature Creation

This section does not adequately describe how lost wildlife habitat functions will be restored.

Page 68, Section L Construction Specifications

This section should include considerations of adjacent wildlife habitat values e.g., amend this section to read "...construction of the mitigation site to ensure that the site is built without impacting adjacent fish *and* wildlife habitat..."

Page 68, Section 2.1.8

Goals 1 and 2 state that native seed would be applied to bare soil, yet Page 58 states that Re-Green would be used for short-term erosion control. Please clarify and make this consistent.

Page 83, Table 3.1

Agriculture/pasture/poplar farm habitat is lumped together and value categorized as ODFW Habitat Category 6 (lowest value designating facilities/structures that are non-restorable). ODFW disagrees with this habitat categorization and recommends that the agriculture/pasture lands be categorized as category 5 and the poplar farms be categorized as category 4.

Page 84, Table 3.1

This section includes a stream as a habitat category 6. Even if this is an intermittent stream or a ditch, it would not be categorized as a category 6. ODFW would be open to discussing this with the applicant as to the stream's appropriate habitat categorization.

Page 85, Second paragraph

This paragraph says: "Mitigation for wetland impacts is addressed in Section 2.0, and mitigation for fish habitat impacts is addressed in Section 4.0 of this mitigation plan." Comment: It is not clear where wetland mitigation, in terms of ODFW's Fish and Wildlife Habitat Mitigation Policy is addressed in Section 2.0. If it assumed that other mitigation methods (e.g., Oregon

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cont'd

Department of State Lands (DSL) wetland mitigation requirement) fulfills ODFW's Fish and Wildlife Habitat Mitigation Policy then clarify this.

Page 87, second paragraph

This paragraph acknowledges that even-aged stands of poplar do indeed provide some wildlife value, including cover habitat for Columbian white-tailed deer (CWTD). This statement supports the change of this habitat to a habitat category 4 as mentioned in the comment above for Page 83.

Page 95, Section 3.9.2 Maintenance, Weed Control

ODFW recommends addressing the timing of when weed control would occur. This should be conducted outside of bird nesting periods.

Page 99 – Avoidance and Minimization Measures for CWTD

Maintenance vegetation control between mid-July to October may be okay for the deer, but not for nesting birds. See comment for page 95 above.

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Estimated average monthly boat count by fishery in the Columbia River downstream of Bradwood area.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
Columbia River													
Sport Sturgeon ^{cd}		25	50	150	3,090	8,320	3,080	352	32				15,109
Sport Salmon (Buoy 10) ^{ee}									6,914				21,894
Spring/Summer Chinook & Shd ^a	0	50	3,300	7,300	425	430	400	450	400	35			12,780
Sport Bottomfish ^{af}		50	150	50					80				360
Sport Crabbing ^{ag}	500	30	15	10	50	150	200	450	450	850	650	700	4,055
Commercial Gilnet ^{ah}	37	70	206	0	455	137	308	935	445	665	0	20	3,334
Commercial Crabbing ^{ah}	125	90										400	675
Ocean Sport Salmon ^{ai}					8	40	744	2,833	569				3,999
Ocean Sport Halibut/Bottomfish ^{aj}					58	35	28	10					128
Ocean Sport Tuna ^{ak}					10	4	9	14	12				40
Ocean Crab ^{al}													0
Ocean Comm. Crab ^{am}	862	768			242	127	61	32				464	3,368
Ocean Comm. Shrimp ^{an}					86	74		64	66			45	439
Ocean Comm. Bottomfish ^{ao}	54	82	66	102	146	132	175	135	133	54	55		1,352
Ocean Comm. Salmon ^{ap}			6	4	105	4	23	42	25	7			256
Ocean Comm. Sardine ^{aq}								804	414		6		1,640
Ocean Comm. Tuna ^{ar}								124	82				327
Ocean Comm. Whiting ^{as}							218	50	2				
Total	1,638	1,176	4,240	8,063	4,661	9,797	5,828	20,935	9,614	1,859	710	1,641	68,766

^a Peak periods

^b Combined OR/WA data

^c Oregon only data. All combination trips are assigned to salmon effort (salmon+bottomfish, salmon+tuna, and salmon+halibut). May through Sept effort only

^d 2002-06 effort based on exit counts of boats that are then assigned to trip type based on interviews on a portion of the boats at the end of their trips.

^e Season open Jan 1-Apr 30 and mid-May thru harvest quota (around Jul 4).

^f Season open Aug 1 thru Dec 31. Main part of season is mid-Aug thru early-Sep.

^g Educated guess

^h 2006 data

ⁱ Based on commercial crabber estimate

^j 2004-06 creel data

^k 2002-2006 average of Troll Salmon Deliveries (should roughly equate to vessel bar crossings)

^l Ocean recreational crabbing is usually part of another targeted fishing trip, and would be included with other listed trip types.

^m 2002-2006 average of fish ticket deliveries

Red text indicates effort doubled to represent both seaward and return trip

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CERTIFICATE OF SERVICE AND MAILING

I hereby certify that I have this day served by electronic mail, and for those parties for which service is not specified at an electronic mail address, by U.S. mail, first class postage prepaid, the foregoing document on all parties listed on the official service list compiled on this proceeding.

Date: December 18, 2007.


Janet L. Prewitt, #85307
Assistant Attorney General

January 3, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 1st NE Rm 1A
Washington, DC 20426-0001

RE: Corrected Version of submittal Docket No. CP06-365-000

Dear Ms. Bose:

Thank you for the opportunity to provide input on the Draft Environmental Impact Statement (EIS) for the Bradwood Landing, LLC liquefied natural gas (LNG) import terminal and storage facility, and an associated natural gas send out pipeline.

Background

The facility would be located at the former mill town of Bradwood, Clatsop County, Oregon, located at River Mile (RM) 38 on the Columbia River.

Specific components of the facility include a one-berth marine facility capable of handling 125 LNG carrier ships per year; interconnecting facilities including piping, electrical, and control systems; two LNG storage tanks with a capacity of 160,000 cubic meters; vapor handling, re-gasification and send out systems; utilities and other support systems, and associated buildings and enclosures.

A 36-mile underground, high-pressure welded steel send out pipeline would extend from the storage facility. This pipeline is split evenly between Oregon and Washington – with approximately 18.9 miles of 36-inch-diameter pipeline in Clatsop and Columbia Counties, Oregon, and 17.4 miles of 30-inch-diameter pipeline in Cowlitz County, Washington. Northern Natural Gas would construct, manage and own the send out pipeline.

The LNG would arrive by large vessel, from overseas sources. The facility would receive and decompress the LNG, routing it through the pipeline to private recipients and to the Williams Pipeline, near Kelso, Washington. The facility would include a natural gas send out capacity of up to 1.3 billion cubic feet per day ("BCFD").

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Authority

This project involves different Divisions within the Department of Natural Resources (DNR). This letter reflects comments from the Aquatic Resources Division.

As the FERC may already be aware, DNR manages over 2.6 million acres of state-owned aquatic lands and attached resources, including bedlands, shorelands, tidelands, and harbor areas.

Resources located upon aquatic lands that DNR manages include aquatic plants, aquatic animals; and valuable materials and minerals.

DNR management authority derives from the state's constitution, law, and regulations.¹ As proprietary manager of state-owned aquatic lands, DNR has been directed to manage these lands "...for the benefit of the public..." in a manner that provides "...a balance of public benefits² for all citizens of the state..." that includes: "(1) Encouraging direct public use and access; (2) Fostering water-dependent uses³; (3) Ensuring environmental protection; and (4) Utilizing renewable resources" (Revised Code of Washington, 79.105.030).

As part of the obligation under RCW 79.105.030 to manage state-owned aquatic lands for the benefit of the public, aquatic resources are viewed as part of a larger complex system. Evaluations typically include assessments of potentially affected aquatic areas, adjacent uplands and the human impacts within those environments. Therefore, individual projects and requests are typically reviewed in this ecosystem context, rather than as isolated cases. The Aquatic Resources Division anticipates taking this approach with hydrokinetic project evaluations on state-owned aquatic land.

State-Managed Aquatic Lands Located Within the Project Area

Of the 17.4 miles of pipeline in Washington, a number of waterbodies will be crossed, and two are considered navigable and under state management by DNR: the Columbia River and the Cowlitz River. NorthernStar Energy, LLC would use horizontal directional drilling methods to cross both the Columbia River and the Cowlitz River.

SA2-1

DNR manages the bedlands and tidelands of the Columbia River where the proposed pipeline is to cross. In order to directional drill through the bedlands and lay pipeline in the Columbia River, the company will need to survey the location and sign a Use Authorization with DNR.

The section of the Cowlitz River where the pipeline would cross is also under DNR management. The crossing is just south of an actively meandering portion of the riverbed. DNR has requested that the company move the original pipeline crossing south, away from this portion of the river.

¹ Articles of the Constitution (XV, XVII, XXVII), Revised Code of Washington (RCW) 79.02, 79.10, 79.14 and 79.105 to 79.145, Washington Administrative Code (WAC) 332-30.

² WAC 332-30-106 defines public benefit as "...that all of the citizens of the state may derive a direct benefit from departmental actions..."

³ Water dependent uses are those uses that "...cannot logically exist in any location but on the water" (RCW 79.90.465).

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SA2-1

Table 1.3-1 includes the WDNR's responsibilities regarding Aquatic Lands Use and Lease Authorization.

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SA2-1 | The company has complied, but has not provided a survey or exact location of the corrected crossing. Thus far, DNR has only received the images provided in the environmental documents.
cont'd

General Comments⁴

SA2-2 | DNR Encourages Submitting Applications for Use Authorizations Early for Large Complex Projects

DNR met with the applicant in June of 2007 to discuss forest practice and aquatic land use requirements. The applicant stated they would be submitting use authorization packages after obtaining all permits. The applicant was highly encouraged to submit a package early, even if incomplete, due to the nature and complexity of this project.

Applicant Concerned by Agency Delays: The applicant has stated concern in the Draft EIS about being "unreasonably" delayed by state or local agencies. DNR would be able to issue a use authorization in a timely manner, if an application were received early – even if the application package were incomplete. DNR has not received such a package.

Aquatic Lands Excluded from Draft EIS

SA2-3 | At the June 2007 meeting, the applicant was informed that Columbia and Cowlitz River crossings would require the applicant to obtain a bedlands easement. The current Draft EIS excludes specific mention of tidelands and bedlands under management of DNR for which an easement from DNR will be needed. An applicant is not relieved of its obligation to obtain authorization from DNR to use the state-owned bedlands because the applicant is drilling beneath the surface of the bedlands. The state's fee ownership of river beds includes all subsurface rights to such lands. The failure to include bedlands in the calculation of state-owned land necessary for easements is in error and further substantiates a need for a formal survey meeting DNR's requirements.

Clarify any use of State-Owned Aquatic Lands for Dredge Material Deposition and Beneficial Use of Materials

SA2-4 | DNR also manages state-owned aquatic lands on Puget Island, where the applicant states they will be disposing of dredge spoils for purposes of beneficial use. The applicant states the county (Wahkiakum County) will be responsible for obtaining all permits associated with this part of the project. However, DNR has not been contacted about this action or approved a Site Use Authorization for the deposition of dredge material from Oregon for beneficial use on state-owned aquatic lands at Puget Island.

Disposal of Dredge Spoils

If the Wahkiakum County Sand Pit Site is located on or adjacent to state-owned aquatic land, DNR needs to be consulted. The applicant or Wahkiakum County will need to obtain or amend a Use Authorization to use state-owned aquatic lands to dispose of dredge spoils. DNR needs to evaluate the amount and quality of any material placed from the Oregon side of the Columbia River onto the Wahkiakum County Sand Pit site. DNR

⁴ See attached comment matrix

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SA2-2 The FERC staff, not the applicant, produced the EIS. We list in table 1.3-1 permits NorthernStar should obtain prior to construction, and it is up to NorthernStar to file applications with appropriate regulatory agencies to obtain those permits.

SA2-3 We have revised section 4.7.3.6 to discuss that Washington state-owned lands include riverbeds crossed by the pipeline. It is the responsibility of NorthernStar to apply for and obtain required permits or authorizations from regulatory agencies, such as use authorization application from the WDNR for waterbody crossings in Washington, prior to construction.

SA2-4 NorthernStar is pursuing the appropriate state permits.

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SA2-4
cont'd

will need assurances that all material placed on state-owned aquatic lands is under the ownership of DNR.

Beneficial Use of Sediments

DNR considers the use of material for beneficial, public use a separate action from the disposal of dredge material. According to the locations described in the Draft EIS, placement of dredge material for beneficial use may involve state-owned aquatic lands along Puget Sound Island or Coffee Pot Island beaches. This would require coordination with and a Use Authorization from DNR. Once placed on state-owned aquatic lands, DNR considers the material under state ownership.

DNR is currently developing internal policy and guidance pertaining to beneficial use of dredged materials on state-owned aquatic lands (both marine and freshwater). Until completed, the applicability of this tactic will be evaluated on a case by case basis, both by the Sediment Quality Unit of DNR and the DNR District staff employees.

SA2-5

No Plans for Abandonment and Decommissioning

The applicant has made no plans regarding the abandonment or decommissioning of the pipeline. DNR's easement form has standard language for the removal of structures on state-owned aquatic lands. These provisions require that improvements owned by the easement holder be removed by the Termination Date unless DNR notifies the easement holder the improvements may remain. It is DNR's policy that if the improvements remain on state-owned aquatic lands after the expiration of an easement, DNR may choose to remove the improvements, at the easement holder's expense.

SA2-6

Assumptions Regarding Payment for Easements

The Draft EIS stated one-time payments would be negotiated with public agencies for easements crossing public lands. Such easements would grant temporary construction and permanent rights of way for operation. DNR has not agreed to, or excluded, a one-time payment in the absence of an application for a Use Authorization. DNR's statutory easement authority requires DNR to charge full market value for any easement it grants for the pipeline. DNR may require payment on either a one-time or annual basis.

SA2-7

Impacts to Shorelines of the Columbia River caused by Vessel Wake

The document makes conflicting statements about the impact of vessel wake and shorelines. The Draft EIS justifies the placement of dredged material at Puget Island, as a beneficial use to offset the impacts of vessel wakes (pages 3-53).

"The shoreline located between the Wahkiakum County Sand Pit and the federal navigation channel is subject to a combination of ship wakes, wind, and tidal effects that are currently eroding sand from the river beach at a rapid rate. Dredged material was most recently applied to the beach area in 2001 to mitigate the erosion."

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- SA2-5 Potential future plans and abandonment are discussed in section 2.9. Any future abandonment would be subject to the appropriate environmental and non-environmental review based on federal, state, and local regulations in effect at that time.
- SA2-6 Section 4.7.3.1 has been revised to state that one-time easement payments are typically negotiated. We acknowledge the DNR's comment that it may require either a one-time payment or payment on an annual basis.
- SA2-7 See our response to comment FA4-14.

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SA2-7
cont'd

The section addressing potential impacts of vessel wake to Columbia River shorelines is simply not clear. No cumulative impact analysis was completed. The Draft EIS concludes that "...staff continue to study this issue and additional analysis regarding shoreline erosion will be included...in the final EIS (pages 4-5)." If the analysis is incomplete, it is difficult to comment on the potential impact.

If there is an increased potential for erosion on state-owned aquatic lands in the Columbia River, DNR needs to be informed of this possibility. Thank you for this opportunity to comment. Should you have any additional questions or comments please do not hesitate to contact me.

Sincerely,

Rich Doenges
Division Manager
Aquatic Resources

Enclosure

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Washington Department of Natural Resources
Aquatic Resources Division
Comment Matrix: Bradwood Landing, LLC Draft Environmental Impact Statement

Commenting Agency	Reference to DEIS (section, page, paragraph, line number)	Subject/Comment	What's wrong or missing and why	Proposed solution and suggested condition language	Suggested deadline for compliance with the condition
SA2-8	WDOB AQ 1.3.11 Other State permits and approvals, p. 44	"The PERC encourages cooperation between applicants and state and local authorities, but this does not mean that state and local agencies, through application of state and local laws, may prohibit or unreasonably delay the construction or operation of facilities approved by the PERC."	DNR does not issue permits. The applicant will be receiving a use authorization for public land. The applicant would not be delayed if the applicant would send an application in to use public lands. To date, one has not been received.	Applicant should submit a use authorization application with required DNR survey.	Prior to construction.
SA2-9	WDOB AQ 1.3.9	"The Columbia River Basin is exempt from the CZMA, except for the zone of significant tidal influence."	Using the zone of tidal influence does not appear to justify exemption from the CZMA. Based on information from Ecology and DNR, DNR Aquatics would be issuing a <u>threshold</u> comment for this area.	Suggest reviewing this section with Ecology.	Prior to PERC
SA2-10	WDOB AQ 2.5, Future Plans and Abandonment, p. 122	"NorthernStar has no future plans to abandon or remove the proposed LNG terminal and pipeline facilities."	A decommissioning plan for encumbrances on state owned aquatic lands will be required by DNR AQ.	DNR will require standard decommissioning requirements as part of its use authorization as it has done with other encumbrances involving natural gas lines and privately owned utilities.	Prior to PERC
SA2-11	WDOB AQ 3.1.92, Dredged Placement Alternatives.	"...the other half at the Wahkiakum County Sand Pit beach area on Puget."	If dredged materials will be placed "in adjacent aquatic areas" located on or near state-owned aquatic lands, DNR	Have Wahkiakum County (or dredging proponent) contact DNR. The dredging proponent must	Prior to placement of spoils

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- SA2-8 Appropriate revisions have been made in the EIS. See our response to comment SA2-3.
- SA2-9 The only portion of the Bradwood Landing Project subject to federal CZMA review is the LNG import terminal at Bradwood. None of the proposed project facilities fall within the Washington coastal zone.
- SA2-10 NorthernStar has submitted a decommissioning plan for the LNG terminal with Clatsop County. As mentioned in section 2.9, NorthernStar would need to submit a new application with the FERC to abandon any of its facilities, including the pipeline, and we would conduct an independent environmental review of that proposal at that time. Since abandonment would be a separate and different undertaking it is not covered by the current EIS.
- SA2-11 All applicable permits and approvals would be obtained prior to placement of dredged materials at the Wahkiakum County Sand Pit site. See our response to comment FA4-14.

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SA2-11
cont'd

	p. 75	Island. Generally, beach nourishment projects entail placing dredged materials on a beach and in the adjacent aquatic areas."	requires a use authorization. DNR has not received a use authorization application; DNR has not authorized the use of state-owned aquatic land. DNR will need assurances that all material placed on state-owned aquatic lands is under the ownership of DNR. Revised use of dredged materials: However, DNR is currently developing internal policy and guidance pertaining to beneficial use of dredged materials on state-owned aquatic lands (both marine and freshwater). Until completed, the applicability of this tactic will be evaluated on a case-by-case basis, both by the sediment quality unit of DNR and the DNR district personnel.	provide confirmation that the sediments are uncontaminated, and that they have all required permits prior to obtaining a SUA from DNR.	
WLR AQ	3.1.9.2, Dredged Placement Alternatives	"Washington County is currently in the process of obtaining the necessary permits and authorizations that would allow placement of dredged materials from the Broadwood Landing Project at the Sand Pit site." <i>See above.</i>	DNR has not received a use authorization application; DNR has not authorized the use of state-owned aquatic land. <i>See above.</i>	Have Washington County contact DNR. <i>See above.</i>	Prior to placement of spoils
WLR AQ	3.1.9.2, Dredged Placement Alternatives	"NorthernStar also proposes to place approximately 60,000 cubic yards of material generated during maintenance dredging once every approximately 2 to 4 years at the Washington County Sand Pit site." <i>See above.</i>	DNR has not received a use authorization application; DNR has not authorized the use of state-owned aquatic land. <i>See above.</i>	Have Washington County contact DNR. <i>See above.</i>	Prior to placement of spoils
WLR AQ	4.1.2.3, 4.1.3.1 Geologic Hazards	"The only element of the proposed project with the potential to affect the rate of shoreline erosion is the passage of LNO ships. "Little information is available on the degree to which erosion of the Columbia River shoreline can be attributed to ship wakes. "A 1990 study measured erosion rates at three	As manager of the state-owned aquatic lands that could be affected by increased vessel traffic, DNR would like to see additional information regarding the effect of the project on erosion of Columbia River islands. This paragraph could use additional information. It states a potential exists for vessel traffic to increase shoreline erosion, but provides no real analysis other than a literature	Provide a better enumeration of the potential for coastal erosion from an increase in deep draft vessel traffic, focusing more on the pattern of traffic, how closely the ships will be to Washington's shorelines, and what an increase in wave energy will be at certain times of the year. Analysts should provide data on the	Prior to PERC

SA2-12

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SA2-12 NorthernStar has not provided the complete study. The information we have been given to date has been incorporated into section 4.1.2.3. See also our response to comment FA4-14.

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SA2-12
cont'd

SA2-13

SA2-14

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SA2-15

		locations ... in the first year after placement of dredged material and concluded that 4 to 24 percent of the erosion was attributable to ship wakes (COE, 1999)?	review on what the potential impacts to Washington's shoreline could be from the 25% increase in deep draft vessel traffic. How will this potential impact be estimated if not under the CEMA?	1) Baseline (now) 2) 25% increase 3) Cumulative impacts 4) Any additional known or predicted future erosion in deep draft traffic in the Columbia	
WENR AQ	4.1.2.3 Geologic Hazards, p. 186	"Northemiller commissioned a study of wave generation by LNG ships, which compared wave generation by an Adriatic tanker, representative of a large ship that works the Columbia River, with an LNG tanker. The study indicated that waves generated by LNG ships would be only slightly larger than those generated by an Adriatic tanker operating at the same speed."	Why not provide complete results of this study? The results will be posted in the Clifton Channel, a narrow area between small islands, which when Bradwood began depositing dredge spoils at the western terminus of Puget Island, may become even more congested. Wouldn't it be in the best interest to fully disclose how the wakes would impact these islands?	Provide a complete description of the study results to support conclusion.	Prior to FEIS
WENR AQ	4.1.2.3 Geologic Hazards, p. 186	"In summary, the degree to which current ship traffic affects shorelines along the waterway is difficult to quantify due to the various other factors which contribute to shoreline erosion and accretion processes. Therefore, it is difficult to determine what additional impacts on shorelines the proposed LNG marine traffic would contribute."	This statement appears to use cumulative impact analysis as a way to avoid addressing potential impacts of wakes on a shoreline. This section is not on cumulative impacts. Pearson (2006) provides information on deep draft vessel impacts on the shoreline, including type of wake, length wake lasts, magnitude of wake, height of wake, backing of ship speed reduction, draw-down, and the surge height. Pearson (2006) found that "Small changes in speed can be expected to generate large changes in surge elevation."	Address potential impacts of LNG vessels on shoreline erosion. Cite Pearson (2006) or similar reference. For example - The authors found that "Redwood characteristics, ground water stage, beach vegetation cover and type, and local beach morphology features may also be important in governing local shoreline and surge."	Prior to FEIS
WENR AQ	4.1.2.5 Geologic Hazards, p. 186	"The PERC staff continues to study this issue and additional analysis regarding shoreline erosion will be included in the revised EA and the final EIS."	If information on potential impacts will not be available until the final EIS, how can agencies comment or consider this document in their decision-making?	Improve analysis and provide it during the public (and agency) comment period, not after.	Prior to FEIS and final Biological Opinion/ITP
WENR AQ	4-1.3 Volcanism and Lahars	"... direct impacts are not expected from the eruption of any of these volcanoes, should one occur. Because it would be underground, the pipeline would not be affected by a lahar."	Was not able to substantiate reference material citing White and Pearson, 1995, used to justify conclusion that within the lifetime of this project, potential for an eruption, lahar or other volcano, even that may affect Bradwood or its pipeline, or records, would occur.	Substantiate explanation.	Prior to FEIS

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SA2-13 See our response to comment FA4-14.

SA2-14 See our response to comment SA1-112.

SA2-15 See our response to comment SA1-112.

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SA2-16

WENR AQ	4.1.3.3 Geologic Hazard, p. 189	"Long term events include shoreline erosion slope instability and inadequate load bearing capacity of muds." <i>See above</i>	These shoreline erosion occurs in real time, and slope instability can be associated with our seasonal rain events, it is unclear why this is "long term." Can this be both short-term (immediate) and long term (occurring continuously over a longer period of time)?	Clarify and define "short term" and "long term" - suggest technical review	Prior to PERC
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SA2-17

WENR AQ	4.1.3.3 Geologic Hazard, Soil Moisture and Rock Slope Failure, p. 190	"However, the Washington State Hazard Mitigation Plan (Washington Emergency Management Division, 2004) indicates that in the 1890s, a poorly documented, landslide triggered tsunami near Othello killed one person on Puget Island."	A Washington state geologist from DNR, met with and provided documentation on this and other hazards to NorthernStar, Northwest Natural Gas, and their consultants. If needed, DNR Geology will provide further comments at a later time.	Suggest a technical review of this section.	Prior to PERC and construction.
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SA2-18

WENR AQ	4.1.3.3 Volcanism and Lahars, p. 204	"The 1980 eruption of Mount St. Helens will likely reduce the magnitude of future eruptions occurring within the lifetime of the Bradwood Landing pipeline (Phillips, 1987; Wells and Person, 1995)."	Mr. St. Helens has erupted four times in 5,000 years and two of those eruptions were two years apart. DNR was unable to locate a conclusion in the Wells and Person study cited.	Suggest further substantiation of this conclusion.	Prior to construction.
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WENR AQ	4.1.3.3 Volcanism and Lahars, p. 204	"Accordingly, volcanism is not considered a significant geologic hazard that could adversely affect the proposed Bradwood Landing LFO terminal."	Wells and Person (1995) state: "Sixty years have elapsed since the last dome-building eruption in October 1986 for magma in the conduit beneath the dome to crystallize and form a plug. The pressure needed to overcome this blockage may exceed that of any eruption since May 18, 1980; therefore, the next eruption may be a truly explosive event owing largely to blockage of the conduit. Several scenarios for renewed eruptive activity notwithstanding, a conservative approach to hazard assessment requires us to assume, until there is specific evidence to the contrary, that the next eruption will be explosive and as large as or larger than the eruption of May 18, 1980."	The assumption is incorrect. The potential impact of volcanoes in the region on the project should be addressed.	Prior to PERC
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SA2-19

WENR AQ	4.1.3.3 Volcanism and Lahars, p. 204	"Accordingly, volcanism is not considered a significant geologic hazard that could adversely affect the proposed Bradwood Landing LFO terminal."	Tephra should also be examined. The probability that the terminal will be buried under 4 or more inches of tephra is 2% and the pipeline is 10%. Tephra includes volcanic ash (fine- grained or finer particles of volcanic rock) and larger fragments, and is ejected rapidly into the air from volcanic vents during an eruption. The annual probability of an eruption and tephra from any volcano in the Cascade is between .01 and	The assumption is incorrect. The volcanoes throughout the Cascade should also be addressed.	Prior to PERC
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SA2-16 Slope instability is referring to the long-term condition existing prior to short-term failure, which would be the landslide or rock fall. A rain event is one possible trigger that could cause an unstable slope to fail.

SA2-17 See our response to comment LA7-25.

SA2-18 See our response to SA1-112.

SA2-19 The discussion on volcanism in section 4.1.3.3 has been revised.

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SA2-20

WDNR AQ	4.2.2.3 Sediments	In accordance with the Dredge Material Evaluation Framework (DMEF) developed by the Regional Management Team (RMT), an inter-agency task force that studies dredging on the Columbia River, Northemstar conducted a Tier I evaluation of the project area. Because the Tier I evaluation indicated the presence of generally low levels of some chemicals of concern, a DMEF Tier II analysis (physical and chemical analysis) was selected as the most appropriate level of evaluation for the proposed dredged materials.	OSR According to the Sediment Evaluation Framework For the Pacific Northwest, which is the framework for assessing and characterizing freshwater and marine sediments in WA, OR, and ID, the Washington Department of Natural Resources is listed as a participant on the Regional Dredging Team, along with the USACE, EPA, Washington Department of Ecology, Washington Department of Natural Resources, Oregon Department of Environmental Quality (ODEQ), Idaho Department of Environmental Quality (IDEQ), and the U.S. Forest Service Water Resources Division (WFRD). The DMEF constitutes and focuses the existing DMEF. The DMEF is a framework for assessing and characterizing freshwater and marine sediments in WA, OR and ID. The DMEF compiles information from many documents in use in the PNW, updating many. The DMEF is consistent with state and federal regulations and provides a toolbox of methods available for sediment characterization, etc... In this DMEF, is the "Regional Management Team" the same as the Regional Dredge Team? If so, DNR is a part of the team. DNR is also a member of the Lower Columbia Solutions Group - DNR is now taking on a leadership role in this group, both from a technical and policy perspective - how sediments are characterized, possible beneficial use locations, STUA's, etc.	Ensure that DNR is contacted and provided with the results of all sediment analyses, since the dredge spoils may be placed on BUAL. Suggest checking terminology (Regional Interagency Team vs Regional Dredging Team, Sediment Evaluation Framework versus Dredge Material Evaluation Framework). Suggest correctly characterizing DNR's role in evaluation of sediment.	Prior to deposition of spoils at Sand Pit
WDNR AQ	4.7.3.1 Land Use	"Northemstar would need to acquire new easements or property to construct and operate the proposed facilities. The easement would convey both temporary (for construction) and permanent rights-of-way to Northemstar and would give Northemstar the right to construct, operate, and maintain the pipeline facilities. Northemstar would negotiate a one-time payment for each easement."	While a one-time payment has been excluded, DNR has been involved in negotiations for payment, and this option has not been agreed upon.	Clearly statement about one-time payment until negotiations complete.	Prior to PER

SA2-21

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SA2-20

All applicable permits and approvals would be obtained prior to placement of dredged materials at the Wahkiakum County Sand Pit site.

SA2-21

Section 4.7.3.1 has been revised to reflect this information about payments for right-of-way easement to the WDNR.

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SA2-22

WDNR AQ	TABLE 4.7.3-2	Calculated amount of acreage for crossing Columbia and Cowlitz River in Washington	The affected area of DNR AQ lands does not appear to be presented	Work with DNR AQ to determine area for easement	Prior to construction
WDNR AQ	"Other Lands" and corresponding TABLE 4.7.3-8 (pages 4-317 and 4-318)	Calculated amount of acreage for crossing Columbia and Cowlitz River in Washington	The calculation for submerged land managed by the Department of Natural Resources is incorrect and does not include the bedlands or islands in Columbia River, or the bedlands or the east point of the Cowlitz River. A ROW calculation will need to be provided before an easement can be obtained.	Correct information. Work with DNR AQ to determine area for easement.	Prior to construction
WDNR AQ	4.5.3.1 Aquatic Resources Inadvertent Release of Drilling Mud, p. 346-08	This section references an "HDD Contingency Plan" which provides for an "alternate site" should a frac out occur.	DNR supports the use of an alternate site, if needed. The location can be included in the easement document prior to construction.	Provide details of alternate site to DNR.	Prior to construction

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SA2-22 Tables 4.7.3-2 and 4.7.3-8 and section 4.7.3.6 have been revised to clarify that acreages of submerged lands managed by the WDNR are estimates. As part of the process of obtaining an easement from the WDNR, NorthernStar would be required to complete a survey, conducted by a Washington state licensed surveyor, of each waterbody that would be affected by the pipeline to determine the amount of state-owned aquatic land that would be affected.

SA2-23 If a frac-out were to occur during HDD operations, an alternative HDD borehole location, within the existing construction right-of-way, would be determined at that time based on the location of the frac-out. Any necessary approvals associated with the new location would be obtained before drilling of the new borehole was started.

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Committee Members
Carl Weimer, Chair • Leo Bowman, Vice Chair
Bob Archey • Bob Bandura • Jean Buckner • Duane Henderson
George Hills • Grant Jensen • Pete Kmet • David Knoelke
Richard Kuprewicz • Shirley Olson • Bill Rickard

State of Washington Citizens Committee On Pipeline Safety

PO Box 47250 Olympia, WA 98504-7250 • www.wutc.wa.gov/pipeline/ccops

December 15, 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C., 20426

Re: Draft Environmental Impact Statement (DEIS) for the Bradwood Landing
LNG Project (Docket Nos. CP06-365-000, et al.)

Dear Secretary Bose:

The Washington State Citizen Committee on Pipeline Safety would like to submit the following comments on the Draft Environmental Impact Statement (DEIS) for the pipeline associated with the Bradwood Landing LNG Facility.

The Washington State Citizen Committee on Pipeline Safety was established by the Washington State Legislature in 2000 to "advise the state agencies and other appropriate federal and local government agencies and officials on matters relating to hazardous liquid and gas pipeline safety, routing, construction, operation, and maintenance." The committee is Governor appointed and meets regularly to discuss, identify, review and highlight pipeline safety issues on a local and national level. The committee consists of nine voting members representing the public, including local government, and elected officials. Four non-voting members represent owners and operators of hazardous liquid and gas pipelines.

Over the past couple months committee members have reviewed the DEIS for the Bradwood facility, and voted unanimously at our November 29th committee meeting to submit the following comments.

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Construction Related Issues

- K-498
- SA3-1 • We are concerned about possible jurisdiction, coordination, and expertise issues between the Federal Energy Regulatory Commission (FERC), the Pipeline and Hazardous Materials Safety Administration (PHMSA), and the Washington Utilities and Transportation Commission (WUTC). For these reasons we ask that FERC allow the WUTC full access to the pipeline and related construction documents for the purpose of inspection during the construction phase. We also ask that PHMSA grant the WUTC permission to carry out these construction inspections as part of their delegated interstate authority. We ask that this be incorporated in the final EIS.
 - SA3-2 • We are concerned that the DEIS does not clearly call for the non-destructive (e.g., radiographic or ultrasonic methods) inspection of every girth weld on the pipeline. Given the difficult terrain, the pipeline is highly susceptible to abnormal loading, we ask that the final EIS makes clear that every girth weld will be 100% inspected by non destructive testing, and that these girth weld nondestructive test records be retained and made available to governmental inspectors for the life of the pipeline.
 - SA3-3 • We concur with FERC that the current amount of information available regarding seismic and landslide hazards is insufficient, and ask that pipeline construction not begin until FERC, PHMSA, and the WUTC are satisfied with the analysis and any proposed routing changes and mitigation that come from it.
 - SA3-4 • We are concerned with the level of confidence that FERC seems to put in the use of strain gauges for providing warning against landslides. While strain gauges can be valuable for predicting problems on slow moving slide areas, they provide little or no protection for landslides in geologic formations that make them prone to catastrophic failures (e.g. slopes susceptible to high hydrology gradients such as that in Western Washington). This again points to the need for better analysis of landslide areas and rerouting if necessary.
 - SA3-5 • The use of HDD to get under streams and landslide areas is extensive in the construction plans. While we do support the use of HDD in such situations, we also know that even with the best geologic analysis HDD can fail. For this reason we ask that the final EIS clearly state what methods will be used in each situation if the HDD methods turns out not to work in an area. For streams this would include which method would be used in place of HDD, and for slide areas this would include whether the pipeline will be rerouted to avoid the slide or what other mitigation may be employed.

- SA3-1 State agencies with statutory authority to regulate pipelines may conduct inspections independent of the FERC or accompany FERC inspection staff.
- SA3-2 As stated previously the pipeline will conform to DOT regulations including Title 49, Part 192 Subpart E §192.241 and §192.243.
- SA3-3 The FERC would not approve construction until it has determined that all applicable safety standards would be met.
- SA3-4 We have recommended that NorthernStar conduct additional field mapping and subsurface investigations of landslide area as needed to develop a Final Pipeline Design Geotechnical Report. If this project is approved, our recommendation would be made a condition of the authorization. Also see the response to comment LA7-25.
- SA3-5 If an HDD borehole is unsuccessful, the method would be attempted at different locations within the existing construction right-of-way. If it is determined that HDD methods cannot be used at a given location, the FERC's Procedures require a contingency plan for an alternative crossing method at each HDD waterbody crossing location in the event that the HDD method is unsuccessful (see section 4.3.2.4). Furthermore, NorthernStar has indicated in its HDD Contingency Plan that it would have approved alternative crossing methods for implementation in the event of HDD borehole failure. Directions for accessing NorthernStar's HDD Contingency Plan (Frac-out Plan) via the eLibrary can be found in the response to comment FA3-13.

- SA3-6 • Sometimes, during the HDD process under streams frac-outs occur that can dump harmful quantities of fine silt materials into fish bearing streams. In the DEIS it states that response to such frac-outs would occur within 30 minutes. We believe that the detection and response to frac-outs should occur much quicker than 30 minutes and we would like to see this reflected in the final EIS.

Right-of-way Issues

- SA3-7 • It is our understanding that FERC has a policy to encourage the use of existing right-of-ways when possible. It is unclear from the DEIS exactly why this proposed pipeline from the Bradwood facility is not following the existing KB Pipeline for more of its route through Washington. Please either explain this more explicitly in the final EIS, or require this pipeline to follow that existing KB Pipeline right-of-way since they are both going to the same place.

- SA3-8 • The DEIS states that this proposed pipeline would be serving the Beaver power plants. This would appear to make the KB pipeline obsolete, and its existing right-of-way more available for this proposed pipeline. Please discuss the future need for the KB pipeline, and why the replacement of that pipeline with a larger pipeline was not considered as an alternative to the Washington part of this proposal.

- SA3-9 • The DEIS states that after construction trees will be planted on the right-of-way in forest areas and wetlands within 5-15 feet of the pipeline to reduce the visual impact and protect habitat. The DEIS also states that property owners will not be allowed to plant trees anywhere on the permanent fifty foot right-of-way. We support the planting of trees as suggested for forest and wetland areas, and ask that similar planting also be approved for property owners in consultation with the pipeline operator.

- SA3-10 • The DEIS states that after construction trees will be planted on the right-of-way in forest areas and wetlands within 5-15 feet of the pipeline, and that such plantings will create a nearly full canopy cover. While we support this planting of trees, and ask that it remains a part of this plan, it does bring up the question of how the company plans to meet its inspection obligations under CFR 49 Part 192.705. Please describe in the final EIS what inspection methods the company plans to use if a nearly complete canopy precludes aerial inspections.

Proximity to Residences

- SA3-11 • The DEIS states that there are six residences within Washington State, which are within 100 feet of the pipeline. We appreciate the care taken to try to avoid residential areas as much as possible, but according to the C-FER

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- SA3-6 The EIS has been revised to indicate that the detection and response to frac-outs would occur as soon as possible.

- SA3-7 The proposed pipeline route is collocated with the KB pipeline right-of-way between MPs 22.0 and 30.0 where practical and where conditions are conducive to construction and maintenance of the pipeline. Realignment away from the KB pipeline route have been necessary where the KB pipeline was constructed in areas containing geological hazards such as poor slope stability, or to reduce stream crossing impacts.

- SA3-8 The proposed Bradwood Landing pipeline would provide an alternative source of natural gas to the PGE Beaver Power Plant. There is no indication that the KB pipeline would discontinue its supply of natural gas to the power plant. The potential end users of the KB pipeline and any expansion of the KB pipeline are beyond the scope of this EIS.

- SA3-9 As part of the easement agreement, property owners could negotiate revegetation methods, including tree planting. See also our response to comment CO9-15.

- SA3-10 Among other pipeline DOT safety requirements, the land surface over the pipeline must be inspected at least 26 times each year. FERC would require that NorthernStar adopt the Wetland and Waterbody Construction and Mitigation Procedures, wherein a 10-foot-wide corridor would be kept clear of trees to facilitate the required inspections in wetlands. Furthermore, the trees planted between 5 and 15 feet from the pipeline would be limited to a maximum height of 15 feet. In non-wetland areas, this herbaceous corridor would be extended to a 30-foot-wide maintained corridor within the permanent right-of-way. Maintenance clearing within these corridor widths would prevent the formation of a full-canopy, thereby allowing the inspections to be completed.

- SA3-11 Based on new information provided by NorthernStar, we have identified only three residences within 50 feet of pipeline construction work areas. Pipeline safety is addressed in section 4.11.9.

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SA3-11
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Technologies report (A Model For Sizing High Consequence Areas Associated With Natural Gas Pipelines - 2000) that is used to help determine high consequence areas, these residents, and probably others, are well within the hazard area. We ask that the final EIS include a list of all residences within the hazard area as defined by the C-FER Report, and that either the route be adjusted to remove these residences from the hazard area, or that an explanation of why that is not possible be given.

Thank you for considering our comments on this proposed facility. If you have questions feel free to contact me.

Sincerely,



Carl Weimer, Chairman

K-500



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

December 21, 2007

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

RE: Bradwood Landing LNG Project, Docket # CP06-365-00, et al.
Comments on Draft Environmental Impact Statement

Dear Ms. Bose:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (draft EIS) for the Bradwood Landing LNG Project. This project proposes to construct a new pipeline to convey natural gas from a new terminal at Bradwood, Oregon that would cross into Cowlitz County, Washington and terminate at a junction with the Williams natural gas pipeline near Kelso, Washington. The Washington Department of Ecology (Ecology) has experience with the environmental review for natural gas pipelines. The following comments highlight regulations and guidelines that apply to the environmental review of this project during the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA) processes. They are intended to assist the Federal Energy Regulatory Commission (FERC) in the revision of the draft EIS and completion of the Record of Decision (ROD).

Please note that the State of Washington strongly opposed the FERC's preemption of state jurisdiction over regulation of LNG facilities in 2005 because it undermined our ability to protect our citizens and resources. Regardless of the possibility of federal preemption, we expect Northern Star to reach full compliance with state regulatory requirements by securing and complying with state permits and approvals. Ecology also asserts its authority and expects full compliance with water quality certification requirements under the Clean Water Act.

These comments are separated into three sections. The first includes an excerpt from Ecology's comments on the Notice of Intent (NOI) for this draft EIS. The second section addresses some general comments on the draft EIS and the third is an attachment that includes specific comments and recommendations on the technical details of the proposal and draft environmental analysis.



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Ecology's NOI Comments Not Addressed in draft EIS

The following comments were included in Ecology's comment letter of October 17, 2005 regarding the EIS Notice of Intent issued for this project. We include them here again because they were not adequately addressed in the draft EIS.

- SA4-1 1. **Safety:** The EIS discussion on "reliability and safety" will be critical for revealing the safety impacts, planning, preparedness and contingencies that would affect Washington communities along the Columbia River. As noted in the Notice of Intent, the EIS shall analyze safety issues related to LNG ship traffic and terminal. The EIS should adequately define the boundaries, intensity, duration and extent of potential safety impacts to workers, communities, and property owners. When providing quantitative estimates of impacts, the EIS should use recognized and accepted risk assessment and modeling. The EIS should identify the spectrum of potential accident scenarios that could occur over the life of the proposed action, including failure scenarios from earthquakes, floods, other natural disasters, and human error.
- SA4-2 2. **FERC Guidance vs. Washington State Guidance/Standards:** Typically, the FERC's EIS would require the applicant to implement the FERC's Wetland and Waterbody Construction and Mitigation Procedures, Upland Erosion Control, Revegetation and Maintenance Plan, and Stormwater Pollution Prevention Plan. However, Washington requests that applicants follow state or local guidance when it is more stringent, which includes the Wetlands in Washington Volume 1 and 2 (which can be found on the Ecology website at http://www.ecy.wa.gov/programs/sea/bas_wetlands/index.html) and the Stormwater Management Manual for Western Washington (which can be found on the Ecology website at <http://www.ecy.wa.gov/programs/wq/stormwater/manual.html>). The environmental review would be strengthened if the EIS reflects that the project will follow the most stringent requirements and/or guidance. Further, Ecology recommends that FERC require that contractor training cover both the FERC guidance as well as any other local, state or federal agency guidance that is more stringent and conditioned in the state or local permits.
- SA4-3 3. **Washington State Water Quality Standards:** The EIS should adequately disclose the extent to which the project will be able to meet state water quality standards. This will include compliance with State of Washington Surface Water Quality Standards (Chapter 173-201A WAC), Sediment Management Standards (Chapter 173-204 WAC), and Groundwater Quality Standards (Chapter 173-200 WAC). If the project is likely to exceed water quality standards during construction in water bodies and wetlands, then the EIS should: (1) identify how much, when and how long the project would be out of compliance; (2) how the impact will be minimized; (3) when the project would be back into compliance; and (4) what mitigation is offered for any temporal losses to fish or wetlands. For upland construction, the EIS should address the development of separate Stormwater Pollution Prevention Plans (SWPPPs) for land disturbing activities in Oregon and Washington, as will be required by the state National Pollution Discharge
- SA4-4

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- SA4-1 Section 4.11.5.3 of the final EIS discusses the hazards associated with a spill from an LNG carrier which includes defining the zones of concern associated with a spill from an LNG carrier, the distance to these zones, the thermal flux levels of these zones, and what communities or areas are included in each zone. Section 4.11.4 discusses the hazards associated with a spill at the LNG terminal which includes modeling for different spill scenarios, thermal flux levels and distances that these thermal flux levels travel. The final EIS presents a consequence analysis of these hazards. The facility must comply with the siting requirements in 49 CFR 193.
- SA4-2 It is anticipated that state-specified measures for project-related activities will be addressed as part of the various permitting processes (see table 1.3-1).
- SA4-3 Table 1.3-1 lists the major federal, state, and local codes, ordinances, statutes, rules, regulations, and permits that would apply to the project. NorthernStar would adhere to conditions of these permits. We have revised section 4.3.2.1 of the EIS to mention Washington state water quality standards. It would be the obligation of NorthernStar to apply for and obtain necessary water quality permits from appropriate Washington state agencies prior to construction. See response to comment SA1-79.
- SA4-4 As described in section 2.4.1, NorthernStar has developed terminal and pipeline ESC Plans for construction activities within Oregon and a SWPPP for Washington. These plans incorporate elements of the FERC's Plan and Procedures, state and county requirements and provisions, stormwater pollution prevention plans, and spill prevention and response procedures. These plans were filed with the FERC as part of the JPA on November 22, 2006. Revisions to the JPA were filed on April 5, 2007. This document is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e. CP06-365), and putting in the proper date range. Potential impacts on critical areas, endangered species and water quality are included in sections 4.7, 4.6, and 4.3, respectively.

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SA4-4
cont'd | Elimination System (NPDES) permits for construction activities. The EIS should include information on critical areas, endangered species, and how potential impacts to water, such as turbidity, will be evaluated.

SA4-5 | Pursuant to the requirements of the Washington State Water Quality Standards (Chapter 173-201A WAC) the EIS should identify beneficial uses of surface and ground water, impacts on those beneficial uses, and measures to comply with the standards or reduce exceedances of the standards.

SA4-6 | 4. **BMPs:** The project design and the EIS should recognize that BMPs for in-water work may be different from BMPs for upland work. Making this distinction in the EIS will reduce confusion or concerns that inappropriate BMPs will be used. Similarly, it would be useful for reviewers of the EIS to understand that two different water quality monitoring strategies will be needed for the project: one that addresses in-water construction and one that addresses upland construction, as required by the respective water quality permits.

SA4-7 | The EIS should include information on clearing limits. It should discuss the construction access and wheel wash -- how the project will minimize dirt, mud, and debris from being tracked onto private and public roads. If wash stations are proposed the EIS should describe how they will be constructed and maintained to prevent runoff from impacting waterbodies and wetlands. The EIS should also discuss how flow rates will be controlled, and if retention/detention facilities will be constructed. The EIS should discuss BMPs to control sediment and stormwater runoff; preserve vegetation, stabilize soils, and protect slopes; protect drain inlets; stabilize channels and outlets; control all pollutants, including water materials and debris; control de-watering; minimize turbidity from equipment working in waterbodies; or trap sediment in a manner to avoid interference with the movement of salmonids. For example, a checklist of sources and perimeter control BMPs, and BMPs that will apply to equipment that will enter waterbodies could be included in the EIS.

The EIS should describe construction sequencing, work and specific erosion and sediment control plans for work planned during the rainy season, and timing for installation of erosion control BMPs. For example, appropriate BMPs should be set up prior to grading or other activities that disturb soils and have the potential to cause erosion.

The EIS should describe spill prevention protocol and the placement and contents of spill kits, and how construction crews will avoid littering the construction right of way. For example, clearly marked garbage cans could be carried on all construction vehicles for cigarette butts, food wrappers, and drink containers.

SA4-8 | 5. **Cumulative Impacts:** The discussion of cumulative impacts should be element-specific, not discussed separately. The discussion should define what the project is

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SA4-5 | Potential impacts and mitigation for beneficial uses of ground and surface water have been addressed in section 4.3.1, 4.3.2, and in NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan. Directions for accessing NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan via the eLibrary can be found in the response to comment FA2-17.

SA4-6 | Section 2.4.2.1 discusses general pipeline construction techniques, and section 2.4.2.2, discusses special construction techniques, including in-water work. NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan provides details on different BMPs in wetlands and waterbodies. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e. CP06-365), and putting in the proper date range.

SA4-7 | Vehicle wheel washing would occur on a paved wash pad near the point where the access road crosses the realigned railroad. No soaps or surfactants would be used for vehicle wheel washing and the temperature of water used for washing would be equal to that of water being stored in the on-site storage tank (no hot water would be used). Excess water from the pad would be discharged to a two-cell sedimentation/infiltration pond. Construction sequencing is discussed in section 2.4. NorthernStar would implement the FERC Staff's Procedures, as well as its Terminal and Pipeline ESC plans in Oregon as well as its SWPPP in Washington. Furthermore, we are recommending that NorthernStar revise its pipeline ESC Plan and SWPPP to include the measures from the FERC's Plan that provide greater protection. We believe that the implementation of these plans will adequately address the issues in this comment.

SA4-8 | We discuss our strategy for analyzing cumulative impacts from projects located in the same geographic region that may occur within similar time frames at the beginning of section 4.12, and list those projects on table 4.12-1. We were unable to find detailed environmental information about each of those other projects, except for the Oregon LNG Project, so we are unable to produce a comparative table. However, we have revised section 4.12 to add data about the Oregon LNG Project. Section 4.12.3 does address cumulative impacts on vegetation and wildlife.

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SA4-8
cont'd

considering the cumulative impact area. The discussion should be linked to how cumulative impacts relate to project impacts. Providing a table of cumulative impacts to supplement a narrative description would be useful to reviewers. Cumulative effects should be identified for vegetation, wildlife, aquatic species and their habitat. Cumulative impacts should also be described for future maintenance of the right-of-way and pipeline. The EIS would be strengthened by having a summary table for each vegetation, upland habitat, and aquatic habitat that shows acreage of estimated permanent impacts (habitat loss) and temporary impacts. Similarly, the EIS could include a parallel table that summarizes how permanent and temporary impacts will be mitigated. Additionally, the EIS should include the methodologies that were used for the impact analysis.

SA4-9

6. **Unavoidable Impacts:** The EIS should identify the unavoidable direct and indirect impacts and the proposed mitigation. The EIS should also identify those unavoidable direct and indirect impacts that cannot be mitigated. Adding separate subsections that explain unavoidable impacts within each technical element of the EIS would be helpful for reviewers and may reduce comments and requests for additional information. For example, unavoidable adverse impacts could be added as a subsection to each of the section of the chapter on Environmental Analysis. These new subsections would logically follow subsections on mitigation. The EIS would be strengthened if unavoidable adverse impacts were summarized in the Executive Summary and in the chapter on conclusions.

SA4-10

7. **Horizontal Directional Drilling:** The EIS should discuss the possible affects of incidental releases of bentonite drilling mud during the proposed horizontal directional drill crossing at the Columbia River and any other waterbodies where HDD is the preferred crossing method.

SA4-11

8. **Air:** The EIS should adequately describe the boundaries or extent of impact areas, the intensity and duration of the impact, and existing air quality. The EIS should discuss potential effects of the proposed action on ambient air quality during construction, during normal operating conditions, and during upset conditions. The EIS should describe impacts that would distinctly occur only in Oregon or Washington and what permits would be necessary.

SA4-12

9. **Floodplain Issues:** Floodplain permits are necessary for projects that traverse a mapped floodplain (referred to as a Special Flood Hazard Area on FEMA maps). Permits are required for any development in flood hazard areas in all communities that participate in the National Flood Insurance Program. There are general standards that apply to placement of all utilities in floodplains, per local ordinances. The EIS should discuss potential temporary and long-term project impacts to floodplains and measures to be implemented to avoid or minimize these impacts. Where spoils are proposed to be stored within the channel, the EIS should explain how this will impact the floodway.

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SA4-9 As appropriate, subsections within each portion of the environmental analysis (section 4) specifically address impacts and mitigation.

SA4-10 Potential impacts from a frac-out are discussed in section 4.5.3.1.

SA4-11 Section 4.10.1 of the EIS includes a discussion of the permitting requirements and air quality impacts of the proposed project. Further details of the modeling analysis described in the EIS are contained in the publicly available Bradwood Landing Modeling Report dated March 22, 2007, submitted to the ODEQ and filed with the FERC. As documented in table 12 of the modeling report, impacts from the proposed project were predicted to exceed the CO and NOx significant impact levels (SIL) for the 8-hour and annual averaging periods, respectively. The predicted impacts greater than the CO 8-hour SIL and NOx annual SIL were predicted to extend 0.38 and 4.4 kilometers, respectively, from the proposed project site.

SA4-12 All construction within floodplains would be temporary, lasting only a few months during clearing, grading, trenching, pipe stringing, welding, lowering in, backfilling, and restoration operations. All trench spoil would be returned to the trench, and all disturbed areas would be restored to preconstruction contours. Because the project would not add permanent fill in the floodplains, potential flood flows would not be displaced and long-term impacts are not anticipated.

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- SA4-13 10. **Channel Migration:** The EIS should discuss stream channel migration issues. The project must not fill, block or otherwise alter channel migration features where such alternations would cause the migration area to impact up or downstream of the area. The EIS should indicate that during project surveying, features of channel migration should also be staked and surveyed (e.g., channel migration areas, relic and overflow channels, spring brooks and other fluvial features related to channel migration).
- SA4-14 11. **Environmental Inspector:** The EIS should describe the responsibilities of the Environmental Inspector. These responsibilities should include notifying agencies of permit violations or when permit requirements need to be altered because of field or weather conditions.
- SA4-15 12. **Vessel Prevention and Contingency Plans:** The vessels delivering LNG to the proposed site will transit Washington State waters inbound and outbound. The EIS should describe the vessels' oil pollution prevention equipment, the vessels' and vessel operators' spill contingency plans and Safety Management Systems. The EIS should describe the vessel bunkering and oil transfer procedures. (Please consult Chapter 317-40 of the Washington Administrative Code - Bunkering Operations for specific requirements that may apply.)
- SA4-16 Ecology's Spill Prevention Program manages a unique non-regulatory environmental protection program for tank vessels. Tank vessels operators are invited to participate in Washington's Voluntary Best Achievable Protection (VBAP) and Exceptional Compliance (ECOPRO) Program for Tank Vessels to protect Washington's irreplaceable natural resources from the damage caused by a spill. For more information about this program please visit the website at: <http://www.ecy.wa.gov/programs/spills/prevention/bap/bapbase.htm>. The EIS should discuss the vessel operators' intent to participate in these and other pollution prevention programs.

Additional Comments specific to the Draft EIS

Section 1, Introduction

The objective or purpose of the project is stated on page 1-3 as follows:

To provide a new source of natural gas to the Pacific Northwest through importation of LNG.

- SA4-17 The stated "need" for this objective is vague and does not sufficiently address the alleged regional shortage or market value problem with natural gas. The draft should be specific about how much more natural gas should be provided to the region. The draft should quantify a reasonably foreseeable future need of natural gas in order to legitimately compare alternatives using the criteria on page 3-1. The boundary of the Pacific Northwest region is not defined, nor is there an estimate of how much this proposal will contribute to the estimated future need of

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- SA4-13 NorthernStar would comply with the permit requirements under section 404 of the CWA and the FERC's Procedures relative to restoration of the stream beds during waterbody crossings.
- SA4-14 Section 2.6 outlines the duties of an Environmental Inspector.
- SA4-15 Contracts with LNG shippers have not been established yet. All vessels are required to carry approved vessel response plans and comply with state spill prevention and contingency plans, including the applicable requirements in Chapter 317-40 of the Washington Administrative Code – Bunkering Operations. Such language has been added to section 2.7.1.
- SA4-16 Contracts with LNG shippers have not been established yet. Therefore, the EIS cannot discuss the vessel operators intent to participate in Washington's Voluntary Best Achievable Protection and Exceptional Compliance Program for Tank Vessels.
- SA4-17 We have expanded our discussion of purpose and need in section 1.0 and have included the results of a study by Wood Mackenzie Limited (2007) of markets served by the proposed Bradwood Landing Project (see our response to comment PM1-23).

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SA4-17 new sources of natural gas. The quantified estimates of future demand for natural gas are based on national averages and do not address the stated purpose of the proposal.

cont'd

This information about purpose and need is particularly important given the number of other LNG terminals and pipelines in the region that are engaged in the FERC licensing process.

Section 2, Proposed Action

SA4-18 This section should specifically (i.e. quantitatively) address the current capacity of proposed connector pipelines (e.g. Williams pipeline) and the feasibility of using this system to distribute Bradwood's natural gas. Without this information, it is unclear how this proposal meets the stated purpose and need and consequently it could fall short as a potentially reasonable and environmentally preferable alternative when the evaluation criteria on page 3-1 are applied.

Section 3, Alternatives

SA4-19 The draft EIS should not include the analysis of alternatives that do not address the stated purpose and need. This is an incomplete and potentially misleading exercise – and particularly so when the selection criteria automatically excludes alternatives such as renewable, nuclear power, conservation and efficiency, etc. because they do not fit the stated purpose and need. (page 3-1) More attention should be paid to identifying and refining the purpose and need, and comparing it only to applicable alternatives.

SA4-20 The draft does not adequately address the alternatives of other proposed LNG terminals in Oregon. Although the details of the environmental impacts of these other projects are currently being addressed in concurrent NEPA processes, this draft EIS concludes that the Bradwood Landing terminal is less environmentally harmful (due to a shorter sendout pipeline) than the other proposed projects. This conclusion is made without the necessary cumulative impact analysis of this project and other proposed pipelines. In particular, the analysis should address the Palomar pipeline – which would essentially serve as another sendout pipeline for Bradwood towards the south.

Section 4, Environmental Analysis and Cumulative Impacts

SA4-21 The key missing piece throughout this document is a description of methods that were used to conduct the environmental analysis and provide the basis of comparison between the proposal and the alternatives. This information would document the legitimacy of the conclusions and recommendations for this large complex project of great public interest.

SA4-22 Additionally, FERC received comments on the NOI (as reported on page 1-25) requesting an analysis of the cumulative impacts on global warming and climate change. This draft EIS does not address climate change impacts from this proposal, nor does it include an analysis on how the “existing” environment for the project will be altered in the future due to sea level rise, river hydrology and other changes.

Washington's SEPA specifically requires state and local agencies to consider the impacts of a proposal on climate – as an element of the environment. This draft is deficient in this area.

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SA4-18 See our response to comment FA2-32.

SA4-19 In the beginning of section 3.1 we explain the project objectives, and our criteria for evaluating alternatives. It is standard practice for the FERC to discuss a range of alternatives, including the no action alternative, other sources of energy, system alternatives, and site alternatives. Furthermore, other parties have commented that the EIS should examine conservation and renewable energy resources as alternatives to the importation of LNG.

SA4-20 We disagree. The EIS adequately addresses other LNG terminal locations in Oregon as alternatives to the Bradwood Landing Project. Where we have data about environmental impacts associated with those other projects, they were provided. See our response to comment FA2-3. It is logical that a longer pipeline would have more environmental impacts. The alternatives analysis has been revised to include the Palomar pipeline (see section 3.1.2.2). We also discuss the Palomar Project in our cumulative impacts section 4.12.

SA4-21 We disagree. The EIS summarizes the studies conducted that led to our conclusions, and provides references to those studies.

SA4-22 Section 4.10.1 has been updated to include the estimated CO2 emissions resulting from the construction and operation of the project. In addition, Section 4.10.1.2 of the final EIS has been updated to indicate that NorthernStar has agreed to voluntarily comply with the ODE's siting requirements for non-generating energy facilities, including the CO2 emission standards, for the proposed LNG import terminal.

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SA4-22
cont'd

Furthermore, SEPA provides agencies with *supplemental authority*¹ to require mitigation for – or deny under certain circumstances – a proposal when they identify adverse environmental impacts that cannot or will not be mitigated through existing laws or administrative rules. Although SEPA does not require decision makers to mitigate the impacts before making their decision, it does give them the ability to address impacts that would normally be outside their regulatory authorities.

We recognize the potential role of additional natural gas supply for meeting our future energy needs, but nevertheless, we recommend that FERC address climate change impacts from this energy development project. Washington has committed to reducing fossil fuel emissions through both an executive order and recent state legislation. FERC should address specific mitigation needed to avoid, minimize and compensate for any climate change effects. State approvals for this project must consider these impacts and possible mitigation in order to be consistent with our climate change policy and new law.

Again, thank you for the opportunity to comment. We hope our comments help you to complete a full environmental review of this project.

Respectfully,



Richard K. Wallace
Regional Director
Southwest Regional Office

cc: Mike Wojtowicz, Cowlitz County Planning Department
Steve West, Washington Department of Fish and Wildlife
Elizabeth Ellis, Washington Department of Natural Resources
Ron Wilson, Emergency Management Division
Steve King, Washington Utilities and Transportation Commission
Susan Hughs, Oregon Department of Energy
Dolly Tawater, Wahkiakum County Emergency Management
Cathy Batchelor, Cowlitz County Emergency Management

¹ Supplemental authority is described in Chapter 43.21C.060 RCW and WAC 197-11-660. All state and local agencies are given the authority to condition for impacts identified in an environmental document when they have identified policies about how they will use the supplemental authority. They can deny a proposal when an EIS has been prepared and mitigation is insufficient to mitigate the impact to a nonsignificant level. This is intended to address gaps in existing regulations due to new science, new issues, new environmental conditions, site specific conditions, and unanticipated consequences. Although many new regulations have been added since 1971 when SEPA was adopted, the legislature reaffirmed the need for SEPA in 1995.

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Mark Lundquist, Wahkiakum County Commissioner
Karla Ellis, Army Corps of Engineers – Portland District
Matt Steuerwalt, Governor's Office
Shadrack Scheirman, US Coast Guard
Sheila Pendleton-Orme, Ecology Water Quality Program
Bob Troyer, Ecology Spills Program
Lori Ochoa, Ecology SEA Program
Mark Cline, Ecology SEA Program
Annie Szvetez, Office of Regulatory Assistance

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- SA4-23 See our response to comment SA4-3.
- SA4-24 We discuss the engine operations of LNG carriers in sections 2.1.1, 4.10.1.1, and 4.11.5.
- SA4-25 See our response to comment PM1-31.
- SA4-26 In the event that the LNG carrier uses all of its cooling water for ballasting to avoid discharging it to the Columbia River, heat radiating from the LNG carrier's ballast tanks to the surrounding water would not result in adverse impacts for several reasons. The amount of ballasting water needed by an LNG carrier is proportional to its cargo capacity, the larger the cargo capacity, the more water required for ballasting to maintain stability when the cargo is offloaded. For example, a 145,000 m³ LNG carrier would require about 57,000 metric tons (MT) of water for ballasting, while a 210,000 m³ LNG carrier may need upwards of 70,000 MT. Meanwhile, the amount of heat generated (by machinery and power generation) by an LNG carrier while at the terminal depends mainly on the type and size of the LNG carrier's propulsion system, the "hotel loads" and the "transfer loads." Hotel loads are electrical power requirements to operate the ship, excluding the cargo transfer pump loads. Transfer loads are the electrical power requirements to operate the cargo transfer pumps and other ancillary equipment required only to transfer cargo. Transfer loads are proportional to the rate at which the LNG is being unloaded. The unloading rates for LNG carriers at Bradwood Landing would be about 12,000 m³/hr. Unloading at about 12,000 m³/hr requires about 4 MW of power. In all, a steam-powered LNG carrier may require about 6 MW of power considering hotelling and offloading loads, which with an efficiency a bit below 30 percent means that about 15 MW of excess heat is being generated. Conversely, some of the newer (and also larger) LNG carriers being built today require upwards of 9 MW of power during the unloading process but because they employ more efficient generators (more than 40 percent efficient) less overall excess heat is generated. Thus the worst case at the Bradwood Landing terminal would be a steam-powered LNG carrier, generating 15 MW of excess heat during the unloading process. Over the course of the entire unloading process, which lasts about 18 hours, this equates to about 9.2 x 10⁸ Btu. Assuming that all of this excess heat is absorbed by the water used for ballasting (about 57,000 MT), the temperature of the water would only rise about 3 °F. As a side note, the assumption that all of the excess heat is being absorbed by the water only is very conservative considering that much of the excess heat generated in the process would be released to the atmosphere internally (into the engine room) through heat radiation and convection and externally into the outside atmosphere through the power plant's exhaust.

So while the ballast tanks would radiate some heat to the surrounding water, it would be very minimal simply due to the fact that the driving force, a

Attachment Washington Department of Ecology Comments on Bradwood Landing LNG Draft EIS

#	Section and Page	Comment	Recommendation
1	1.3.1 Washington Page 1-12 and Table 1.3-1 Page 1-18	Washington Department of Ecology's authority to protect water quality and regulate "waters of the state" under state statute RCW 90.48 is not addressed. Authority/Regulation/Permit lacks reference to Section 402 of Clean Water Act whereby NPDES Construction Stormwater Permit is required.	1. In section 1.3.1, add a paragraph on Ecology's regulatory role under RCW 90.48 and section 402 of the CWA. 2. Add "Section 402 of the CWA" and "RCW 90.48" to Table 1.3.1 next to "WDE"
2	2.1.1.4 Pressure/ Temperature Control Page 2-6	The internalized combustion energy system of LNG ships is not uniform. Most of the LNG vessels under construction are diesel powered and will meet the requirements of this BOG emission control.	Add details on how diesel powered ships will remove BOG to maintain the tank pressure.
3	2.1.1.5 Ballast and Cooling Water - Delivering filtered river water to the LNG ships	Northern Star proposes to construct a system capable of delivering filtered water to the LNG ships and providing incentives for the delivering vessels to make modifications needed to use this system. The vessels would require regulatory approvals and costly shipyard modifications to accomplish this. This is not practical using spot charter vessels which are not under contract with the terminal as indicated in 2.1.1.9 Ship Selection. The proposal to reduce heat	Northern Star should provide details of how the terminal will enforce this modification on LNG vessels contracted by other parties. Ecology recommends that a heat balance analysis showing the reduction of heat transferred to the Columbia River using this concept versus the normal direct overboard discharge of engine cooling water be included as an appendix to the FEIS.

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SA4-26 cont'd) temperature difference of 3 °F, is so small. Moreover, much of the area adjacent to the ballast tank is above water, meaning some of the excess heat would be dissipated to the surrounding air. Essentially, given the small difference in temperature between the ballast water and the surrounding Columbia River water, the effects of heat radiating from the ballast tanks would be minimal.

In the event an LNG carrier unloads at the wharf without the necessary modifications to discharge cooling water into the ballast tanks, cooling water discharge would occur via standard overboard methods. We have recommended that NorthernStar continue to consult with the NMFS, ODFW, and other appropriate agencies to develop a temperature performance standard for all cooling water discharges from LNG carriers at the wharf. Further analysis of the potential thermal impacts of cooling water discharge on aquatic resources will be included in the revised BA and EFH Assessment. See also our response to comment PM1-31.

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		exchange into the river is questionable. Existing LNG vessels discharge warmed engine cooling water directly overboard. This plan would pump the warmed water into the vessel's ballast tanks until they filled, then recirculate ballast water to provide engine cooling. The ballast tanks are adjacent to the steel hull of the vessel. Engine heat transferred to the ballast water would then pass through the steel hull into the surrounding river water.	
		The net effect of this concept is that the engine operational heat would be indirectly transferred to the Columbia River through the ballast tanks rather than directly overboard as warmed cooling water.	
SA4-27	4	2.1.1.6 Ship Safety Systems Page 2-7	The technology listed in this section is not up to date.
			Revise to include a current listing and description of international and USCG required navigational and safety monitoring equipment
SA4-28	5	Figure 2.3.3-2 Page 2-38	Pipe Storage and Contractor Yard - B is depicted with a waterbody in the western portion of the site. National Wetland Inventory maps also indicate that an emergent wetland extends into the southwestern portion of the site.
			Include a description of how these waters of the state will be protected.
SA4-29	6	2.4 Construction Procedures 2.4.2.1 Page 2-46 Survey and Staking	This paragraph needs more detail and should be expanded to include requirement in Construction Stormwater Permit.
			Prior to beginning any land disturbing activities, including clearing and grading all clearing limits shall be clearly marked/staked. Travel corridors and stockpile sites shall be clearly marked. Sensitive areas to be protected from disturbance shall be delineated and marked with brightly colored construction fence, so as to be clearly visible to equipment

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- SA4-27 Section 2.1.1.6 is a general listing of navigational and communication system equipment and is not intended to be a detailed, comprehensive list of technology. All LNG vessels would have to meet all applicable international, federal, and state navigational, communication, cargo monitoring and control systems prior to being placed into service or conducting operations. We have updated this section in the final EIS.
- SA4-28 Section 4.4.1.3 has been revised to include a recommendation that wetlands potentially affected by activities within the pipe and contractor yard in Washington should be flagged in the field. Construction activities within the yard should not occur within 50 feet of flagged wetlands.
- SA4-29 Section 2.4.2.1 includes a description of survey and staking methods that would be used to mark boundaries of approved disturbance areas. Section 2.4.2.1 has been modified to include a reference to NPDES Construction Stormwater Permit conditions.

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SA4-29 cont'd			operators. Equipment shall enter and operated only within the delineated clearing limits, corridors and stockpile areas. See Element #1 Marking Clearing limits of the NPDES Construction Stormwater General Permit.
SA4-30			Within the same paragraph discussion of marking clearing limits of wetlands and sensitive areas, then mentions used densely vegetated areas for treatment of stormwater. *BMP 102 of the Stormwater Management Manual for Western Washington. "Critical area buffers should not be used for sediment treatment areas."
SA4-31	2.4.2.1 Page 2-46 7 Clearing and grading	It is unclear if all erosion control devices will be in place before construction starts and how they shall be maintained throughout construction.	An adequate Stormwater Pollution Prevention Plan (SWPPP) for construction activity shall be implemented in accordance with the Construction Stormwater General Permit beginning with initial soil disturbance and until final stabilization.
SA4-32	2.4.2.1 Page 2-46 8 Trenching	Insufficient erosion control on stockpiles.	All stockpiles shall be stabilized from erosion, protected with sediment trapping measures and where possible, be located away from waterways, and drainage channels. The controls must include a Mulch BMP see BMP 121. Mulch spreading referenced in element #4.
SA4-33	2.4.2.1 Page 2-47 Hydrostatics Testing 9	It is unclear where the intake and discharge locations are for the hydrostatic testing of pipeline segments in Washington. It is also not clear what the volume and rate of discharge will be for these segments of pipeline.	Add more details and clarification on discharge of hydrostatic water. This is a large volume of water. The intake and discharge locations should be more clearly described. The volume of water and rate of discharge as well as any Best Management Practices (BMP's) to

Attachment - 3 -

SA4-30 The paragraph being referred to in this comment is not in section 2.4.2.1; however, the treatment of stormwater is discussed in 4.3.2.3.

SA4-31 The EIS is a summary document; more detail on BMPs and construction plans can be found in the FERC's Plan and Procedures as well as in NorthernStar's terminal ESC Plan, pipeline ESC Plan for pipeline construction within Oregon, and SWPPP for pipeline construction within Washington.

SA4-32 See our response to comment SA4-31.

SA4-33 The final water intake and discharge locations as well as the discharge rates associated with hydrostatic testing of the pipeline can not be determined until the contractor is selected. The volume of water required and rate of appropriation are described in table 4.3.1-1 as well as in section 4.3.2.4. BMPs are described in the pipeline ESC Plan for Oregon and SWPPP for Washington. Furthermore, NorthernStar would be required to obtain all applicable water appropriation and discharge permits, which require specific intake and withdrawal information and BMPs during application.

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SA4-33
cont'd

SA4-34

			prevent scouring and turbid water from entering any surface waters should also be included.
10	2.4.2.2 Page 2-49 Water body crossings. Water crossings continued.	Trench spoils and top soil stockpiles need to be stabilized during construction to protect water bodies. When working in areas of high ground water, trench de-watering may be necessary. De-watering has the potential to create an immediate need to dispose of large volumes of sediment-laden water during construction. Alternative BMPs and preparation for de-watering needs to be discussed in more detail.	Add requirements for control of dewatering Trench dewatering activities should not result in the deposition of sand, silt or sediment. Trench dewatering water should be discharged away from waters of the state and should be discharged in a manner that allows it to infiltrate into the ground. Turbid water must not be discharged into waters of the state. De-watering was only touched on, and the SWPPP does not have alternative BMPs listed.
SA4-35	Water crossings continued.	The procedures and environmental precautions lack sufficient detail.	Include the identification and the location of all waterbodies requiring "drivable berms".
SA4-36	11 Page 2-51	Water quality protection using straw Bale Barriers is not addressed sufficiently.	Require Northern Star to secure approval from Ecology and/or the WDFW for "additional" imported material that is used to backfill waterbodies at open-cut crossings. Require Northern Star to prepare a site specific deep well dewatering plan for Ecology's review and approval. The plans must identify the location of the well points and the discharge location. Require Northern Star to prepare site specific contingency plans for all waterbodies where the HDD and bore crossing methods are proposed. This should include an incidental release response plan. Clarify that Straw Bale Barriers
SA4-37			
SA4-38			

Attachment - 4 -

SA4-34 NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan addresses the issues raised in this comment. This document is available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e. CP06-365), and putting in the proper date range.

SA4-35 Additional details regarding procedures and environmental precautions are contained in NorthernStar's Pipeline Waterbody and Wetland Construction and Mitigation Procedures Plan. Directions for accessing NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan via the eLibrary can be found in the response to comment FA2-17.

Drivable berms are just one of the potential BMPs that would be used during construction of the pipeline. The number and locations of drivable berms would be determined based on site-specific conditions in the field at the time of construction activities. Other BMPs, such as silt fence and/or straw bale structures may also be used in place of drivable berms at some locations.

SA4-36 NorthernStar would obtain approval from the WDFW for use of any additional imported material used to backfill waterbodies at open-cut crossings.

SA4-37 Dewatering plans would be prepared by the boring contractor prior to conducting borings for waterbody crossings. All applicable permits and approvals would be obtained at that time.

SA4-38 NorthernStar would prepare site specific plans for all HDD waterbody crossings.

K-513

SA4-39

			<p>should only be used where the size of the drainage area is not greater than ¼ acre per 100 feet of barrier length; the maximum slope length behind the barrier is 100 feet; and the maximum slope gradient behind the barrier is 2:1.</p> <p>Straw bale barriers should not be constructed in streams, channels or ditches. Straw bale barriers should only be used where effectiveness is required for less than three months.</p>
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SA4-40

2.4.2.3 Associated Above Ground Facilities	12	Pages 2-55 and 2-56	<p>More detail is needed on how to stabilize sites and prevent runoff from bare soils.</p> <p>Mulch should be applied uniformly over the area to cover 100% of the disturbed area. Hydro mulch application rates are approximately 25-30 lbs per 1000 sf or 1500-2000 lbs per acre. Hydro mulch should be applied with seed and tackifier. If this is not done the application rate should be at the least doubled.</p>
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SA4-41

2.6 Environmental Compliance Inspection Pages 2-56 and 2-57	13		<p>References trained personnel for proper implementation of ESC plans etc. The NPDES Construction Stormwater General Permit requires a Certified Erosion and Sediment Control Lead (CESCL).</p> <p>Add a requirement consistent with Construction Stormwater General Permit Condition of S4.B.4 that requires a CESCL to conduct site inspections. Refer to www.ecy.wa.gov/programs/wq/stormwater for a list of approved training courses.</p>
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SA4-42

3.1.9.2 Dredged Material Placement Alternatives Pages 3-53 through 3-58	14		<p>This section states that approximately half (approximately 350,000 cu/yd) of the material dredged from the ship berth will be placed at the Wahkiakum County Sand Pit Disposal site.</p> <p>The Sand Pit disposal site is only authorized to receive 205,000 cubic yards of suitable dredged material. This leaves a balance of approximately 145,000 cubic yards of material for disposal.</p> <p>The Scour Holes at Welcome Slough and Pancake Point may already be at capacity.</p> <p>Add more analysis and detail on appropriate disposal sites with adequate capacity.</p>
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SA4-39 We discuss the engine operations of LNG carriers in sections 2.1.1, 4.10.1.1, and 4.11.5.

SA4-40 Sections 2.4.2.1 and 4.4.2.3 discuss restoration and revegetation. NorthernStar would perform restoration and revegetation activities in accordance with its SWPP in Washington, the FERC staff's Plan,

SA4-41 See our response to comment SA4-14. NorthernStar would have to implement whatever measures were specified in required NPDES permits.

SA4-42 The scour holes at Welcome Slough and Pancake Point had capacity at the time of the alternatives analysis and were therefore appropriate to use. The discussion of the Wahkiakum County Sand Pit site has been revised.

K-514

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SA4-43	15	4.3.1 Groundwater Resources	The impacts to groundwater quality from a pipeline breach are not addressed. Constituents in natural gas meet the requirements of a hazardous substance as defined by Washington State regulations. In the event of a leak, these gases (particularly methane) could dissolve in groundwater and pose hazards such as explosion when exposed to air.	Add an analysis of pipeline breach and its potential impacts to groundwater. Require Northern Star to develop an aquifer mitigation plan.
SA4-44	16	4.3.2.1 Water Resources Page 4-63	Tributary 5 to Coal Creek is 303(d) listed for temperature. Table 4.3.2.4 indicates pipe construction will be open cut, which has potential for temperature impacts.	Require a different pipe installation method to reduce or eliminate impacts.
SA4-45	17	4.3.2.4 Page 4-88	The requirement for a SWPPP lacks sufficient detail. Northern Star's current SWPPP within the JARPA is not adequate for the scope of this project.	Add a requirement that the SWPPP be complete, consistent with the elements and provides detailed description of the alternative BMPs
SA4-46	18	4.4.2.3 Wetlands Page 4-117	Does not address water quality impacts from vehicle washing. areas to prevent spread of noxious and noxious weed contamination.	Add a requirement for SWPP to include in BMPs used during truck washing to prevent water quality impacts.
SA4-47	19	Aquatic Resources 4.5.3.1 4-166	Insufficient details on management of Drilling Mud.	Add a requirement for the SWPPP to include more detail on managing drilling mud and describing collection areas, and dealing with frac-outs.

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State Agencies

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- SA4-43 In the event of a pipeline leak, natural gas would be released to the air and would not dissolve in the groundwater. We do not believe an aquifer mitigation plan for a breach of the pipeline is warranted.
- SA4-44 All references to the crossing method that would be used at Tributary 5 to Coal Creek in section 4.3.2 were checked to confirm that the bore method would be used (including table 4.3.2-4). Use of the conventional bore method at Tributary 5 to Coal Creek would include maintenance of a riparian buffer to minimize impacts on the waterbody.
- SA4-45 NorthernStar's SWPPP for pipeline construction within Washington is intended to meet the requirements of the Construction Stormwater General Permit issued by Washington's Department of Ecology in November 2005. Local county requirements are incorporated into this plan. Cowlitz County has adopted the DOE requirements for erosion control. Application would be made to Cowlitz County for approval prior to construction. Furthermore, NorthernStar would implement the FERC Staff's Procedures, and we are recommending that NorthernStar revise its pipeline ESC Plan and SWPPP to include the measures from the FERC's Plan that provide greater protection.
- SA4-46 See our response to comment FA3-10.
- SA4-47 Drilling mud would be managed using standard BMPs. NorthernStar's revised HDD contingency plan contains detailed measures for mitigating frac-outs. Directions for accessing NorthernStar's HDD Contingency Plan (Frac-out Plan) via the eLibrary can be found in the response to comment FA3-13.



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STATE OF WASHINGTON

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

1300 S. Evergreen Park Dr. S.W., P.O. Box 47250 • Olympia, Washington 98504-7250
(360) 664-1160 • TTY (360) 586-8203

December 11, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
Public Reference Room
888 First Street N.E., Room 2A
Washington, DC 20426

Dear Ms. Bose:

Reference: **Bradwood Landing, LLC Docket No. CP06-365-000**
NorthernStar Energy, LLC Docket No. CP06-366-000

The Washington Utilities and Transportation Commission (UTC) welcomes this opportunity to comment on the draft environmental impact statement (EIS) for the Bradwood Landing liquefied natural gas (LNG) terminal and related pipeline proposed by NorthernStar Energy LLC (NorthernStar).

The UTC is an agent of the U.S. Department of Transportation's Pipeline and Hazardous Material Safety Administration (PHMSA) and authorized to inspect interstate pipelines in that capacity. The UTC is also an intervenor in these Federal Energy Regulatory Commission (FERC) dockets.

Our comments focus on the portions of the draft EIS related to the proposed pipeline (the send-out pipeline) that will transport natural gas from the Bradwood Landing LNG terminal to the Williams interstate gas transmission pipeline near Kelso, Washington.¹

Our comments will apprise FERC of environmental and public health and safety issues raised by NorthernStar's proposal to build this pipeline. Our review also addresses issues related to the construction, operation and maintenance of the proposed pipeline pursuant of the Code of Federal Regulation (CFR) Title 49, Part 192 for Transportation of Natural Gas.

Description of the Proposed Pipeline and its Route through Washington State

The draft EIS proposes a 36 mile-long pipeline extending from the LNG terminal at Bradwood, Oregon, to the Williams Northwest pipeline system near Kelso, Washington. Approximately 17 miles of 30-inch diameter pipe would be within Washington State.

¹ Our comments relate to the route of the pipeline referenced as the "proposed pipeline" in Figure 3.1.8-1 on page 3-7 of the draft environmental impact statement.

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State Agencies

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UTC Comments
FERC Dockets CP06-365-000 and CP06-366-000
December 11, 2007
Page 2 of 4

The pipeline, as proposed, would cross the Columbia River at Port Westward, Oregon, and extend east through the southern portion of Washington's Willapa Hills to Williams Northwest pipeline approximately three-quarters of a mile east of Interstate 5 and north of Kelso. In addition, eight miles of the proposed route is in close proximity to the exiting Kelso-Beaver (KB) pipeline right-of-way. As proposed, the pipeline would be made of carbon steel, with a maximum operating pressure of 1,280 pounds per square inch.

The proposed route is currently lightly populated (e.g., mostly Class 1). The soil type is mostly silt loam and the terrain is typically a 20 to 30 percent slope. The proposed pipeline is located north of the metropolitan areas of Longview and Kelso.

Comments and Recommendations

The UTC has the following comments and recommendations about the proposed NorthernStar pipeline:

SA5-1

1. The principal shortcoming of the draft EIS is that the pipeline route has not been selected to avoid areas of soil instability, a common geological feature in Southwest Washington. Soil instability was the cause of a catastrophic failure of the Williams pipeline near Kalama during 1997. The existing KB pipeline right-of-way, which is adjacent to the proposed pipeline route, includes areas of soil instability and KB has a history of monitoring and mitigating soil induced stresses on its pipeline. For example, a section of the KB Pipeline was relocated above ground and supported by piling across a landslide feature.

The geo-hazards report prepared by United Research Services (URS) for NorthernStar identified 30 landslide features to be crossed by the proposed pipeline alignment. The report states the majority of the landslide features are on private property and have not been field-verified due to access issues. This is an area where additional analysis is needed.

UTC Recommendation: In the final EIS, NorthernStar should identify a route that, to the maximum extent possible, avoids areas of soil instability. To the extent that areas of instability cannot be avoided, specific measures should be identified to address this instability.

SA5-2

2. The URS report also estimates that 41,000 feet of horizontal directional drilling (HDD) will be required for crossing rivers, streams, sloughs and roadways. However, we do not believe that sufficient soil analysis throughout the route has been completed. Without this, an accurate assessment of where HDD may be used will not be achieved. This is important because HDD cannot be used in some soil conditions. If those soil conditions are present, then other means of crossing water features on the route will be needed. These other means are typically more environmentally disruptive during construction.

SA5-1 NorthernStar has routed the Bradwood Landing pipeline to avoid areas of soil instability. Although the pipeline would be largely collocated with the KB pipeline, the route deviates from the KB pipeline route in areas instability. Section 4.1.4.3 discusses measures that would be used to mitigate for soil instability. See also our responses to comments SA3-4 and LA7-25.

SA5-2 See our response to comment SA3-4.

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UTC Comments
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Page 3 of 4

UTC Recommendations:

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|--------------------------|--|--|
| SA5-2
cont'd
SA5-3 | | <ul style="list-style-type: none"> • NorthernStar should test soils thoroughly to determine where HDD can be used. The results of this testing should be included in the final EIS. • The criteria that NorthernStar will use to determine both where HDD will be deployed and where the pipeline will be placed above ground should be defined and included in the final EIS. |
| SA5-4 | \| | <p>3. Federal safety rules require operators to protect gas transmission pipelines from external corrosion by installing a cathodic protection system. The rule allows that this system may be placed in operation as late as one year after completing construction (CFR-49-192-455). In this case, however, we believe that re-excavating the pipeline to attach test stations, galvanic anodes, and other components after the pipeline construction will increase soil erosion and effect surface runoff quality. We therefore recommend that NorthernStar install the cathodic protection system on the pipeline at the time of construction.</p> <p>In addition, cathodic protection systems are susceptible to interference from other systems located nearby or from nearby sources of electrical current. NorthernStar should evaluate possible sources of this interference along its route in the final EIS.</p> <p>UTC Recommendations:</p> <ul style="list-style-type: none"> • To minimize soil erosion and other environmental impacts caused by re-excavation, NorthernStar should be required to install its cathodic protection system at the time of construction. • The final EIS should address explicitly the potential for interference with its planned cathodic protection systems from sources of current in proximity and describe how it will address this issue in design and operation of the pipeline. |
| SA5-5 | \| | <p>4. Over the past 15 years, Western Washington has experienced dramatic population growth. Previously semi-rural areas now contain housing developments close to pipeline rights-of-way. We encourage the NorthernStar to anticipate increased population density (e.g., class 3 locations) likely to occur in the area north of Longview and Kelso and design its pipeline accordingly.</p> <p>UTC Recommendations:</p> <ul style="list-style-type: none"> • The final EIS should identify the steps NorthernStar will take to mitigate the threat to people and property such as posed by the pipeline in high consequence areas. |
| SA5-6 | | <ul style="list-style-type: none"> • NorthernStar should take the following additional safety measures in potentially high consequence areas through which the proposed pipeline will run: |

State Agencies

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| SA5-3 | | A final determination on HDD locations will not be made until the final geotechnical analyses have been completed. There are no areas where the pipeline is proposed to be placed aboveground. See also our response to comment FA3-13. |
| SA5-4 | \| | The FERC does not typically impose additional safety conditions other than DOT standards. |
| SA5-5 | \| | As addressed in section 4.11.9.1, if a subsequent increase on population density adjacent to the right-of-way indicates a change in class location, NorthernStar would be requested to reduce the MAOP or replace the segment with pipe of sufficient grade and wall thickness to comply with DOT regulations for the new class location. |
| SA5-6 | | The FERC does not typically impose additional safety conditions other than DOT standards. |

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UTC Comments
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Page 4 of 4

SA5-6
cont'd

- o Install cathodic protection test stations at approximately 2,000 linear foot intervals and reference cells where the pipeline crosses other cathodically protected facilities,
- o Conduct a close interval survey approximately two years after the pipeline is installed. Utilize the data obtained from the close interval survey and compare them with the data collected from annual monitoring and reference cells to determine the frequency of close interval surveys.

SA5-7

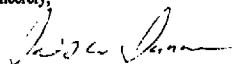
- Conduct an internal inspection survey prior to commissioning the pipeline to identify construction anomalies and establish a baseline for future evaluations.
- Schedule future internal inspections at approximately five-year intervals to identify wall loss from corrosion and third-party excavation damage.

SA5-8

5. In addition to the comments above relating to the EIS, the UTC believes that public health and safety will be protected more fully if NorthernStar includes the following actions in its pipeline construction plan:
- Specify that bedding and shading material around the pipe should be select fill material free of sharp rocks with maximum particle size of ½" and containing a large percentage of fines. If the trench bottom is not free from sharp or unusually rough surfaces, the trench should be over-excavated six inches and refilled with select fill material.
 - Inspect pipe coating integrity before lowering the pipe in the trench by "jeeping" and repairing coating with manufacture's recommended material.
 - Radiographically examine 100 percent of the girth welds. For welds that cannot be radiographed, the radiographer should certify that radiographs are impractical and provide written evidence in support of his or her conclusion.

The UTC Staff appreciates the opportunity to review the EIS for the proposed NorthernStar transmission pipeline to further enhance environmental protection and public safety. If you have questions about our response, please contact David Lykken, Acting Pipeline Safety Director at (360) 664-1219 or Al Jones, Pipeline Safety Engineer at (360) 664-1321.

Sincerely,



David W. Danner
Executive Director

State Agencies

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SA5-7 The FERC does not typically impose additional safety conditions other than DOT standards.

SA5-8 Section 2.4.2.1 includes the General Pipeline Construction Techniques that NorthernStar would use during installation of its pipeline, including requirements for padding the pipeline in stony soils, pipeline coating, and visual and radiographic inspection of pipeline welds.

K-519

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State of Washington
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Main Office Location: Natural Resources Building, 1111 Washington Street SE, Olympia WA

Kimberly D. Boser
Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, D.C. 20426

Re: Draft Environmental Impact Statement for the Bradwood Landing Liquefied Natural Gas
Terminal and Pipeline Project (Docket No. CP06-365-000, et al.)

Dear Mrs. Boser:

Upon review of the Bradwood Landing Draft Environmental Impact Statement (DEIS), the Washington Department of Fish and Wildlife (WDFW) has many concerns with regard to the proposed project. WDFW believes fish and fisheries-related impacts will occur during construction/implementation, daily operations, and maintenance.

SA6-1 The DEIS addresses many items of concern, but in many cases, WDFW feels the discussion is inadequate. Most prominent of these is that restrictions to sport and commercial fisheries, through river closures, and lost harvest opportunities are only briefly addressed. The closure around the vessel in transit will negatively impact intensive sport salmon, sport sturgeon, and commercial fisheries. Additionally, establishment of the docking site will likely close a significant portion of one of the most popular spring chinook sport fishery locations in the lower Columbia River. Further, discussion regarding associated impacts to Select Area Fisheries (SAFE) harvest and general interception of hatchery fish, preventing them from entering tributaries, is poorly addressed. Restricted harvest of hatchery fish is potentially counter to the goals of the Lower Columbia River Fish Recovery Board (LCFRB) Salmon Recovery Plan (www.lcfrb.org/wa/2002) and the initial recommendations of the Hatchery Scientific Review Group (HSRG).

SA6-2 WDFW categorized its concerns into three main areas: 1) Construction-related; 2) Operations-related; and 3) Mitigation. These are included. WDFW assumes that the Construction impacts will be ephemeral and limited to the proposed site only. While WDFW prefers HDD as the preferred method of pipeline installation, there is assumed "frac-out" risk that would have deleterious effects to spawning grounds. WDFW assumes that the Operations impacts will be on going, including maintenance dredging at the terminal, but remain within in the proposed "footprint". Shipping and related river closures fall in this category. WDFW assumes that mitigation is on going and will be commensurate with the potential impacts of the project.

SA6-3 WDFW views the proposed mitigation for the overall project, specifically on the Washington side, as being grossly inadequate. First of all, it is unclear if the \$50,000,000 SEI is guaranteed or is voluntary.
SA6-4 Additionally, WDFW has concerns that the mitigation site at the mouth of Delamater Creek is adequate in magnitude or benefits to all affected species (including smelt and sturgeon) and affected habitat.

Regards,


Tim Rymer
Regional Habitat Biologist
Washington Department of Fish and Wildlife

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SA6-1 The project should not have significant impacts on commercial or recreational fishing. The project would not result in restrictions on fishing activities outside of the moving safety and security zone around LNG carriers in transit in the waterway to the proposed Bradwood Landing terminal, and there would be no river closures. Nor would the safety and security zone around an LNG carrier at dock at the terminal cause the closure of any popular nearby spring Chinook sport fishing areas. See section 4.7.1.4. Significant impacts on fish movements are not expected as a result of operation of the proposed project. Potential impacts on salmon due to construction and operation of the proposed project are discussed in section 4.5.2.1.

SA6-2 Section 4.5.3.1 has been revised to include a discussion of potential impacts on spawning habitat due to a frac-out. Implementation of NorthernStar's HDD Contingency Plan would minimize potential impacts on salmonids if a frac-out were to occur. Directions for accessing NorthernStar's HDD Contingency Plan (Frac-out Plan) via the eLibrary can be found in the response to comment FA3-13.

All operational activities authorized by the FERC would occur within the proposed project footprint. During operation of the project, if circumstances were to result in changes to the area impacted by the proposed project, NorthernStar would be required to file a revision with the COE requesting authorization of the proposed project changes. In addition, changes to the area or volume of sediment being dredged would require reinitiating formal consultation with the NMFS.

Adequacy of mitigation is addressed in the response to comment FA2-10.

SA6-3 The general adequacy of NorthernStar's proposed compensatory mitigation for the project is addressed in the response to comment FA2-10. NorthernStar's SEI is not a part of the compensatory mitigation for unavoidable impacts associated with the project. Although it was proposed by NorthernStar as a voluntary measure to provide a net benefit to the lower Columbia River, the SEI is part of the proposed action. To this end, NorthernStar has indicated that multiple agencies would make the SEI a required component of the project through their permits. See also our response to comment FA4-12.

SA6-4 See our response to comment FA2-10.

K-520



THEODORE R. KILGUSKI
GOVERNOR
May 9, 2008

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington, D.C. 20426

Re: Supplemental Draft Environmental Impact Statement
Bradwood Landing LLC Docket No. CP06-366
Northern Star Energy LLC Docket Nos. CP06-366, CP06-376
and CP06-377

Dear Secretary Bose:

SA7-1

On behalf of the State of Oregon, I request that the Federal Regulatory Energy Commission (FERC) issue a supplemental Draft Environmental Impact Statement (DEIS) for the Liquefied Natural Gas (LNG) import terminal facility at Bradwood Landing and its associated pipelines.¹ I believe that a supplemental DEIS (SDEIS) is required under the regulations of the Council on Environmental Quality (CEQ) on the National Environmental Policy Act (NEPA). 40 CFR § 1502.9(c).

As you know, the State of Oregon previously submitted comments on the Draft Environmental Impact Statement for this project, to help ensure that state standards and concerns are addressed by the developer and by the Federal Energy Regulatory Commission. As we explained in those comments, the Bradwood Landing DEIS is incomplete and flawed in a number of respects. We particularly noted in our cover letter to our comments that "any mitigation plan or other document that will be relied on by FERC to determine that the facility meets licensing criteria must be included in the DEIS and circulated for meaningful review before adoption of the final EIS." We also stated:

As an example of the inadequacy of the DEIS, large portions of the mitigation for habitat, wetlands, archeological impact, landslide protection and emergency planning are still unknown. Indeed, many supporting documents for the licensing decision will be produced after the opportunity for comment on the DEIS has closed. This is a fundamental process flaw.

¹ The State of Oregon supports the same request made by Columbia Riverkeeper et al. in the letter to FERC dated April 24, 2008.

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SA7-1 See our response to comment CO15-1.

K-521

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SA7-1
cont'd

1. The CEQ regulation requires a Supplemental DEIS in this context.

40 CFR § 1502.9(c) provides:

(c) Agencies:

(1) Shall prepare supplements to either draft or final environmental impact statements if:

(i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or

(ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

For purposes of NEPA, the concept of "significance" is defined by the regulations of the Council on Environmental Quality.²

² In 40 CFR § 1508.27, CEQ defines the term "significantly" as follows:

"Significantly" as used in NEPA requires considerations of both context and intensity:

(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

(2) The degree to which the proposed action affects public health or safety.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

State Agencies

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SA7-1
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FERC has its own set of NEPA regulations, *see* 18 CFR §§ 380.1 through 380.16. FERC's NEPA regulations, however, do not appear to explicitly address or implicitly bear on the standard for a supplemental EIS established in the CEQ regulation quoted above.

The policy underpinning of the supplemental EIS requirement was well articulated in *Sierra Club v. Marsh*, 714 F Supp 539, 571 (DC Maine 1989), *appeal dismissed*, 907 F2d 210 (1st Cir 1990):

NEPA is an environmental "full disclosure" law. The supplemental EIS process is designed to ensure that agencies act with "complete awareness . . . of the environmental consequences of [their] action[s]."
Essex County Preservation Ass'n v. Campbell, 536 F.2d 956, 961 (1st Cir. 1976) (citation omitted), *aff'g*, 399 F. Supp. 208 (D. Mass. 1975) (ordering supplemental EIS despite inability to determine, as a matter of law, that new information would have significant environmental effect; but public should have opportunity to analyze and assess it).

a. The LNG import terminal facility project has changed substantially since the DEIS was issued.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

As noted in the April 24, 2008 letter from Columbia Riverkeeper, the Bradwood Landing LNG import terminal facility and associated pipeline project has changed in four key respects:

SA7-2

1. **Unscreened water intakes:** The DEIS contained a recommended condition that "only LNG ships that are retrofitted to use the screened water supply system at the berth are allowed to unload cargo at the Bradwood Landing LNG terminal." DEIS at 4-145. The assessment in the DEIS of environmental effects of the project was presumably based on the assumption that all LNG ships would use screened water intakes. The applicants have recently taken the position that not all incoming LNG tankers will use screened ballast and cooling water intakes. As stated in the applicants' April 8, 2008 letter to FERC,

The goal of Applicants' on-site water system program is to ensure that as many LNG carriers as practicable have the ability to use the on-site water system. * * *

Applicants have proposed, as part of the Project, to provide reasonable contract incentives to encourage equipping or retrofitting LNG carriers for compatibility, but it is not in Applicants' control to require *all* LNG carriers to retrofit. Despite these reasonable contract incentives proposed by Applicants, it is not likely that all LNG carriers making deliveries to the Bradwood Landing terminal under spot market contracts, short term contracts, or as replacement carriers to long term contracts will be equipped for the on-site water system.³

The impacts of unscreened water withdrawals on threatened and endangered salmon were not addressed in the DEIS, and the public has never had a chance to comment on that substantial project change. Hence, the environmental effects of that change must be evaluated in a supplemental DEIS.

SA7-3

2. **Changed pipeline route:** The pipeline route is expected to change. NorthernStar has apparently acknowledged that many alterations of the route are underway. Those changes could significantly alter the nature of the environmental, public-safety-related and economic impacts of the project, which must be evaluated in a supplemental DEIS.

³ Response of NorthernStar Energy LLC and Bradwood Landing LLC to the FERC Staff's Recommended Mitigation Measure 24 in the DEIS. Letter dated April 8, 2008, pp 2-3.

State Agencies

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SA7-2

After our issuance of the draft EIS, NorthernStar indicated that not all LNG carriers may be retrofitted to connect to the proposed ballast and cooling water supply system. Therefore, our analysis and discussion of potential impacts on water quality and aquatic resources (which includes salmonids) in sections 4.3.2.2 and 4.5.2.1 has been revised. We conducted additional analysis of entrainment and water quality impacts at the wharf without the use of the filtered water supply system and NMFS-approved screens. Due to the potential impacts on sensitive aquatic resources at the terminal, we are recommending that the Commission Order include a condition to require that NorthernStar develop a plan to deliver screened water to LNG carriers at the terminal. We are also recommending that NorthernStar conduct post-installation tests of all intake screens at the terminal, and develop a monitoring and reporting program to assess the efficacy of the screened water supply system at minimizing entrainment and impingement. In addition, we are recommending that NorthernStar develop performance standards for water quality impacts associated with LNG carrier discharges of cooling water at the wharf. We will conduct additional detailed analyses of the screened water supply system and the performance standards in our revised BA and EFH Assessment.

SA7-3

The proposed pipeline route has not changed since the draft EIS was issued. The pipeline alignment in the final EIS is the same alignment that was in the draft EIS. Changes to the pipeline route that may occur after the final EIS is issued would likely be relatively minor and fall within the corridor that has been assessed for wetland and wildlife impacts (where access has been granted). All route realignments, with certain exceptions described in recommended condition no. 6 in section 5.2, would require written approval from the Director of OEP before construction in or near that area.

K-524

SA7-4 3. **Deposit of dredge spoils:** Dredge spoils will now be placed entirely on the Bradwood site; it appears that deposition elsewhere in Wahkiakum County will not occur. The environmental effects of that substantial change must be evaluated in a supplemental DEIS.

SA7-5 4. **Open regasification:** The regasification system may be altered to allow open regasification. That substantial change will result in greatly increased amounts of effluent discharged into the Columbia River. The environmental effects of that increased effluent on fish species and other values are unknown and must be evaluated in a supplemental DEIS.

SA7-6 The standard for requiring a supplemental EIS when a project has substantially changed was explained by the United States Supreme Court in *Marsh v. Oregon Natural Resources Council*, 490 US 360 (1989). The decision to prepare a supplemental EIS is similar to the decision whether to prepare an EIS in the first instance: "If there remains 'major Federal action[n] to occur, and if the new information is sufficient to show that the remaining action will 'affect[t] the quality of the human environment' in a significant manner or to a significant extent not already considered, a supplemental EIS must be prepared." *Id.* at 374.

An agency violates NEPA when it fails to give adequate and timely consideration to the significance of new circumstances. *NRDC v. United States Army Corps of Engineers*, 399 F Supp 2d 386, 405 (SDNY 2005) (dredging action alleged to have changed due to EPA consent order requiring a remedial investigation/feasibility study). A party challenging an agency's failure to prepare a supplemental environmental impact statement need demonstrate only that there is a substantial possibility that the changed agency action may have significant new impacts. *Id.* at 411.

An alternative that entails "a different configuration of activities and locations" from that contained in a previous EIS must be presented in a supplemental EIS. In *Dubois v. United States Department of Agriculture*, 102 F3d 1273 (1st Cir 1996), *cert den* 521 US 1119 (1997), the First Circuit explained that in contrast to "a reduced version of a previously-considered alternative," a new alternative reflected a different proposed configuration must be publicly aired, because "public commenters might have pointed out, if given the opportunity – and the Forest Service might have seriously considered – wholly new problems posed by the new configuration (even if some of the environmental problems present in the prior alternatives have been eliminated)." 102 F3d at 1292-93.

The four changes listed *ante* (unscreened intake water, changed pipeline route, different location for putting dredge spoils, and open gasification system)

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SA7-4 We considered the alternative of placing all of the dredged material from the ship berth and maneuvering basin at the LNG terminal site in the draft EIS. Up to 205,000 cubic meters of dredged material may still be placed at the Wahkiakum County Sand Pit site. However, even if all of the dredged material is placed at the LNG terminal, aside from the raising the grade an additional 5 feet, there would not be any significant changes in impacts at the LNG terminal site resulting from the additional dredged material.

SA7-5 NorthernStar has not filed any proposed changes to their regasification process with the FERC. NorthernStar proposed SCVs to regasify the LNG and that is the technology that we have analyzed in our EIS.

SA7-6 The submittal by NorthernStar on April 16, 2008 did not contain "substantial" amounts of new information or information that reflected substantial changes in the project.

State Agencies

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SA7-6
cont'd

represent substantial changes in the project that are relevant to environmental concerns. The CEQ regulation provides that "[a]gencies [s]hall prepare supplements to either draft or final environmental impact statements if [t]he agency makes substantial changes in the proposed action that are relevant to environmental concerns." 40 CFR § 1502.9(c). Hence, FERC is *required* by the CEQ regulation to issue a Supplemental Draft Environmental Impact Statement.

As noted by the First Circuit Court of Appeals with respect to that CEQ regulation, "[t]he use of the word 'shall' is mandatory, not precatory. It creates a duty on the part of the agency to prepare a supplemental EIS if substantial changes from any of the proposed alternatives are made and the changes are relevant to environmental concerns." *Dubois v. United States Department of Agriculture*, 102 F3d at 1292.

b. Significant new information is relevant to environmental concerns and bears on the proposed action and its impacts.

Significant new information has been generated both by the applicants themselves and by the Oregon Department of Energy concerning the proposed LNG import terminal facility and its environmental effects.

On April 16, 2008, NorthernStar and Bradwood Landing submitted to FERC its Motion for Leave to Respond and Response of NorthernStar Energy LLC and Bradwood Landing LLC to Comments Filed with the Commission Regarding the Draft Environmental Impact Statement. The motion to file a response to comments included four large appendices containing voluminous information, which NorthernStar and Bradwood Landing have characterized as "additional information" or information that has been "revised."

A sense of the scope of the "additional" and "revised" information contained in the motion submitted by NorthernStar and Bradwood Landing is conveyed in the Index of Attachments:

Index of Attachments

- Attachment A: Applicants' Responses to Comments on the DEIS re General Matters**
- Attachment A-1: Revised DEIS Table 1.3-1
- Attachment A-2: Revised Draft of DEIS Section 2
- Attachment A-3: Memorandum re Washington Forested Wetland Conversion

SA7-6
cont'd

- Acreage Discrepancies
- Attachment A-4: Revised Frac-out Mitigation Plan
- Attachment A-5: FERC Staff's Recommended Mitigation Condition 20 Response
- Attachment B: Applicants' Responses to Comments on the DEIS re Air Quality**
- Attachment B-1: Revised Bradwood Landing Construction Emissions Table
- Attachment B-2: Revised DEIS Table 9.1-7
- Attachment B-3: Northwest Pipeline LNG Interchangeability Meeting Slides
- Attachment B-4: LGN South Coast Air Basin Impact Slides, Jan. 06
- Attachment B-5: Revised DEIS Table 4.10.1-4
- Attachment C: Applicants' Responses to Comments on the DEIS re Design**
- Attachment C-1: Applicants' Response to Comments of Jerry Havens
- Attachment D: Applicants' Responses to Comments on the DEIS re Water Suitability Assessment**
- Attachment D-1: Columbia River Navigation Channel – Analysis of Vessel Arrival Patterns
- Attachment D-2: Columbia River Navigation Channel – Analysis of Navigation Protocols & Priorities

NorthernStar and Bradwood Landing is seeking leave to file its response to comments, given that such response comments are outside the normal NEPA process. By definition, the additional and revised information that NorthernStar and Bradwood Landing has submitted in its reply comments was not considered in the Draft Environmental Impact Statement. Hence, the public has not had a chance in the NEPA process to evaluate the additional and revised information and comment on it. Such additional and revised information is "significant" within the meaning of the CEQ regulation and must be evaluated in a supplemental DEIS.

The current scenario, in which NorthernStar and Bradwood Landing have submitted additional and revised information that the public has had no opportunity to review within the NEPA process, despite the bearing of that

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State Agencies

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SA7-6
cont'd

information to the environmental effects of the proposed project, clearly demonstrates a need for issuance of a Supplemental DEIS.

In *Kettle Range Conservation Group v. United State Forest Service*, 148 F Supp 2d 1107 (ED Wa 2001), the court granted an injunction prohibiting the United States Forest Service from implementing a "Douglas-fir Bark Beetle Project" until the Forest Service had prepared a supplemental EIS. 48 F Supp 2d at 1139-40. And in *Portland Audubon Society v. Babbitt*, 998 F2d 705, 708 (9th Cir 1993), the Ninth Circuit held that a supplemental EIS should have been prepared regarding the effect of timber harvest on the spotted owl, "because the scientific evidence available to the Secretary in 1987 raised significant new information relevant to environmental concerns, information bearing on the impacts arising from the ongoing implementation of the land use decisions driven by the original TMPs [timber management plans]."

SA7-7

In addition to the significant additional and revised information submitted by the applicants, the Oregon Department of Energy has developed the attached report, entitled "Response to Governor Kulongoski's Request for LNG and Natural Gas Review, ODOE, May 7, 2008." That report concerns the need for and costs, both fiscal and environmental, of an LNG import terminal facility in Oregon. The report contains significant new information bearing on the impact of the proposed LNG import terminal facility on the human environment. The report discusses the alternative of new pipelines to bring natural gas from domestic Rocky Mountain sources to Oregon at less cost and with fewer adverse effects on the environment. The report addresses the carbon footprint of LNG generally and the carbon dioxide emissions in Oregon caused by the proposed LNG import terminal facility. That new information is significant, as defined by the CEQ regulation, and hence it must be evaluated in a supplemental DEIS.

More specifically, the ODOE report concludes that natural gas will continue to be needed in Oregon for the foreseeable future, but that the three LNG import terminal facilities proposed in Oregon are not the only viable option to assure needed natural gas supplies are available. There is an over-capacity of existing LNG facilities in the United States, and hence Oregon LNG facilities would likely be underutilized. Furthermore, high oil prices and competition from Asian countries competing for natural gas supply mean that the price of Pacific Basin LNG would greatly exceed the price of North American natural gas. Domestic natural gas from North American could provide adequate natural gas to meet Oregon needs for the foreseeable future. Three new proposed pipelines from the Rocky Mountain gas fields, for example, could provide natural gas more

SA7-7

We have incorporated information from the report titled, *Response to Governor Kulongoski's Request for LNG and Natural Gas Review* (ODE, May 7, 2008) into sections 3 and 4.10.1 of the final EIS.

K-528

economically for the Oregon and California markets than the three LNG terminals.

SA7-8 In addition, the report indicates that LNG has significantly higher life cycle CO2 costs than domestic natural gas, due to the processes used to liquefy and regasify the natural gas and the large transportation distances involved in shipping LNG to Oregon. It is likely that CO2 emissions from regasification at an LNG terminal in Oregon would be included in a regional cap and trade system and thus could adversely affect Oregon's ability to meet its CO2 reduction targets under a state law passed in 2007 (House Bill 3543) and under the Western Climate Initiative. In general, the Rocky Mountain pipelines appear likely to have less environmental impact on Oregon and lower levels of life cycle greenhouse gas emissions than the three LNG facilities proposed for Oregon to serve the same markets. The information contained in the ODOE report is significant new information that must be evaluated in a supplemental DEIS.

SA7-9 In *Blanco v. Burton*, 2006 US Dist Lexis 56533 (ED La 2006) (impacts of Hurricanes Katrina and Rita resulted in new information supporting a call for a supplemental EIS), the court agreed that the plaintiffs were likely to prevail on their NEPA claim that a supplemental EIS was required:

The Court of Appeals has stated, "The principal factor an agency should consider in exercising its discretion whether to supplement an existing EIS because of new information presents a picture of the likely environmental consequences associated with the proposed action not envisioned by the original EIS." *Louisiana Wildlife Fed'n, Inc. v. York*, 761 F.2d 1044, 1051 (5th Cir. 1985) (quoting *Wisconsin v. Weinberger*, 745 F.2d 412, 418 (7th Cir. 1984).

In determining whether to issue a supplemental EIS, FERC is required under NEPA to take a "hard look" at the environmental impacts of substantially changed actions and significant new information. See *Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437, 446 (4th Cir 1996) (Army Corps of Engineers failed to take a "hard look" at problem of zebra mussel infestation resulting from dam project; case remanded for determination regarding supplemental EIS).

CONCLUSION

SA7-10 As Governor of the State of Oregon, I request that FERC issue a Supplemental Draft Environmental Impact Statement to address the substantial

Request to FERC for Issuance of a Supplemental DEIS

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May 9, 2008

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SA7-8 We have added a discussion of lifecycle GHG emissions for LNG facilities to sections 3.1.3.3 and 4.10.1 of the final EIS.

SA7-9 We do not believe that substantial new information exists to support the need for a supplemental draft EIS.

SA7-10 See our responses to comments SA7-1 through SA7-9.

SA7-10
cont'd

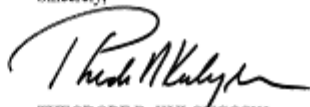
changes in the proposed action and the significant new information relevant to environmental concerns bearing on the proposed action. Such new information includes not only the voluminous material that NorthernStar and Bradwood Landing have themselves identified and submitted to FERC in the form of additional and revised information not previously included in the DEIS, but also the attached report from the Oregon Department of Energy addressing considerations of need, cost and the carbon footprint consequences if the proposed LNG import terminal facility is built in Oregon.

In closing, I reiterate the comment I made in my previous letter accompanying the DEIS comments of Oregon agencies:

Ultimately, the decision to site terminals requires the full engagement of the federal government, the state and the communities where facilities are proposed. Only by working together through the siting, environmental assessment and permitting processes can we make sound decisions about the appropriateness of any proposed LNG terminal.

In that spirit of cooperation and coordination, I look forward to an affirmative resolution of Oregon's request that a Supplemental Draft Environmental Impact Statement be prepared for the Bradwood Landing LNG import terminal facility and associated pipelines.

Sincerely,



THEODORE R. KULENGOSKI
Governor

State Agencies

LOWER COLUMBIA
ECONOMIC DEVELOPMENT
COUNCIL

Encouraging Growth Now, and in the Future

November 2, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D. Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Ref. Docket# CP06-365-000

ORIGINAL
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FEDERAL ENERGY
REGULATORY COMMISSION
(file:///C:/Users/Bradwood/FI/2007/CP06-365-000/letter.doc)

To Whom It May Concern:

On behalf of the Board of Directors of our Economic Development Council I would like to respond to the proposal before you concerning Bradwood Landing and Northern Star Natural Gas.

For the past 2 1/2 years we have taken a wait and see attitude about the building of an LNG plant across the river from our County. We have studied all of the pros and cons, safety and water traffic issues etc., and we have visited with Northern Star officials.

With our understanding that your county will benefit greatly with a massive tax increase, our board has decided that we want to support the building of this facility at the requested site for the following reasons:

LA1-1

1. Northern Star has committed the docking of three tug boats in Cathlamet. These boats would constitute 35 jobs, plus rent and remodeling of an old building. In addition to maintenance, fuel, food, etc. This operation would greatly enhance our job growth and waterfront development.
2. Northern Star has committed fifty-five living wage jobs at the plant. If our county could earn ten to fifteen of those jobs along with the tug boat jobs, it would make Bradwood Landing our fourth largest employer. See attached Wahkiakum County list of top employers.
3. With the decline in timber revenues that our County uses to fund mandated services, our County medical clinic is in jeopardy. We need industry, growth and funds to help make up this loss in revenue and services.
4. Northern Star has committed to allow Wahkiakum County to bid on manufacturing items to be used in building their plant and giving us a start up business, and development of a business park. In addition to job training for our High School students.
5. Northern Star has committed \$100,000.00 a year to our Wahkiakum Community Foundation to be used to assist with safety issues and address County needs. They have already funded the first payment and will continue annually until the plant comes on line.
6. Northern Star has committed \$500,000.00 a year after the plant is operational for the life of the plant to be used as the County Foundation submits requests for needs.
7. We feel that one of our biggest assets is the river and its ship traffic. Many of our landowners and tourists come to Wahkiakum County to see the ships and river traffic. We feel it will not hurt our growth but add to it.

Thank you for considering our needs and requests.

Cordially,

Richard Erickson
Executive Director

P.O. Box 243 * Cathlamet, WA 98612 * Phone 360-795-3996 * FAX 360-795-3944

Local Agencies

1

LA1-1 Comment noted.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Bradwood Landing LLC	)	Docket No. CP06-365-000
Northern Star Energy LLC	)	Docket Nos. CP06-366-000 CP06-376-000 CP06-377-000

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT BY THE
CITY OF WARRENTON, OREGON

Movant-Intervenor¹ the City of Warrenton, a municipal corporation, through its City Commission, the duly elected governing body for the City of Warrenton (the "City" or "Warrenton"), hereby submits its comments on the Draft Environmental Impact Statement ("DEIS").

Background

As described in the DEIS, the City of Warrenton, Oregon is a municipality consisting of approximately 17 square miles in geographic jurisdiction located at the mouth of the Columbia River. It is the most northwesterly City in Oregon. The former Town of Hammond is merged into Warrenton. The City's year round population is currently 4,645, however based on proposed development plans this is expected to increase to over 7,000 in the next several years. The summer time population can exceed 10,000. The City is directly and significantly impacted by the proposed vessel transits carrying liquefied natural gas ("LNG") to the proposed Northern Star Natural Gas LLC ("NSNG") facility at Bradwood Landing, located at approximately river mile ("RM") 38 upstream.

Included within or immediately adjacent to Warrenton are a diverse number of private and critical government occupancies. Among these are Fort Stevens (Oregon's largest State

¹ On or about July 5, 2006, the City of Warrenton's timely Motion to Intervene was docketed by the Federal Energy Regulatory Commission (the "Commission") as Accession No. 20060706-0160, but to date the City has not been placed on the Service List.

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Park), Warrenton-Astoria Regional Airport (Clatsop County's only commercial airport), Camp Rilea Armed Forces Training Center (Oregon's largest active military reservation), a 100 bed juvenile corrections facility, and two major recreational and commercial fishing boat mooring basins.

Public Safety is provided by local police and fire departments. The Warrenton Police Department is comprised of eight full-time officers and several reserve officers, who are responsible for 24 hour protection of the City's 17 square mile area. The Warrenton Fire Department consists of two full-time personnel, 32 volunteer firefighters, and seven response vehicles. The Fire Department's service area is 28 square miles and includes the numerous facilities noted above. In addition, through existing Mutual Aid Agreements, Warrenton supports the Knappa-Svensen-Burnside Rural Fire Protection District, in which the proposed LNG terminal would be located. The City currently has no marine law enforcement or firefighting capability.

The City has very limited funding resources available for public safety services. It relies on limited property tax revenues that are used primarily for existing personnel expenses. In recent years equipment purchases have depended on grants, loans, **and serial levies.**

The City's public safety responsibility extends for approximately seven miles along the southerly bank of the Columbia River beginning at approximately Clatsop Spit (Buoy 14) then continuing eastward to Smith Point. Approximately four and one-half miles of the Columbia River shipping channel from Hammond Marina east to the Astoria city limits are within the municipal jurisdiction of the City of Warrenton. Warrenton is the first municipality potentially impacted once the LNG Carrier enters the Columbia River. As described in the DEIS (Section 4.7.1), portions of the City are located within all three Zones of Concern, including the Hammond and Warrenton waterfront within Zone 1 (p. 4-273), the Warrenton Waterfront Trail, Carruthers' Park and the community library within Zone 2 (p. 4-278), and the police and fire

Local Agencies

stations are located within Zone 3 (p. 4-327). Within all three zones are many areas where people congregate outdoors including essentially the entire route from Fort Stevens State Park, along the River Walk trail, in the area of Hammond Boat Basin and at Carruthers' Park. Each of these public assembly areas are sufficiently close to the vessel transit route to warrant heightened safety and security measures.

Procedural History

On May 24, 2006, during the Pre-Filing Process, the City of Warrenton wrote to the Commission to advise that the City had a number of safety related concerns regarding the potential transit of LNG carriers through the corporate limits of the City of Warrenton, which would occur should the Bradwood Landing site be approved by the Commission. A copy of that May 24, 2006 letter was also included in the Safety Advisory Report submitted to the Commission by the Oregon Department of Energy, attached as Appendix K to the DEIS. The City timely moved to intervene, which motion was docketed July 5, 2006 as Accession No. 20060706-0160. Since that time, both Warrenton's Police Chief and Fire Chief have participated in various meetings and workshops held in conjunction with preparation of the U.S. Coast Guard Waterway Suitability Assessment Report ("WSR") dated February 28, 2007, attached as Appendix H to the DEIS, and with respect to development of an Emergency Response Plan ("ERP").

Comments on the DEIS

LA2-1

The DEIS repeatedly refers to the same discussion concerning waterway safety and security throughout the voluminous report. Specifically, the DEIS recognizes significant potential impacts within Zones 1 through 3 due to an accidental or intentional breach of an LNG vessel resulting in a release of LNG during transit or while at the berth. It acknowledges the risk of severe consequences, with injuries ranging from mild to fatal, being most severe in Zone 1 and decreasing outward through Zones 2 and 3. See, e.g., DEIS, p. 4-322. Yet, the DEIS

Local Agencies

LA2-1

We have updated section 4.11.5.5 to include a condition which would require NorthernStar to comply with all requirements set forth by the COPT

LA2-1
cont'd

uniformly concludes that "with the implementation of the safety and security measures and conditions outlined in the Coast Guard's WSR (see Appendix H), an LNG release along the waterway would be highly unlikely." *Id.* See also DEIS, p. 4-273 ("Effects on structures within Zone 1 would be most severe, while buildings within Zone 3 would be less impacted. However, with implementation of the mitigation measures described in the Coast Guard's WSR, an LNG release along the waterway would be highly unlikely."); DEIS, p. 4-275 ("With the implementation of the safety and security measures outlined in the Coast Guard's WSR, it is highly unlikely that there would be a release of LNG from a passing LNG ship that would lead to a spill and related pool fire affecting planned commercial or residential developments along the waterway."); DEIS, p. 4-279 ("Those facilities within Zone 1 could sustain damages to structures, features, or vegetation. Facilities within Zone 3 would be less affected. However, with the implementation of the safety and security measures outlined in the Coast Guard's WSR, the chance of a spill would be extremely remote.").

As a result of these findings, the FERC staff made a number of recommendations which are described in detail in Sections 4.11.5.5 and 4.11.6 of the DEIS (pp. 4-429 through 4-436) and further documented in Section 5.2, Conditions 42, 62 and 63. These conditions fail to properly acknowledge, however, that the Coast Guard measures are *necessary requirements* and not simply preliminary recommendations with the details to be worked out later. Compare DEIS, p. 4-432 ("the WSR recommends additional facilities and infrastructure to make the waterway suitable for LNG marine traffic") with WSR, App. H ("I have determined that to make the Columbia River suitable for the type and frequency of LNG marine traffic associated with this project, additional measures will be necessary ... [and] must be put into place").

LA2-2

Additionally, the DEIS minimizes and generalizes the specific requirements outlined by the Coast Guard. For example, on page 4-432, the DEIS identifies one item as "augmentation of shoreside firefighting capabilities to provide protection services to the facility as well as

Local Agencies

2

LA2-2 By necessity, the EIS must summarize information from many sources. The complete WSR is provided as Appendix H.

LA2-2
cont'd

communities along the river" when the original WSR (p.4 of 6) stated "shore side firefighting resources and training will need to be augmented ... [including] adequate cost-sharing arrangements for project related training, equipment, maintenance, and staffing ... for all communities impacted by the project."

LA2-3

Representatives of NSNG have had approximately two years to make firm commitments to state, county and local law enforcement and fire agencies concerning these requirements, and have not done so. The proposed conditions that the WSR be updated annually and NSNG commit prior to commissioning to implement the required measures is simply too little too late. Additionally, the conditions recommending the Emergency Response Plan ("ERP") and cost-sharing plan be submitted prior to initial site preparation likewise do not provide sufficient certainty for local communities, like Warrenton.

As documented throughout the DEIS, implementation of these measures are critical to the viability of the project and the validity of the DEIS assessment. Absent binding agreement with the state, county and local fire and police agencies concerning security and safety requirements, the project cannot proceed and the entire DEIS safety and security analysis is rendered meaningless. Therefore, NSNG should be required, *prior to issuance of the final order issuing certificates ("Order" or "Certificate")* to reach an agreement in principle, in a form acceptable to each respective agency, with each state, county and local municipality affected on the level of resource funding NSNG will commit for safety and security requirements including, without limitation, capital requirements for new equipment, resources for additional staff, and training for all affected personnel (both professional and volunteer). These critical decisions cannot and should not be put off until after the Certificate issues.

The Commission cannot fulfill its statutory duty to address state and local safety considerations required by 15 U.S.C. § 717b-1 (Section 311(d) of the Energy Policy Act of 2005) by simply stating that these important details will be worked out after the Certificate issues. See

Local Agencies

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LA2-3 See our response to comment PM1-1.

LA2-3
cont'd

DEIS, Appendix K, Response of the Federal Energy Regulatory Commission to the Safety Advisory Report of the Oregon Department of Energy for the Bradwood Landing Project (referring to proposed Conditions 42, 62, and 63). The statute requires meaningful resolution of state and local safety considerations "prior to issuing an order pursuant to section 717b." See 15 U.S.C. § 717b-1(b) and (c). Therefore, NSNG must be required to address Warrenton's requirements (as well as the other jurisdictions affected), outlined in its May 26, 2006 letter, and commit to the funding necessary to implement these requirements, prior to issuance of any Order approving the project.

LA2-4

Secondly, with respect to "the current capacity of the local public services to respond to an incident or fire at the LNG terminal," the DEIS recognizes "that significant gaps exist in fire fighting capacity for both shore and water side fire fighting response." DEIS, p. 4-342. These gaps were also described in the State Advisory Report (Appendix K) filed pursuant to 15 U.S.C. § 717b-1. The DEIS states that "NorthernStar has indicated that trained personnel and fire fighting equipment would be maintained at the LNG terminal in the event of an emergency." Id. However, there is nothing in the DEIS to indicate that NSNG has committed to anything more than that which is required by applicable regulations and requirements found in 49 C.F.R. Part 193 and NFPA 59A. The proposed solution to address this acknowledged issue, the requirement to produce an ERP prior to construction, is simply inadequate.

Given the lack of local capacity and the distance from supporting fire fighting services, NSNG must be required to provide enhanced fire protection in the form of an Industrial Fire Brigade as described in NFPA 600. It is simply insufficient that operations and maintenance personnel will be trained in safe shutdown and evacuation procedures, etc. as already required by applicable regulations. If an incident occurs at night, when only a limited operations crew is working, there may be insufficient personnel to man all of the fire fighting equipment likely to be present. Additionally, by conditioning the Order on implementation and maintenance of an

Local Agencies

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LA2-4 As discussed in section 4.11.6, NorthernStar would be required to develop an ERP that would be approved by the FERC before any final approval to begin construction. See our response to comment PM1-1.

LA2-4 cont'd Industrial Fire Brigade (NFPA 600), the Commission and the public can be assured that dedicated fire fighters with proper training and equipment will be readily available to address any incident at the terminal.

LA2-5 Lastly, with respect to protection of Cultural Resources in the event of an incident, the DEIS states that "NorthernStar indicates that it would produce a Cultural Resources Management Plan that would outline procedures for coordination with first responders in order to protect historic properties." DEIS, p. 4-359. This commitment is not reflected in any of the proposed conditions prepared by FERC Staff. See Section 5.2. Therefore, Condition no. 36 (requiring such Cultural Resources Management Plan) must be modified to include a requirement to coordinate, and reach agreement, with first responders on the method and means to protect historic properties which are located within the Zones of Concern, especially historic buildings along the waterway which are most likely to be adversely impacted.

Conclusion

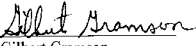
As described herein and in its prior correspondence (incorporated by reference), Warrenton requires a commitment to fund necessary capital and on-going expenditures related to police and fire protection before it can agree to any proposed ERP. NSNG should be required to document such commitments, in a form agreeable to Warrenton, before any final Order is issued from the Commission. The proposed mitigation conditions, which delay finalizing such monetary commitments until after the Certificate issues, are inadequate and contrary to statutory requirements enacted as part of the Energy Policy Act of 2005. Additionally, based on the recognized need, NSNG should be required to implement and maintain an Industrial Fire Brigade meeting all requirements described in NFPA 600, and as approved by the City of Warrenton. Lastly, the required Cultural Resources Management Plan must contain provisions addressing the risk to historic properties located within the Zones of Concern and include agreements with local first responders documenting the method and means for protecting these properties and sites.

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LA2-5 We agree that the Cultural Resources Management Plan that NorthernStar committed to protect historic properties from the actions of first responders in the event of an unexpected accident should be part of the FERC's requirements to complete compliance with the NHPA. Therefore, we have added to our recommendation in section 4.9.4 the requirement that NorthernStar must provide a Cultural Resources Management Plan, for review and approval by the SHPOs and the FERC, prior to construction.

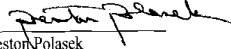
Respectfully submitted,


Gilbert Gramson
Mayor
City of Warrenton
P.O. Box 250
Warrenton, OR 97146
Telephone: 503-861-2233

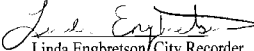
December 17, 2007

CERTIFICATE OF SERVICE AND MAILING

I hereby certify that I have this day served the foregoing document on each person designated on the official service list compiled by the Secretary in this proceeding on December 18, 2007, by first class mail, postage prepaid.


Preston Polasek
City Manager

Attest:


Linda Engbretson, City Recorder

Local Agencies



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ADMINISTRATIVE COORDINATOR

Stephanie Dunn

December 11, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: Docket CP06-365-000 and CP06-366-000 et al.
Bradwood Landing LNG Import Terminal Draft Environmental Impact Statement

Dear Ms. Bose:

Cowlitz County is the SEPA agency for the State of Washington. It is our responsibility to ensure that the environmental document adequately addresses local and state issues. To that end the County has reviewed the Draft Environmental Impact Statement (Draft EIS) and compiled comments from the public and local and state agencies. As members of the Board of Cowlitz County Commissioners, we respectfully submit this letter and the enclosed attachments as the County's official comments on the Draft EIS.

Enclosed with this letter are the following documents:

- Cowlitz County official comments on the Bradwood Landing Project Draft EIS
- Public Comments
- Agency Comments
- County Meeting Notes

Overall, we found the Draft EIS helpful in its description of the proposed terminal and operations, and we appreciate the difficulty of completing a thorough environmental analysis for such a large and complex project. Our comments identify our primary areas of concern and make requests for revision to the Draft EIS or for additional analysis.

Sincerely,
Board of County Commissioners
of Cowlitz County, Washington

Kathleen A. Johnson, Chair

George Raiter, Commissioner

Axel Swanson, Commissioner

cc: Mike Wojtowicz, Building and Planning Director
Commissioners' Record

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Local Agencies

Cowlitz County Official Comments: Bradwood Landing Project Draft EIS NEPA/SEPA Review

Introduction

This NEPA/SEPA review looked at the Bradwood Landing Draft EIS, Resource Reports for the environmental disciplines for both the Terminal and Pipeline portions of the project, and additional supporting materials found as referenced in the Bradwood Landing materials or referred to the County through public comment. The comments are organized by Draft EIS chapter and section.

These comments represent the official comments of the Cowlitz County Board of Commissioners, the designated State Environmental Policy Act lead agency for the Bradwood Landing Project. Attached with these comments is the full record of comments received by the County during the Draft EIS comment period. The record is organized by public comments, agency comments, and county meeting notes.

Chapter 1 Introduction

- LA3-1 1) **Comment:** (Page 1-2) The description of the proposed LNG import terminal does not mention or describe the development of the foundation for a third LNG storage tank. Because the development of a third storage tank foundation would affect habitat resources at the site, it should be identified as part of import terminal development.
- Request:** The FERC should clarify that a third storage tank foundation will be developed under the proposed LNG import terminal description.
- LA3-2 2) **Comment:** (Page 1-3) Cowlitz County is concerned that the purpose statement and at least one of the stated objectives for the project may be considered too narrow under NEPA. Including "through importation of LNG" in the purpose statement is rather narrow and rules out other sources of new natural gas to the Pacific Northwest. Additionally, the statement "delivering natural gas to the Wauna Mill, Oregon and the PGE Beaver Power Plant at Port Westward, Oregon" and then using this statement as a project objective to rule out alternative sites and pipeline routes may be seen as too narrow for NEPA standards.
- Request:** The FERC may want to consider a more broad purpose statement to meet the intent of NEPA.
- LA3-3 3) **Comment:** (Page 1-8) ODEQ will not review the Bradwood Landing NPDES permit application until Clatsop County has issued a Land Use Compatibility Statement.
- Request:** The review of the NPDES permit application should be made available for review and comment prior to issuance of the Final EIS.
- LA3-4 4) **Comment:** (Page 1-24 and 1-25) The Draft EIS should incorporate all substantial comments submitted during the scoping process. However, the comments included in Chapter 1 do not include comments made about unsuitable soils and geologic hazards or comments regarding economic impacts to landowners along the pipeline.
- Request:** The FERC should include all substantial concerns and comments raised during the scoping process.

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- LA3-1 Soil corrections and vibroflotation would be conducted in the entire LNG storage tank area (including the area of the possible third tank); however structural foundations for the third tank would not be constructed.
- LA3-2 Although the purpose statement included the phrase "through importation of LNG" we evaluated system alternatives that included new pipelines (see section 3.1.2.2). Regionally, we considered locations in Puget Sound, Grays Harbor, and Jordan Cove and did not exclude them because they could not supply natural gas to specific end users that the Bradwood Landing Project proposes to serve. However, when we considered the locations on the Columbia River, we did a more detailed comparative analysis and assumed the same delivery points along the sendout pipeline for all of the proposed alternatives for consistency.
- LA3-3 We have revised the EIS to acknowledge that Clatsop County made its land use decision on March 20, 2008. See responses to comments PM6-94, SA1-179, and SA4-3.
- LA3-4 The EIS addresses all general issues raised during scoping. See our response to comment PM3-24.

Chapter 2 Description of Proposed Action

- LA3-5 1) **Comment:** (Pages 2-11 and 4-428) Chapter 2 describes the waterway conditions at the mouth of the Columbia River, for example the potential for a 35-foot standing wave at the bar and the need for large ships to wait for good conditions before leaving or entering the river channel. Page 4-428 explains that there are two anchorages on either side of the channel at Astoria, but that the LNG ships would not use the anchorages. Cowlitz County poses this question because if the location of holding for LNG ships is closer to Washington there may potential impacts to the State of Washington.
- Request:** The FERC should disclose the alternative locations for holding LNG ships while waiting for safe passage conditions to allow for consideration and review of potential impacts.
- LA3-6 2) **Comment:** (Pages 2-27 and 4-9) The Draft EIS indicates gas conveyed by the pipeline would not be odorized. The pipeline alignment in Washington would pass through an area of numerous documented mass-wasting hazards.
- Request:** The Final EIS should include a more thorough risk analysis to address leak detection and pipeline safety given the risk to pipe integrity posed by the geologic setting coupled with the pipeline transport of non-odorized gas.
- LA3-7 3) **Comment:** (Page 2-28) This section briefly describes the Palomar Gas Transmission pipeline project (Palomar). It describes that although NorthernStar has indicated it is seeking capacity on the Palomar pipeline, the construction of the Palomar pipeline is entirely independent of the Bradwood Landing project. As such, the FERC indicates that all analysis of impacts and alternatives for the Palomar pipeline will be conducted separately. This section also indicates that a section of the pipeline connecting to Bradwood Landing would not be constructed if Bradwood were not constructed. Thus, in our analysis, for at least that section of the pipeline, any impacts from the Palomar pipeline are, in fact, dependent on the Bradwood Landing LNG import terminal project.
- Request:** The FERC should evaluate and disclose potential impacts of that section of the Palomar pipeline that is dependent on the Bradwood Landing project. Because these impacts would occur on lands not presently impacted by the project currently under review in this Draft EIS, property owner notification, additional public comment hearings, and additional comment period for an updated Draft EIS would be appropriate.
- LA3-8 4) **Comment:** (Page 2-28) The potential connection of the Bradwood Landing LNG facility to the Palomar pipeline has raised many questions about the future use of gas imported to Bradwood Landing. Many Cowlitz County residents have questioned whether the Draft EIS accurately represents the intent of NorthernStar with respect to the ultimate market destination of imported LNG. The indication in this section that natural gas could be sent through the Palomar pipeline makes Cowlitz County residents question whether the proposed pipeline through Cowlitz County is even necessary, and if the demand for natural gas presented in the purpose and need section of the Draft EIS accurately represents the intended markets.
- Request:** The FERC should closely evaluate the relationship between the Bradwood Landing LNG facility, its proposed pipeline, and the proposed Palomar pipeline. To the extent possible, future plans for capacity on the Palomar pipeline and the proposed Bradwood Landing pipeline for LNG imported through Bradwood Landing should be disclosed.
- LA3-9 5) **Comment:** (Page 2-41) Site preparation may include blasting along the southern boundary of the site and at the existing rock quarry. The Draft EIS states that all applicable federal, state, and local regulations will be adhered to and NorthernStar would employ mitigation measures, as necessary.

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- LA3-5 There are no locations planned for holding LNG carriers. If the Columbia River Bar is closed, incoming LNG carriers would stay in the ocean, while outgoing carriers would remain at the LNG terminal. No anchorages would be allowed for LNG carriers along the waterway.
- LA3-6 Section 4.1.4.3 describes the mitigation measures proposed by NorthernStar to address potential geological hazards. The pipeline would be operated under the DOT's pipeline safety standards contained in CFR 49 Part 192, including leakage survey requirements in 192.706. See also our responses to comments PM5-81 and LA7-25.
- LA3-7 Although the segment that would connect to the Bradwood Landing LNG terminal would not be built if the Bradwood Landing Project is not authorized, taken as whole, the Palomar pipeline is not dependent on the Bradwood Landing Project. The environmental impacts of the Palomar project are being reviewed under a separate EIS process, including property owner notification and the opportunity for public review and comment.
- LA3-8 The Bradwood Landing sendout pipeline would terminate at an interconnection with the existing Williams Northwest pipeline system near Kelso, Washington. The Palomar pipeline could be an alternative destination for natural gas from the Bradwood Landing LNG terminal if it is certificated and constructed, but the Bradwood Landing Project would not be dependent on it.
- LA3-9 NorthernStar would develop a Blasting Management Plan which would contain measures for noise mitigation.

K-542

K-543

LA3-9 | **Request:** Prior to completion of the Final EIS and to comply with SEPA, NorthernStar should coordinate with nearby residents at Puget Island regarding potential noise impacts during blasting and should develop a blasting management plan as part of the mitigation for this impact.

LA3-10 | 6) **Comment:** (Page 2-56 through 2-58) The FERC requires that NorthernStar hire an independent third-party contractor for compliance monitoring throughout construction.
Request: The FERC should include stipulations that the third-party contractor be under contract to the FERC, not to NorthernStar to avoid conflict of interest concerns.

LA3-11 | 7) **Comment:** (Pages 2-63 and 3-41) Section 2.9 - Future Plans and Abandonment states "...provisions have been made in the layout of the site to allow for a possible future expansion by adding a third LNG storage tank and associated equipment." Section 3.1.6.2 (page 3-41) states that "...designing a project to allow for future expansion is a typical model for energy projects..." Both sections may be interpreted to mean that a specific terminal area for a third LNG tank may be set aside for future expansion. The Draft EIS does not explicitly state that construction of the foundation and concrete pad is necessary as part of future planning or provisions.
Request: The FERC should clarify in the Final EIS that construction of the foundation and containment berm for a possible third LNG storage tank will be undertaken during terminal development, and that the foundation and relevant section of the containment berm are provisions for future expansion.

Chapter 3 Alternatives

LA3-12 | 1) **Comment:** Overall, the terminal site alternatives analysis as provided in the Chapter 3 of the Draft EIS and in the Bradwood Landing Resource Report 10 fail to meet the standards for alternatives analysis found in Section 10.4 of the FERC's *Guidance Manual for Environmental Report Preparation*, August 2002. Section 10.4 requires that the environmental document "Identify and discuss the decision criteria and weighting used at each decision point and clearly state the basis for each decision." This statement is followed by a list of factors that should be discussed for each alternative site. Of the 17 factors, it appears the Bradwood Landing terminal site alternatives analysis did not specifically evaluate seven of these factors as follows:

- a) Visual impact;
- b) Amount of prime farmland soils;
- c) Presence of HRHP-eligible sites;
- d) Number of noise-sensitive areas (NSAs);
- e) Location of nearby NSAs;
- f) Air quality considerations; and
- g) Noise considerations;

Although the environmental documents state that the alternatives analysis consisted of a three year long evaluation process, there is very little supporting information regarding the alternative terminal sites and no evidence of a weighted criteria system or consistent application of the criteria to each site. Cowlitz County reviewed the alternative locations for the terminal because of the impacts to residents of the State of Washington on Puget Island and because the location of the pipeline is determined by the location of the terminal.

Request: The FERC and NorthernStar should provide documentation of the detailed criteria evaluation for each of the proposed alternative terminal locations and demonstrate how each criterion was equally applied to each alternative site.

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LA3-10 | The FERC third-party contracting guidelines establish a separation of the contractor's technical interactions with the FERC staff from the invoicing process, whereby the project sponsor is only involved in paying for the contractor's time, materials, and related expenses. This is so that the applicant has the burden of covering the costs for the review of its proposal, rather than passing on those expenses to U.S. tax payers. This arrangement is similar to what other federal agencies, such as the BLM and USFS, do under their cost-reimbursable contracts with applicants. The third-party contractor is under the direction of the FERC staff, and NorthernStar is prohibited from viewing any work products. There is no conflict of interest. See response to comment PM3-65.

LA3-11 | See our response to comment LA3-1.

LA3-12 | We discuss our criteria for evaluating alternatives at the beginning of section 3.1 and in section 3.1.5.3. We provided information about impacts on specific resources where we have data for alternative LNG terminal sites. We did evaluate visual impacts for certain alternatives. For example, the discussion of the Oregon LNG terminal, in section 3.1.3.4, indicated that it may have greater visual impacts than the Bradwood Landing location because it would be closer to population centers in Warrenton and Astoria. We mentioned that the sendout pipeline for the Oregon LNG Project could potentially impact nine archaeological sites, while 88 archaeological sites were identified along the sendout pipeline for the Jordan Cove LNG Project. NSAs and noise impacts were considered indirectly by an assessment of the closest residence and the population density in adjacent areas. Air quality issues are equivalent, as all of the LNG terminal alternative locations are within areas that are in attainment for all NAAQS criteria pollutants.

K-544

- LA3-13 2) **Comment:** (Page 3-6) Reference to the estimated 1,800 waste sites and radioactive contamination at Hanford Nuclear Site is not explicitly linked to power generation at the Columbia Generating Station. Unless the 1,800 waste sites are a byproduct of power generation they should not be included in the analysis of nuclear energy as an alternative.
- Request:** The FERC should clarify or qualify in the Final EIS the relation and relevance of these waste sites and/or nuclear contamination to nuclear power generation at the Hanford Nuclear Site – Columbia Generating Station.
- LA3-14 3) **Comment:** (Page 3-29) The argument for the dismissal of the Port Westward alternative site is insufficient. This alternative site appears to have important advantages over the Bradwood Landing site, specifically the potential for reuse of waste heat and cool water.
- Request:** To improve the conclusion, the results of additional research into the lease agreement for site feasibility and more clearly quantified potential, incremental negative impacts of the further river travel should be provided.
- LA3-15 4) **Comment:** (Page 3-31 through 3-34) The Draft EIS states that the analysis of feasibility for off-shore LNG import facilities was conducted at one location southwest of Astoria. This location was chosen to provide an efficient pipeline connection to on-shore facilities. We note that for on-shore LNG import terminals the alternative site analysis included sites outside of the immediate proposed project area, as long as a site could meet the purpose of bringing LNG to the Northwest market. By limiting the evaluation of off-shore alternatives to just one location, the alternatives analysis does not evaluate a reasonable breadth of locations.
- Request:** (Page 3-31) The FERC should identify other potentially feasible off-shore locations that could serve the purpose of bringing LNG to the Northwest and should conduct the same analysis for feasibility, and the results should be presented in the Final EIS.
- LA3-16 5) **Comment:** The analysis performed to compare Oregon off-shore conditions to those of the Gulf of Mexico and the Atlantic Ocean near Massachusetts is limited and may not provide a clear picture of the conditions other LNG facilities have been constructed in.
- Request:** The FERC should also include a comparison to the conditions in Nova Scotia where the Keltic Petrochemicals LNG and Bear Head LNG facilities have been proposed with off-shore components.
- LA3-17 6) **Comment:** (Page 3-39) The argument for the dismissal of the Cherry Point alternative site is insufficient. Reasoning for dismissing this site is based on potential restrictions on development due to an August 2000 Withdrawal Order by the Washington Commissioner of Public Lands that created the Cherry Point State Aquatic Reserve (CPSAR). As stated in the Draft EIS, the specific management plan will not be finalized until late 2007 or early 2008. To date negotiations are still underway and include all the stakeholders in the area including industrial developments (www.dnr.wa.gov/hdocs/aqu/reserves). We feel that the existing industrial character of this site, the deep water access, and short distance to the Williams Pipeline make the Cherry Point site a strong alternative to the Bradwood Landing site for bringing LNG to the northwest market.
- Request:** Further investigation of the potential for development of an LNG import terminal should be included before finalization of the Bradwood Landing EIS. For more information, the DNR website references Kyle Murphy (360-902-1073; kyle.murphy@dnr.wa.gov).
- LA3-18 7) **Comment:** (Page 3-48) The reasons given for dismissing the Railroad Route Alternative are insufficient. The Draft EIS states that this alternative fails to meet the project objective of delivery to

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- LA3-13 We have revised the text discussing nuclear power as a renewable energy resource alternative in section 3.1.1.3.
- LA3-14 We disagree that our analysis of the Port Westward alternative LNG terminal location is insufficient. We do not believe that the potential to exchange waste heat and cooling water from the Beaver power plant at Port Westward is a critically important advantage. The Bradwood Landing Project would have limited impacts on air quality, as explained in section 4.10. As our discussion in section 3.1.3.4 indicates, the disadvantages of an LNG terminal alternative at Port Westward includes lack of a project sponsor able to prepare a FERC application, unfavorable development conditions for the lease of waterfront property, and longer LNG carrier transit. No additional research is necessary to support those conclusions.
- LA3-15 The data on rough seas conditions, derived from the ABSC report, apply to the entire Pacific Northwest coast line. (See our response to comments PM2-24 and FA2-4.) We picked a hypothetical location off the Oregon Coast, in close proximity to the proposed Bradwood Landing Project, in order to meet the project objectives. The conclusions presented in the EIS are based on an evaluation of technologies that are technically and economically feasible given weather conditions off the Oregon coast. These technologies have certain limitations under conditions that would be present along the entire Pacific Northwest coastline. See also our response to IND115-2 [Bennett and Patricia Garner].)
- LA3-16 We have revised section 3.1.4.1 to better explain how rough sea conditions off the Oregon coast compares to conditions off the Northeast and Gulf coasts. Keltic Petrochemicals of Halifax is proposing a petrochemical plant and a cogeneration plant with an associated LNG terminal, storage, and regasification facility (see http://www.kelticpetrochemicals.ca/projects_lng.html). The Bear Head LNG project has since been discontinued but would have been located on a peninsula on Cape Breton Island, Nova Scotia, Canada (LCG Consulting Energy Online, accessed March 2, 2008 <http://energyonline.com/Industry/News.aspx?NewsID=6951>). With LNG storage and vaporization facilities located onshore, both of these proposed facilities are not conceptually different than the one proposed by Oregon LNG. Regardless, the sea conditions located at these sites are not comparable to the conditions off the coast of Oregon.
- LA3-17 Because of the uncertainty associated with the potential restrictions imposed by the CPSAR, a potential LNG facility developer could not have considered the Cherry Point alternative site under the same schedule as the proposed site. As further discussed in section 3.1.5.3, the Cherry Point location was also eliminated due to the interim restrictions on the development of any new in-water structures within the Cherry Point State Aquatic Reserve. We do not believe this alternative warrants further consideration at this time.
- LA3-18 We believe our conclusions in section 3.1.8.1 sufficiently describe the benefits of the proposed route over the Railroad Route Alternative. The proposed route beyond the PGE Beaver Power Plant at Port Westward would be collocated with the existing KB Pipeline for a significant portion of its length.

K-545

LA3-18
cont'd

the PGE Beaver Power Plant at Port Westward without a pipeline lateral that would significantly extend the length of the pipeline. Considering the objective of delivery to the power plant suggests that another alternative, a hybrid of the proposed pipeline route and the Railroad Route, could have been considered. The route could have followed the proposed route to the power plant and then transitioned to follow the Railroad Route. It appears, without any independent research or analysis, there is potential for a route with fewer environmental impacts (as described by the Railroad Route) that could be developed by such a combination. Additionally, based on Comment 2 in our comments for Chapter 1, this alternative was eliminated for not meeting a project objective that may be seen as too narrow under NEPA.

Request: Before finalization of the Bradwood Landing EIS, this additional alternative should be analyzed.

LA3-19

8) *Comment:* (Page 3-49) The Major Pipeline Route Alternatives Conclusion appears to falsely state that the proposed pipeline alternative is the shortest alternative route, when the description of the Railroad Route of page 3-48 states that the Railroad Alternative is slightly shorter than the proposed route, and Table 3.1.8-1 on page 3-50 shows the Proposed Route length as 36.3 miles and the Railroad route length as 35.8 miles.

Request: This statement should be evaluated and corrected if needed.

LA3-20

9) *Comment:* (Page 3-49) The Major Pipeline Route Alternatives Conclusion statement further claims that the proposed route eliminates constructibility issues. There is no specific evidence provided to measure constructibility issues. Many would argue that the proposed route poses numerous constructibility issues due to challenges of drilling below two major rivers and laying pipeline for approximately 17 miles in terrain with approximately 31 documented landslide features, stream drainages, and other geologic challenges.

Request: Before finalization of the Bradwood Landing EIS, further analysis of constructibility between pipeline route alternatives should be provided.

LA3-21

10) *Comment:* (Page 3-51) Table 3.1.8-2 provides reasons for minor route variations in the proposed pipeline route. While this information is helpful, it is difficult to evaluate the accuracy of the statements because the level of detail provided on the maps in Appendix B is not sufficient to verify the conclusions. Additionally, on the maps, it is unclear whether the red solid line shows the route as indicated with the "selected" notation in Table 3.1.8-2 where the alternative route was selected, or if the dashed line shows alternatives considered in the case where it was selected or where it was not.

Request: Where a minor route variation was determined based on a physical element that can be mapped, more detailed mapping should be provided. Additionally, clarification should be provided for symbolization of the selected route.

Chapter 4 Environmental Analysis

4.1 Geology

LA3-22

1) *Comment:* (Pages 4-20 and 4-21) Section 4.1.4.3 states that horizontal directional drilling (HDD) is proposed for routing the pipeline under landslide features and up to 17 waterbodies. A URS geotechnical investigation (URS 2006b) states for each of the proposed HDD sites, that "the risk of encountering varying geologic conditions is low." Based on a review by Foundation Engineers contracted with Cowlitz County, the Columbia River Basalt underlying many of the sites vary from soil to very hard rock with zones of very close jointing. Therefore, in our opinion, the HDD will likely encounter widely varying conditions. The proposed extensive use of HDD technology appears

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LA3-19

The major pipeline route conclusion has been revised in the final EIS.

LA3-20

The constructability issue referred to is specifically the requirement for blasting in proximity to the railroad bed. This has been clarified in the conclusions for the major pipeline routes in section 3.1.8.1.

LA3-21

The legend on each figure indicates that the solid line is the proposed route, which by definition, would be the selected route segment. The EIS is by necessity a summary document and we believe the level of detail in the pipeline route maps, along with the narrative in the text, is sufficient to depict the minor route variations.

LA3-22

See our response to comment SA3-5.

LA3-22
cont'd

to 'push' the limits of the existing technology. In addition, there are no contingency plans for alternate stream crossing methods such as open trenching. The lack of surety regarding whether HDD technology can be used at all the locations it is proposed may present problems with compliance with the Biological Opinion and other agency approvals.

Request: The Final EIS should provide a more thorough discussion of design considerations and the feasibility of using HDD. This discussion should include contingencies in the event that attempts to use HDD fail to a significant degree and should demonstrate approval from regulatory agencies for these contingency methods.

LA3-23

- 2) *Comment:* (Pages 4-20 and 4-84) The Draft EIS recommends preparation of a Final Pipeline Design Geotechnical Report prior to construction but after project approval. The more detailed geotechnical report is to refine the subsurface conditions beneath difficult geometries and/or sensitive watersheds. The potential scope of engineering challenges seems to merit a more detailed analysis of the suitability of the proposed pipeline alignment prior to project approval.

Request: The Final EIS should provide a more detailed assessment of engineering challenges to pipeline installation and integrity posed by local geology that can be compared with other pipeline routes in the alternatives analysis.

4.2 Soils and Sediments

No specific comments.

4.3 Water Resources

LA3-24

- 1) *Comment:* (4-84) The Draft EIS states that up to 17 waterbodies will be traversed using HDD. A URS geotechnical investigation (URS 2006b) that examines thirteen potential HDD sites states that the risk of "frac-out", loss of drilling fluid to the surface is reduced by the subsurface basalt bedrock. In our experience, Columbia River Basalt often includes open joints and zones of high permeability. Therefore, the risk of drilling fluid loss is relatively high.

Request: The Final EIS should include an assessment of cumulative effects from potential multiple frac-outs. The Final EIS should also include a "failure threshold" analysis whereby the use of HDD would be re-evaluated. In addition, because some regulatory approvals (U.S. Fish and Wildlife Biological Opinion and U.S. Army Corps of Engineers Section 404 Permit) are dependant on methods presented in applications based on HDD technology, contingency plans and demonstration of approval from all required regulatory authorities must be provided prior to the Final EIS.

LA3-25

- 2) *Comment:* (Page 4-56) The HDD alignment for the Columbia River crossing falls within the area of influence of a Port of St. Helens, Oregon municipal well that was not discussed in the Draft EIS.

Request: The Final EIS should describe and discuss effects of pipeline construction on the Port of St. Helens municipal well.

LA3-26

- 3) *Comment:* (Pages 4-66 and 4-70) Model predictions taken from the WEST hydrodynamic and sediment transport report prepared for NorthernStar state that dredge-related total suspended solids (TSS) would diminish to 0.1 mg/L before reaching Tenasillahe Island. Teasillahe Island is located approximately 1 kilometer downstream of the edge of the proposed dredging zone. Hunt Creek, which is recognized essential salmonid habitat, is located immediately adjacent to the proposed dredge site.

Request: Clarify in the Final EIS whether TSS concentrations on the order of 0.1 mg/L would be temporary and minor in the vicinity of Hunt Creek during dredge activities, and what effects on natural resources may be anticipated from anticipated TSS concentrations.

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LA3-23

The detailed geotechnical analysis for the pipeline requires property access that is currently not available. It is not feasible to include this level of analysis in the final EIS.

LA3-24

The trajectory of the Columbia River HDD would be designed to minimize the potential for frac-outs. The FERC's approval of the project is contingent on the COE's approval of the section 404 permit. In addition, the FERC would not allow construction to proceed until after we have concluded formal consultation with the FWS and NMFS.

LA3-25

Based on the location of the Port of St. Helens municipal water well relative to the trajectory of the Columbia River HDD borehole, we do not believe that the well would be affected by pipeline construction.

LA3-26

Based on figure 44 within the Hydrodynamic and Sediment Transport Assessment conducted for the Bradwood Landing Project by WEST (2006), TSS concentrations would diminish to 0.1 mg/L before reaching Hunt Creek. Sections 4.2.2.2 and 4.3.2.3 have been revised to address this comment. Potential impacts on aquatic resources due to increased suspended sediment and turbidity levels from dredging activities are described in section 4.5.2.1.

K-547

LA3-27 4) **Comment:** (Page 4-70) The Draft EIS states that background levels of turbidity measured in Nephelometric Turbidity Units (NTUs) are on the order of 3 to 10 NTUs in the Columbia River, and that "...turbidity plumes from dredging for the Bradwood Landing Project would return to within 1 NTU of background levels within 1 minute after suspension." This represents a 10% to 33% increase in NTUs over background over a period of 48-72 days, 24 hours per day for the initial dredging to be completed.

Request: The Final EIS should more explicitly characterize whether increases in NTUs reported in the Draft EIS would have significant impacts to natural resources, and should more explicitly characterize the extent and duration of the plume anticipated from dredging activities.

LA3-28 5) **Comment:** (Pages 2-42 and 4-50) The Draft EIS describes dredging a 58-acre basin to accommodate LNG ship movement and berthing. The description of channel habitat affected by dredging does not adequately quantify benthic species and their ecological functions.

Request: The Final EIS should more thoroughly characterize habitat and species usage in the area proposed for dredging, and should discuss how proposed mitigation replaces functions and habitat lost via dredging. The Final EIS should also provide more detail as to why dredge of the proposed scale was determined to be "minor and temporary."

4.4 Wetlands and Terrestrial Vegetation

LA3-29 1) **Comment:** (Pages 4-96) The Draft EIS requests that NorthernStar should file the final wetland mitigation plan with the FERC prior to construction. Wetland and terrestrial mitigation is a key component in the evaluation of environmental impacts and, therefore should be complete and available for review and comment prior to application approval.

Request: The Final EIS should include the final mitigation plan in order to allow adequate evaluation of proposed mitigation.

LA3-30 2) **Comment:** (Page 4-103) The Draft EIS describes recovery of vegetation affected by pipeline construction taking "several years" in the case of shrub-scrub wetlands, and presumably longer for affected forested wetlands. However, the Draft EIS suggests a "minimum of 3 years" of post-construction monitoring. It is typical for wetland mitigation monitoring to extend longer than three years. We recommend a minimum of five years of mitigation monitoring, staggered over a ten-year period.

Request: The Final EIS should include a more adequate post-construction mitigation monitoring program.

LA3-31 3) **Comment:** (Page 4-105) The Draft EIS notes that ten temporary construction areas located in wetlands or within 50 feet of wetlands were not approved by the FERC. The Draft EIS recommends relocating these construction areas or providing better site-specific rationale for their use "prior to pipeline construction."

Request: The Final EIS should include descriptions for all temporary construction areas, and any temporary construction areas that affect wetlands or other critical habitat areas should include site-specific rationale.

LA3-32 4) **Comment:** Proposed wetland mitigation for the Washington section of pipeline includes enhancement of existing wetlands via weed removal and control, and native plantings. In our experience, existing wetland areas that include invasive, weedy species are difficult to enhance without changing base conditions, such as modifying land management practices, manipulating

Local Agencies

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LA3-27 We believe the potential direct and indirect impacts on aquatic resources as a result of dredging activities are adequately described in section 4.5.2.1. Additional details on the extent and duration of the turbidity plume associated with dredging activities at the LNG terminal site are included in the Hydrodynamic and Sediment Transport Assessment conducted for the Bradwood Landing Project by WEST (2006).

LA3-28 We believe that the discussion of habitat and species usage in the dredged footprint is adequately described in section 4.5.2.1. The adequacy of NorthernStar's Compensatory Mitigation Plan is discussed in the response to comment FA2-10.

We were unable to find any reference within the pages described in the comment (pages 2-42 and 4-50) to impacts from dredging being classified as minor and temporary. We agree that dredging of the ship berth and maneuvering area would result in permanent habitat modification (see table 2.3-1).

LA3-29 See our response to comment FA2-16.

LA3-30 We have included a recommendation in section 4.3.2.4 that NorthernStar consult with the COE, NMFS, FWS, and other appropriate agencies to finalize its Waterbody and Wetland Construction and Mitigation Procedures Plan. The plan would include procedures for monitoring the success of revegetation and weed control efforts. The Waterbody and Wetland Construction and Mitigation Procedures Plan would be filed, along with agency comments, with the Secretary prior to construction.

LA3-31 Temporary construction areas are depicted in the Alignment Sheets for the Bradwood Landing Project. Waterbody and Wetland Construction and Mitigation Procedures Plan. Directions for accessing NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan via the eLibrary can be found in the response to comment FA2-17. In addition, table 4.4.1-7 describes all additional temporary workspaces that would be located within 50 feet of a wetland. Because the EIS is a summary document, we believe that the inclusion of site-specific rationale for the approval or denial of each workspace within 50 feet of a wetland is not appropriate.

LA3-32 See our response to comment SA1-124.

K-548

LA3-32 hydrologic regimes, or other such measures. Proposed mitigation measures do not adequately address existing conditions.

cont'd

Request: The final wetland mitigation plan should include a description and analysis of the base conditions that support weedy species in the proposed enhancement area, and a description of measures undertaken to modify those base conditions in order to decrease the chance of long term mitigation failure.

4.5 Wildlife and Aquatic Resources

LA3-33 1) *Comment:* (Page 4-139) The Draft EIS requests that NorthernStar prepare a bubble curtain contingency plan prior to beginning pile driving activities.

Request: The Bubble Curtain Contingency Plan should be completed and submitted for evaluation prior to release of the Final EIS.

LA3-34 2) *Comment:* (Page 4-147) The Draft EIS requests that NorthernStar submit a facility Lighting Plan "prior to operation of the LNG terminal."

Request: The Lighting Plan should be completed prior to the Final EIS in order to adequately assess effects of facility operation on sensitive species and to comply with SEPA.

LA3-35 3) *Comment:* (Page 4-150) The Draft EIS describes the majority of habitat mitigation occurring at Svensen Island. Svensen Island is located approximately 14 miles downstream of the impact area. The distance between impact and mitigation site seems significant given that significant numbers of species using the Bradwood site are migratory. The Draft EIS does not appear to adequately consider how loss of habitat at Bradwood would affect travel distance for fish species that would otherwise use Bradwood.

Request: The Final EIS analysis should include discussion of the importance and function of Bradwood Landing habitat in the context of its distance from similar habitat areas, and should analyze the effects of habitat loss on species movement.

LA3-36 4) *Comment:* (Page 4-145) The Draft ESA states "NorthernStar would offer contract incentives to the LNG suppliers to retrofit LNG ships to connect with the wharf filtered water supply so that all water withdrawn from the Columbia River would be done via screened intakes constructed by NorthernStar at the LNG terminal." The FERC recommends that NorthernStar prepare a plan "prior to beginning initial site preparation at the LNG terminal" outlining how to ensure that incoming ships are retrofitted to use the screened water intake. The proposed use of "contract incentives" is vague and inadequately described in the Draft EIS.

Request: The Final EIS should state that all ships wishing to unload at Bradwood Landing must be retrofitted to use the proposed facility's screened water.

LA3-37 5) *Comment:* (Page 4-150) Dike breach activities are on the north side of Svensen Island, meaning that access to the island interior would be from the main Columbia River channel only. The south side of the island is in close proximity to streams on the Oregon mainland that outfall to the slough area between the island and mainland.

Request: The Final EIS should provide more detail for the decision to locate dike breaches on the north side of the island, provide a discussion of the function and value of contributing streams from the Oregon mainland, and should assess and discuss the feasibility and desirability of dike breaches on the south side of Svensen Island

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LA3-33 As described in section 4.5.2.1, NorthernStar filed its Bubble Curtain Contingency Plan with the FERC on December 21, 2007. This document is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

LA3-34 As stated in section 4.5.2.1, NorthernStar submitted its Lighting Plan for the Bradwood Landing Terminal as part of its response to the NMFS's May 11, 2007 request for additional information to the FERC on July 6, 2007. This document is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

We agree that additional information on the potential impacts of terminal lighting and mitigation for lighting is required; therefore, we recommended in section 4.5.2.1 that NorthernStar continue to consult with the NMFS, FWS, ODFW, and other applicable agencies regarding its Lighting Plan. The final Lighting Plan, along with agency comments, should be filed with the Secretary prior to operation of the LNG terminal.

LA3-35 In addition to mitigation efforts proposed for Svensen Island, it is important to note that the Hunt Creek Mitigation Site, which is located immediately adjacent to the proposed LNG terminal site and is designated critical habitat, is included as part of NorthernStar's Compensatory Mitigation Plan. Hunt Creek is known to provide both spawning and rearing habitat for federally listed salmonids.

It is our opinion that due to the migratory nature of juvenile salmonids, the distance between the proposed LNG terminal site and the proposed mitigation site at Svensen Island would not significantly reduce the benefits of the proposed mitigation for these populations. The adequacy of NorthernStar's Compensatory Mitigation Plan is also discussed in the response to comment FA2-10. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.

LA3-36 See our response to comment PM1-31.

LA3-37 See our response to comment FA2-10.

K-549

LA3-38 6) **Comment:** (Page 4-153) The Draft EIS describes several mitigation measures for impacts to aquatic resources and wetlands. Included as mitigation measures are:

- Place some excavated material along selected dike areas to facilitate growth of shrubs and trees to be planted
- Protect two existing home sites by placing fill around one and raising the eastern cross-dike

The placement of excavated material and the protection of home sites do not appear to be mitigation measures that will benefit aquatic resources or wetlands.

Request: Clarify in the Final EIS how these two measures constitute mitigation for wetland and aquatic habitat loss.

LA3-39 7) **Comment:** (Page 4-169) The Draft EIS states that most of the unstable slopes above sensitive waters would be crossed by the HDD construction method. For reasons stated above, there is concern that HDD construction methods may be difficult, if not impossible in some areas.

Request: The Final EIS should more precisely identify geologic hazards within the pipeline alignment, and should expand on the contingency analysis should HDD be found unfeasible, or should construction lead to unanticipated erosion or frequent "frac-outs." The more detailed geotechnical analysis and contingency plan should be completed prior to, and a discussion of the findings and measures should be included as part of the Final EIS.

4.6 Threatened, Endangered and Other Special Status Species

LA3-40 1) **Comment:** (Page 4-250) The Draft EIS describes potentially adverse impacts to Columbian white-tailed deer as habitat loss (59 acres temporary and permanent), noise disturbance, and potential increased vehicle collisions. Disturbance from facility lighting is not mentioned. Three database records of Columbian white-tailed deer record deer activity less than one mile distant, and place deer activity on three different sides of the proposed facility.

Mitigation for adverse effects to deer populations includes preservation of remaining habitat. The Draft EIS notes that deer remaining in the areas would acclimate to the long-term noise disturbance caused by operation of the facility. Mitigation for adverse effects on Columbian white-tailed deer is inadequate.

Request: The Final EIS should provide a more thorough analysis of effects of LNG terminal development on Columbian white-tailed deer.

LA3-41 2) **Comment:** The Washington section of pipeline passes through an area documented as historical habitat for listed Nelson's checker mallow (*Sidalcea nelsoniana*). The Draft EIS does not discuss or address potential adverse effects of pipeline construction or easement maintenance through this area.

Request: The Final EIS should address potential adverse effects to *S. nelsoniana* habitat.

4.7 Land Use, Recreation, and Visual Resources

LA3-42 1) **Comment:** (Page 4-289) Section 4.7.2.3 states that planned development was researched in Clatsop County in 2005. Although it is understood that the analysis for the Draft EIS began more than two years ago, development is dynamic, and new planned land use actions are likely left out of the Draft EIS analysis. Using January 1, 2007 as a cut off date for determining if a development meets the definition of "planned" under NEPA would likely result in additional developments either in the vicinity of the pipeline or the vicinity of the terminal.

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LA3-38 As discussed in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. Although NorthernStar proposes to protect two existing home sites on Svensen Island by placing fill around one and raising the eastern cross-dike, we agree that this would not mitigate for impacts on aquatic resources and wetlands; therefore, this statement has been removed from section 4.5.2.1. In contrast, the placement of excavated material along selected dike areas in order to facilitate the growth of shrubs and trees would indirectly provide a benefit to aquatic resources by increasing the quality of riparian vegetation.

LA3-39 See our response to comment LA7-25.

LA3-40 Section 4.6.2.2 has been revised to include additional information on the potential impacts on Columbian white-tailed deer due to construction and operation of the proposed terminal. See also our responses to comments PM3-68 and FA4-6.

LA3-41 Section 4.6.2.3 has been revised to include new survey information for the Nelson's checker-mallow.

LA3-42 We have revised section 4.7.2.3 based on comments we received on the draft EIS.

K-550

LA3-42 | *Request: Prior to completion of the Final EIS, the FERC should provide an updated list of planned land use developments and analysis of potential impacts to these developments along with proposed mitigation.*
cont'd

LA3-43 | 2) *Comment:* (Page 4-308) Access road locations and conditions are listed in a table. They are all listed as private roads and no names are given. This is insufficient information for reviewers considering impacts to access roads.
Request: The location and name (if any) of all access roads should be provided on a detailed map to allow for full consideration and comment.

LA3-44 | 3) *Comment:* (Page 4-310) The Draft EIS notes that a Christmas tree farm will be crossed by the pipeline construction in Cowlitz County between mile posts 31.7 and 32. The Draft EIS notes that after construction is complete, NorthernStar would repair and/or restore all contours and grade to as near original conditions as possible. Because the pipeline easement will require permanent conversion of all land within the easement from productive Christmas tree growing area to unproductive land (i.e., no trees can be grown in the easement in the future), more information on the nature and extent of the impact is required.
Request: The Final EIS should provide:
a) *The proportion of the farmed area will be permanently converted.*
b) *The value of the land for tree production and lost future revenues.*
c) *Proposed mitigation for loss of productive crop land.*
In addition, the Farmland Protection Act (7 CFR 658.1 et seq.) may require a Prime Farmland Conversion Impact Evaluation for much of the timber land being converted in this project. The FERC should evaluate whether this is required and provide updated information in the Final EIS.

LA3-45 | 4) *Comment:* (Page 4-313) The Draft EIS states that NorthernStar has not yet reviewed the zoning of storage and laydown areas along the pipeline with Cowlitz County staff.
Request: The Final EIS should include analysis of land use compatibility of these areas and identify what permits will be necessary for temporary or permanent use of the areas.

LA3-46 | 5) *Comment:* (Page 4-316) The Draft EIS states that no future planned residential or commercial developments in close proximity to the proposed pipeline route in Cowlitz County were identified. Cowlitz County residents William and Marjorie Castle have submitted comments to Cowlitz County that their proposed single family residence is located directly adjacent to the proposed pipeline route and drilling location. Their property is located at 212 Whitewater Road. They submitted a building permit application for the proposed single family dwelling on December 22, 2006. The permit can be reviewed under permit number 06-12-2674.
Request: Because the County is aware of this example of a planned development directly adjacent to the pipeline and the FERC Draft EIS fails to identify it, the County questions the accuracy of the review of other areas along the pipeline, both in Washington and Oregon. The planned development analysis should be conducted again and be provided along with potential impacts and proposed mitigation in the Final EIS.

LA3-47 | 6) *Comment:* The Visual Assessment included as an appendix to Resource Report 8 indicates that the presence of LNG tanker ships at the terminal pose a short duration visual impact. With the proposed frequency of ships per year and proposed duration of 24 hours per terminal visit, there will be a ship

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LA3-43 | Many of the access road do not have names and are thus listed as "unnamed." Detailed maps of the proposed pipeline route that show the locations of access roads were filed by NorthernStar as attachments to Resource Report 1 and are available from the FERC's eLibrary site.

LA3-44 | As further discussed in section 4.7.3.1, compensation for impacts for losses resulting from construction, including losses of non-renewable and other resources, damages to property during construction, and restrictions on existing uses that would not be permitted on the permanent right-of-way after construction.

LA3-45 | As discussed in section 4.7.3.1, NorthernStar's proposed pipe storage and contractor yard in Washington is located in a commercially zoned area.

LA3-46 | Based on this comment we have revised section 4.7.2.3.

LA3-47 | This comment refers to the Visual Assessment completed by NorthernStar. Our visual resources discussion in section 4.7.2.7 does not include this language.

K-551

LA3-47
cont'd

at the terminal in view of the residences on Puget Island approximately 34% of the year. This visual presence is inaccurately described as 'short duration'. This kind of visual impact should be considered moderate duration, not short. Additionally, it should not be treated as equal to the visual impact on an LNG tanker passing by any point on the river as it seems to be.

Request: The FERC should consider revising the analysis of the visual impact of the LNG Tankers while docked at the Bradwood Landing terminal.

LA3-48

7) *Comment:* There is no complete evaluation of light scatter and glare, only notation of future collaboration with planners to minimize impacts.

Request: SEPA Rules require evaluation of scatter and glare. Because the terminal will be lighted 24 hours per day and there are residents and wildlife refuge areas with direct visual connection to the terminal site, the Draft EIS should provide more information about nighttime lighting and mitigation for lighting effects.

4.8 Socioeconomics

LA3-49

1) *Comment:* (Page 4-328) The Draft EIS states that "about 1,500 recreational fishing boats go out on the Columbia River between February and October, based on per-day use data from 2004." Based on our review, this statement appears to be inaccurate and misleading in two aspects: the total number of vessels and the reported area of the measurement.

Total number of vessels

Using the "about 1,500" number and the approximately 270 days between February and October, the average number of recreational vessels per day on the river would be 5 - 6 vessels per day. Given that this number seems exceedingly low, we reviewed the *River User Impact Analysis* provided as an Appendix to Resource Report 8. We found that Table IV.1 Recreational Fishing Boats - Average Per-Day Use, 2004 in that report was used incorrectly to generate the "about 1,500" number presented in the Draft EIS. Data in Table IV.1 indicate an average number of recreation vessels using the Columbia River estuary during each month between February and October. It appears that the authors of the Draft EIS added each of the daily averages shown for each month to reach an approximate total of 1,500, and used this number to describe the total approximate usage for the full duration of time between February and October. This incorrect use of data leads to a gross underestimation of total recreational river usage reported in the Draft EIS.

Accurately approximating a total number of recreation vessels from February to October based on the daily averages in Table IV.1 cannot be accomplished. One can generate a very rough total estimate by multiplying the daily average to the number of days in each month, and then summing the total for each month, but because high weekend boating numbers may largely inflate some of the data, a total generated this way may grossly overestimate the total. However, the ODFW estimates annual fishery recreation usage at over 50,000 boats on the Columbia River, which compared to the data provided in the Draft EIS suggests that the full impacts to recreational boaters has not been fully evaluated.

Reported Area of the Measurement

LA3-50

The Draft EIS statement, "about 1,500 recreational fishing boats go out on the Columbia River between February and October, based on per-day use data from 2004" is unclear as to what portion of the Columbia River the measurement applies to. We believe that most readers of the Draft EIS would assume it applies to the Columbia River, generally downstream of the Portland Vancouver Metropolitan area. However, the *River User Impact Analysis* indicates that the data is for the Columbia River estuary. Given this clarification that the data applies to the estuary area only, the data is misrepresented in the Draft EIS and does not cover the full area of the LNG ships transit of the Columbia River.

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LA3-48

See our response to comment LA3-34.

LA3-49

Section 4.8.1.7 has been revised to correct the number of recreational fishing boats.

LA3-50

Section 4.8.1.7 has been revised. However, we still conclude that the project would not have significant impacts on recreational users of the lower Columbia River.

LA3-50
cont'd

Request: The addition of an LNG ship traveling either up or down the river every 1.5 days presents both frequent hazards and frequent disturbance and inconvenience to many recreational rivers users that must relocate out of the exclusion area to let a ship pass. With incorrect data presented in the Draft EIS, the FERC appears to have not accurately evaluated the impacts to recreational river users. This error should be corrected and any impacts different from those presented in the Draft EIS need to be disclosed.

LA3-51

- 2) **Comment:** (Page 4-328 and 4-329) The FERC Draft EIS briefly discusses impacts to shipping navigation and traffic with regard to the U.S. Coast Guard's safety recommendations. The Draft EIS concludes that although there will be security zones, ships would not be allowed to overtake an LNG ship, and one-way traffic would be imposed for each LNG ship transit up the Columbia River every 1.5 days, ship traffic delays are expected to be negligible. The Draft EIS notes that there may be delays due to wait times for ships either entering or leaving the mouth of the Columbia River, but does not attempt to quantify the delays.

The River User Impact Analysis provided as an attachment to Resource Report 5 Socioeconomics, indicates that although there has been some volatility in shipping traffic over the last several years, the long term projection is for an increase in cargo shipping on the Columbia River. This report also states:

"With river traffic of roughly 2,000 vessels annually, a ship is going upriver (and down river) roughly once every 4.4 hours. With a 3 hour travel time, there is therefore a roughly 70% chance of meeting oncoming traffic for each of the 250 annual tanker trips (125 upriver and 125 down). The worst-case scenario is that a ship must wait the entire 3 hours that the tanker is traveling. If this scenario came to pass, the estimated annual impacts on shipping would be \$423,165. Delays of less than the entire three hours would decrease the overall cost to shipping accordingly."

A marginal increase in ship traffic could increase the wait time for ships in Astoria occasionally. If a large number of ships arrive at the mouth of the Columbia in a short time period, some may need to wait for a pilot. A similar scenario plays out just upriver of Astoria when Bar and River pilots replace one another."

This estimate of delay is likely substantially understated. Additionally, the report also notes that the full impact of the U.S. Coast Guard's recommended safety zones has not been identified and that future more in-depth analysis would be needed to discern the actual impacts to the shipping industry.

Request: The shipping industry on the Columbia River is an extremely important component of the economy of several northwest states, and the industry is very sensitive to delay. The FERC should conduct a full analysis of socioeconomic impacts due to shipping delays imposed by the addition of the LNG vessels on the Columbia River. This analysis should include modeling of ship traffic based on the best available data and vessel traffic monitoring system information, and should provide data on expected delays based on cargo type to provide analysis of which industries and economies will be most affected. The analysis should also provide a scheduling scenario of a typical trip and encounters with other shipping traffic as well as a worst case scenario for delays imposed by timing restrictions crossing the Columbia River Bar and delays imposed by the U.S. Coast Guard safety zones.

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LA3-51

The River User Impact Analysis was prepared prior to the Coast Guard's review of the WSA and release of the WSR. We do not anticipate significant shipping delays would occur as a result of the project. In addition, section 4.8.1.7 has been revised to include additional discussion regarding potential for navigational conflicts LNG carrier traffic may have with other commercial ships traversing the Columbia River bar. See also our response to comment IND33-16.

K-553

- LA3-52 3) **Comment:** The FERC implementing regulations for NEPA [18 CFR Ch. 1 Part 380.12(g)(6)¹] require that the FERC:

"Conduct a fiscal impact analysis evaluating incremental local government expenditures in relation to incremental local government revenues that would result from construction of the project. Incremental expenditures include, but are not limited to, school operating costs, road maintenance and repair, public safety, and public utility costs." (emphasis added)

The FERC did not produce a Resource Report 5 Socioeconomics for the pipeline portion of the project stating that the project is exempt from the Socioeconomics requirements because it is not an above ground facility or a major pipeline project. The incremental local government cost of road maintenance and repair is not sufficiently addressed for the pipeline portion of the project and concerns have been raised about these costs by the local agencies.

Road Maintenance and Repair

In the Draft EIS the subject of local roads is addressed on page 4-353, second paragraph. The Draft EIS indicates that access road modifications will be limited to grading and the addition of gravel to prevent rutting. This is followed by a statement to the effect that previously existing roads used for access would be returned to original or better conditions, or as requested by the owner.

Concern about the future condition of Cowlitz County roads used to access pipeline construction sites was raised during the public open house hosted by Cowlitz County on October 11, 2007. Many of the roads providing access to construction areas are also the only roads providing access to residential properties, and are narrow roads with low average daily traffic and very little truck use. Concerns about the use of County roads can be seen as near-term and long-term. The near term concerns that were not sufficiently addressed in the Draft EIS include:

- a) Scheduling and restricted use of roads during construction causing financial burden on residents due to delays and conflicts with other scheduled road work;
- b) Damage to roadway, underlying utilities and adjacent properties by large trucks and heavy equipment frequently using County roads would be costly for the county to repair; and
- c) No specific description of standards to be followed for mitigation of damage and reconstruction of damaged areas.

The long-term concerns that were not sufficiently addressed include:

- a) Drainage impacts to roads may occur during the subsequent rainy seasons after construction;
- b) Geotechnical issues impacting the road right-of-way that are a result of the initial pipeline construction activities;
- c) Conflicts with future improvements to the County roads that may require pipeline relocation;
- d) Long-term maintenance of the pipeline within County right-of-way; and
- e) Potential issues from pipeline failure.

Request: To comply with FERC guidance, the FERC should inventory County roads to be used during construction of the pipeline and analyze potential impacts to the roadways and the associated costs for repairing damages prior to completion of the Final EIS.

- LA3-53 Additionally, to address the near- and long-term concerns, Cowlitz County requests that the FERC require the applicant to enter into a binding agreement with the County that identifies, but is not limited to items in the following list:

¹ Title 18--Conservation of Power and Water Resources, Chapter 1--Federal Energy Regulatory Commission, Department Of Energy Part 380--Regulations Implementing The National Environmental Policy Act

Local Agencies

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- LA3-52 NorthernStar prepared environmental Resource Report 5 (Socioeconomics) as part of its application to the FERC in accordance with 18 CFR 380.12(g) which is meant to only address major aboveground natural gas facilities. However, we addressed potential socioeconomic impacts for the entire project in section 4.8 of the EIS

Section 4.8.3.7 has been revised to include additional discussion of NorthernStar's requirements regarding local road permits.

- LA3-53 NorthernStar may voluntarily enter into an agreement with Cowlitz County regarding road repair. We require that all work areas be returned to their pre-construction condition and use, including access roads.

LA3-54

- a) Standards and procedures to be used for weight restricted bridges;
- b) Standards and procedures to be used for work within County right-of-way. If the applicant does not intend to obtain public works permits, then the agreement must specify how all components of the standard permit will be accomplished;
- c) Responsible party for road work inspections;
- d) Implied liability in the absence of a County public works permit;
- e) Impacts to and coordination with utility franchises;
- f) Long term drainage impacts to County roads due to the project;
- g) Process for future road relocations that may affect the location of the pipeline; and
- h) Transferability of the agreement to future owners.

The agreement must clearly specify responsible parties for each aspect of the project and bind the applicant or future owners to financial assurances to the County. The FERC should require that this agreement be signed prior to issuance of the Final Commission Order.

- 4) **Comment:** The FERC implementing regulations for NEPA [18 CFR Ch. 1 Part 380.12(g)(6)²] require that the FERC:

LA3-55

"Conduct a fiscal impact analysis evaluating incremental local government expenditures in relation to incremental local government revenues that would result from construction of the project. Incremental expenditures include, but are not limited to, school operating costs, road maintenance and repair, public safety, and public utility costs." (emphasis added)

The FERC did not produce a Resource Report 5 Socioeconomics for the pipeline portion of the project stating that the project is exempt from the Socioeconomics requirements because it is not an above ground facility or a major pipeline project. The incremental local government cost of public safety preparedness is not sufficiently addressed for the pipeline portion of the project and concerns have been raised about these costs by the local agencies.

Public Safety

Public safety concerns resulting from the presence of LNG tankers on the Columbia River and a new natural gas pipeline in Cowlitz County have been voiced early and often. In the heavily forested area that the pipeline traverses, if a leak and subsequent fire, or an explosion were to occur along the pipeline, Cowlitz County Fire and Rescue services would be responsible for Public Safety. At current funding, staffing, and equipment levels, Cowlitz County is not prepared to suppress a fire of the nature caused by explosion of a natural gas pipeline. The two nearest fire stations of the Cowlitz 2 Fire and Rescue district, the Bakkers Corner and Lexington Stations, are rural facilities with very few staff and limited resources.

Emergency response for a fire or other event on an LNG ship while in transit will rely on the emergency response departments of the five counties surrounding the Columbia River. These county departments will need to be coordinated, trained and ready, and supplied with the appropriate equipment for such an event. At present the counties lack the training, staff, coordinated emergency management plan and equipment to effectively respond to large-scale events on the Columbia River.

FERC guidance for Resource Report 5 Socioeconomics (page 3-57 and 3-58) requires that,

"If concerns are raised during project coordination in the area, this report should be provided for minor projects and those with only below ground facilities. However, for major

² Ibid.

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LA3-54 See our response to comment LA3-53.

LA3-55

As discussed in section 4.11.6 of the final EIS, NorthernStar would be required to develop an ERP and coordinate procedures with the Coast Guard; state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies. In addition, the ERP would be required to include a Cost-Sharing Plan identifying mechanisms for funding all project/specific security/emergency management costs that would be imposed on state and local agencies. In addition to the funding of direct transit-related security/emergency management costs, this comprehensive plan would include funding mechanisms for the capital costs associated with any necessary security/emergency management equipment and personnel base.

NorthernStar would be required to submit the ERP, which includes the Cost-Sharing Plan, to the Secretary for review and written approval by the FERC before any final approval to begin construction. If the needed resources are not available and properly funded, operation of the project would not be approved.

K-554

K-555

LA3-55
cont'd

pipeline projects that require an EIS, preparation of all or portions of this report may be necessary. In addition, federal, state or local land managing agencies may require the analysis of the socioeconomic impact of pipeline construction as part of the review process for right-of-way grants."

Request: *To comply with FERC guidance, the FERC should inventory and analyze potential impacts to the cost of preparedness for a natural gas pipeline explosion in Cowlitz County. The County requests that the FERC require the applicant to provide funds to Cowlitz 2 Fire and Rescue district specifically for facility improvement to allow space for needed equipment, equipment upgrades and adequate personnel training for response to a natural gas pipeline incident.*

LA3-56

Additionally, the FERC should require the applicant to conduct a detailed study of emergency response requirements. The analysis must be conducted in coordination with emergency response representatives from the five affected counties, and must include evaluation of the following:

- a) Need for appropriate response equipment for use on the Columbia River.*
- b) Staffing levels for fire suppression of a vessel fire and any subsequent effects to nearby structures, natural areas, or vessels.*
- c) Staffing levels for law enforcement assistance to control water traffic during LNG vessel transit on the Columbia River.*

LA3-57

As a result of the study and prior to final Commission Order, the FERC should require the applicant to sign an agreement with all five counties to provide sustained funding from the beginning of operations through decommissioning of the proposed facility to provide for the necessary additional staff and equipment. Funding should also provide for one full time Emergency Management Planner for each of the five counties whose first responsibility would be to create a collaborative five-county river event response program. Additional responsibilities of this position would include ongoing management of training and exercises to ensure preparedness.

LA3-58

- 5) **Comment:** (Page 4-337) Section 4.8.2.3 discusses effects to property values from the location of the LNG terminal and references two studies that found no appreciable or significant effects. It appears from the discussion in the EIS that these studies focused on actual sale values, but likely did not take into account the effect on reducing the frequency of sales or the time on the market, or the increased or decreased incidence of properties failing to sell when listed. The County has been contacted by at least one property owner that is unable to sell their property, with the most likely reason being proximity to the Kelso-Beaver Pipeline at the location where it is exposed above ground.

The River User Impact Analysis reported a methodology and potential impact specific to evaluating the effect of loss of views on property value specifically for those residences on Puget Island. The report found that a liberal estimate assuming a total loss of view value could cost \$851,253 annually based on the per-day and per-person value of the view for a year. Neither Resource Report 5 on Socioeconomics, nor the Draft EIS introduces this cost impact as part of the analysis on the socioeconomic impact to properties on Puget Island.

Request: *Although the Draft EIS reasons that no property value impact can be determined until there is actual sales data, this valuation of cost due to visual impact should be disclosed in the Draft EIS so it can be reviewed.*

Local Agencies

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LA3-56 See our response to comment LA3-55

LA3-57 See our response to comment LA3-55

LA3-58 The referenced section of the River User Impact Analysis states that the annual impacts of \$851,253 is the total amount applied to 65 people living in the area, not the per-person, per-day estimated impact, which is identified as \$13,096.

- LA3-59 6) **Comment:** (4-322) Section 4.8.1.2 states that in Astoria there are five hotels with 253 rooms within the Zone 1 hazard zone. Zone 2 contains an additional seven motels and hotels with a total of 333 rooms. In addition, the table below was created using the information on pages 4-322 through 4-328. It shows the resources identified in the Socioeconomics section within each zone.

Zone 1	Zone 2	Zone 3
	• CRM 29	
		• Coast Guard Cape Disappointment Station Mooring
	• CRM 13	
	• Hammond Boat Basin	• Warrenton Police and Fire
	• Youngs Bay Bridge (101)	• Port of Astoria
		• Coast Guard Air Station
	• CRM 13/14	
• Astoria Pier 1 – Cruise ships	• Captain Robert Grey Elementary School (780)	• Astoria Middle School (550)
• Astoria Pier 2 – Commercial fishing and recreation boats	• John Jacob Astor Elementary School (298)	• Astoria High School (760)
• Astoria/Megler Bridge	• Clatsop Care Center	
• Astoria Police/Fire and Emergency Information Center	• Columbia Memorial Hospital	
• Columbia River Maritime Museum	• County Health Services	
• River front trolley	• Coast Guard Base	
• Boat anchorages		
• CRM 33		
• Wahkiakum Fire District #2		
• Skamokawa town center		
	• CRM 39	
		• Wahkiakum Fire District #1
		• Cathlamet Fire District
		• Cathlamet town center

Recommendations for risk management within Zone 1 found in the Sandia³ report include "Incident management and emergency response measures should be carefully evaluated to ensure adequate resources (i.e., firefighting, salvage) are available for consequence and risk mitigation."

The primary fire, police, and emergency control center in Astoria is within the highest hazard zone, and in the unfortunate event that an explosion were to occur at that point along the LNG route, emergency response systems would be severely impacted.

Request: In order to understand how this high risk situation will be mitigated, the Emergency Response Plan must be made public for review. Otherwise, there is insufficient information on which to base a decision for approval of the proposal.

- LA3-60 7) **Comment:** The Draft EIS provides information about the existing public services in the communities along the Washington side of the LNG waterway route, but it doesn't fully address economic cost of responding to a forest fire in Cowlitz County due to a pipeline breach/explosion. In several places the

³ *Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas spill Over Water*. December 2004 (SAND2004-6258), by the U.S. Department of Energy Sandia Laboratories.

Local Agencies

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- LA3-59 The ERP is developed under consultation with appropriate federal, state, and local agencies. The ERP is approved by the FERC, not by the public. NorthernStar would be required to submit the ERP for review and written approval by the FERC before any final approval to begin construction. If the needed resources are not available and properly funded, operation of the project would not be approved.

- LA3-60 See our response to comment LA3-55.

K-557

LA3-60
cont'd

text includes language similar to that below, which overly minimizes the risk of fires in this region. We would point to the Tillamook Forest fires in the 1930's, 40's and 50's as examples of how forest fires in similar climate and ecoregions have been devastating when started during the dry summer months.

(Page 4-325) Section 4.8.1.5:

"However, because the hazard area surrounding an LNG cargo vessel is transient (moving with the vessel along its route), it is not possible to accurately quantify the economic impact of an incident. Also, given the precipitation in the region, any project-related fire would likely be of short duration and limited extent. Nevertheless, with the implementation of the safety and security measures and conditions outlined in the Coast Guard's WSR, an LNG release along the waterway would be highly unlikely."

Request: The Draft EIS should disclose mitigation for the impact to local fire and rescue services.

LA3-61

- 8) **Comment:** The Draft EIS uses 125 LNG ships annually throughout the document as a basis for evaluating impacts. However, in some cases the Draft EIS refers to increased capacity from expansion at the terminal by constructing the third storage tank.

Request: The number of ships with the tank expansion should be disclosed and all impacts from that larger number of ships should be analyzed.

4.9 Cultural Resources

LA3-62

- 1) **Comment:** (Page 4-360) There are three unrecorded potential historic-archaeological sites in the Bradwood Landing APE.

- a) Hunt Mill
- b) OTLC Mill
- c) OTLC Mill logging road

Request: The FERC should clarify what is planned for recording these sites.

LA3-63

- 2) **Comment:** (Page 4-364) "NorthernStar has not yet documented any additional consultations with Indian tribes, or that it provided the Confederated Tribes of the Grande Ronde with copies of cultural resources reports as requested."

Request: The Draft EIS should disclose when and how will this information be provided and the results of consultations.

LA3-64

- 3) **Comment:** (Pages 4-364 through 4-366) Several cultural resources issues are unresolved, including:

- a) Effects on previously recorded site 35C016 due to HDD activity under the Columbia River based on Oregon SHPO opinion.
- b) Effects on the historic Hunt Mill pending full results of an archaeological investigation at the mill location.
- c) Status of the mill town of Bradwood under Section 106 of the National Historic Preservation Act due to questions from the Oregon SHPO.

Request: Contrary to the FERC's recommendation that these issues must be resolved prior to beginning construction, these issues must be resolved with the appropriate agencies prior to completion of the Final EIS. This includes any mitigation agreements or Memorandums of Understanding.

Local Agencies

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LA3-61

See our responses to comments FA2-13 and FA2-14.

LA3-62

As discussed in section 4.9.4, prior to the initiation of construction, we would require NorthernStar to file additional cultural resources survey and evaluation reports, for the review and approval of the SHPOs and the FERC. We would expect the revised report for the LNG terminal tract to address additional investigations to locate, record, and evaluate the Hunt mill, OTLC mill, and the OTLC mill logging road if elements of these resources are still extant and visible.

LA3-63

In section 4.9.3, we added a new condition that would require NorthernStar, prior to starting construction, to file documentation of additional consultations with Indian tribes, and documentation that it sent the Confederated Tribes of Grand Ronde, and other interested tribes, copies of revised cultural resources reports.

LA3-64

We disagree that the FERC must resolve issues related to the identification of historic properties and assessment of project effects prior to the issuance of our final EIS. It is standard FERC practice to complete compliance with the NHPA after an Order is issued, but before we allow construction to begin. This is because cultural resources inventories cannot be done on lands where access was previously denied until after an Order, when the company could use the power of eminent domain to acquire its pipeline right-of-way easement. See our response to the comment from the state of Oregon (SA1) and response to comment LA3-62. Our recommended mitigation measure in section 5.2 ensures that the FERC will be able to review and approve additional cultural resources investigations and plans, that would, among other things, address potential project impacts on archaeological site 35C016, the identification and evaluation of the historic Hunt mill (if remnants are still extant and visible), and the NRHP evaluation of the townsite of Bradwood.

4.10 Air Quality and Noise

Air Quality

LA3-65

1) **Comment:** (Page 4-380) The Air Quality section states:

"The second provision requires that certain emission units at stationary sources meet Typically Achievable Control Technology (TACT). The [submerged combustion vaporizer] SCVs would be subject to TACT because the Bradwood Landing LNG facility would require a permit, and the SCVs each would have emissions of more than 1 tpy and would not be subject to major source New Source Review, New Source Performance Standards, or other emission limits specified in OAR 340-226-130(2)(a). Procedures for identifying air pollution control equipment and emission reduction processes that meet TACT are not included within Oregon's regulatory text. However, if the ODEQ notifies NorthernStar that it intends to make a TACT determination for the SCVs, then the proposed facility would need to submit any requested information and comply with the final TACT determination."

Request: Prior to the completion of the Final EIS, the FERC needs to demonstrate how this standard is being complied with.

Noise

No specific comments.

4.11 Reliability and Safety

LA3-66

1) **Comment:** (Page 4-399 and 4-370 to 4-371) The Reliability and Safety section states:

"Methane vapors, the primary component of natural gas, are colorless, odorless and tasteless, and are classified as a simple asphyxiant. Methane vapors may cause extreme health hazards, including death, if inhaled in significant quantities within a limited time. Although very cold methane vapors may cause freeze burns, any cloud resulting from an LNG spill would be continuously mixing with the warmer air surrounding the spill site. Dispersion modeling indicates the majority of the cloud would generally be within 25° F of the surrounding atmospheric temperature, with colder temperatures closest to the spill source. In addition, this modeling estimates that most of the cloud would be below concentrations resulting in oxygen deprivation effects, including asphyxiation, with the highest methane concentrations closest to the spill source. Therefore, asphyxiation and freezing normally represent a negligible risk to the public from LNG facilities."

This statement indicates a risk of asphyxiation to humans if there is a spill over water, but it minimizes discussion of that risk without providing an evaluation of the potential for humans to be near enough to the source of the spill to be affected.

Request: The Final EIS should answer the following questions. What distance is considered "closest to the spill source" such that asphyxiation concentrations could occur? If, as stated elsewhere in the document, other river users will be allowed to travel in the Coast Guard's required exclusionary safety zones around moving LNG ships on a case by case basis, what is the risk of asphyxiation to the large numbers of recreational boaters annually on the Columbia River, and especially during the summer months and fishing seasons (see Comment 1 for Socioeconomics)?

LA3-67

2) **Comment:** There is no discussion either in the section on impacts to/from geology or in this section on safety concerning the location of the proposed pipeline near BPA transmission lines or towers in Cowlitz County. The towers are located in an area of known landslide hazards and the proposed

Local Agencies

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LA3-65

As documented in the March 2007 Air Contaminant Discharge Permit application submitted to the ODEQ and filed with the FERC, the SCVs would meet the state TACT requirements by being equipped with low-NO_x burners that achieve an emission rate of 30 ppm NO_x. Emissions of CO would be controlled through good combustion practices to 90 ppm. Emissions of other criteria pollutants would be controlled through good combustion practices and the use of low-sulfur LNG prior to odorization, which minimizes the amount of PM₁₀ and SO_x that would be formed from combustion in the SCVs.

LA3-66

Using DEGADIS, FERC staff modeled the distance to methane concentrations which may result in asphyxiation. Those distances would be within the Coast Guard's proposed safety/security zone of 500 yards. We would not expect large amounts of recreational boaters inside this zone during transit of an LNG carrier. Also, the GAO released a report in February 2007 presenting a survey of experts in areas related to LNG risk, hazards, and consequence modeling. As presented in Appendix III of the GAO Report, the 19 LNG risk and hazard experts unanimously agreed that asphyxiation would represent a negligible risk to the public.

LA3-67

The FERC takes a number of factors into consideration when evaluating proposed pipeline routes. With respect to collocating pipelines with other utilities, such as electric transmission lines, experience has shown that these two types of utilities lines are reasonably compatible from a safety perspective, provided sufficient spacing is maintained. Such collocation serves to limit the number of corridors created in a given region.

LA3-67
cont'd

pipeline will be located both near the towers and near the existing Kelso-Beaver Pipeline. In the event of a geologic event the addition of the new pipeline will add to the hazards in the area.

Request: The FERC should evaluate the hazards or issues due to locating near BPA transmission lines with respect to geologic hazard events in the Final EIS.

4.12 Cumulative Impacts

LA3-68

1) *Comment:* The Port of Vancouver Columbia Gateway project is not included in the list of projects evaluated for cumulative effects in Table 4.12-1. Because this project issued a Notice of Intent (NOI) in September 2006, it would appear to meet the definition of reasonably foreseeable. This project has the potential of adding approximately 365 large vessel ships annually to the total large vessels using the Columbia River. The Bradwood Landing Draft EIS does include the cumulative impacts of the Oregon LNG project with its additional 150 LNG ships, so it appears reasonable that the Draft EIS should also consider the impacts of an additional 365 ships from the Port of Vancouver Columbia Gateway project.

Request: An analysis of how the Port of Vancouver project would add to cumulative impacts should be included in the Final EIS.

LA3-69

2) *Comment:* As an existing past project in close proximity to the proposed pipeline in Cowlitz County, the Kelso-Beaver Pipeline may create a setting where the cumulative impacts of the proposed pipeline could be considered significant. It appears that although the cumulative impacts of the KB pipeline were considered for some elements of the environment, including vegetation, they were not considered for others. Specifically, given the safety requirements for pipelines found in section 4.11.9.1, how does the introduction of a new pipeline adjacent to an existing natural gas pipeline affect safety standards? How does the presence of an older pipeline increase the risk of failure of the proposed pipeline (i.e. if the older pipeline were to suffer a failure and explode, could that cause failure of the proposed pipeline, and if so, what are the additive risks of fire exposure with the added volume of gas from both pipelines?

Request: The Final EIS should evaluate the cumulative safety impacts of placing the proposed pipeline adjacent to the KB pipeline.

Overall Comments

LA3-70

1) *Comment:* The FERC indicates many issues are unresolved in the Draft EIS including evaluation of cultural resources and consultation with responsible agencies and responses to requests for additional information in the Biological Assessment for the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service. There are other instances where the FERC requests that NorthernStar provide a management plan, the Lighting Plan for example, after completion of the Final EIS, but before construction. The NEPA and SEPA processes require that the public and agencies have the opportunity to comment on all pertinent decision making information as part of the evaluation process.

Request: The FERC should address all comments received on the Draft EIS as well as resolve the outstanding issues like those noted above and re-release a new Draft EIS for review that will allow full review of the project components and analysis prior to issuing the Final EIS.

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LA3-68

The industrial development district levy intended to fund the Port of Vancouver Columbia Gateway project failed in August 2007 and, therefore, the project is not certain. However, we have included it in table 4.12-1 as a potential development in 10 to 15 years because funding could become available in the future.

LA3-69

The FERC takes a number of factors into consideration when evaluating proposed pipeline routes. With respect to collocating pipelines with other pipelines, minimum off-set distances are required, as are other safety measures such as above-ground markers, signage, and pipeline integrity testing. From an environmental perspective, collocation serves to limit the number of corridors created in a given region.

LA3-70

The FERC is not going to reissue the draft EIS for this project, because that document was adequate to comply with the NEPA. Comments on the draft EIS are addressed in this final EIS, in volume 2, Appendix K. See our responses to comments PM6-94, SA1-179, and SA4-3.

Local Agencies

4



Board of Wahkiakum County Commissioners

George A. Trott
District #1

Daniel L. Cothren
District #2

Blair H. Brady
District #3

December 18, 2007

The Honorable Kimberly D. Bose
Federal Energy Regulatory Commission
888 First Street NE
Room 1A
Washington, D.C. 20426

Re: Bradwood Landing LLC Docket No. CP06-365-000

Honorable Members of F.E.R.C.:

The Wahkiakum County Commissioners are concerned that the Draft Environmental Impact Statement related to the proposed Bradwood Landing LNG Terminal does not adequately consider the needs of Wahkiakum County. The County, having neutral intervenor status in the proposed LNG terminal, requests F.E.R.C. include a permit condition that Northern Star Natural Gas enter into a binding Community Benefit Agreement ("agreement") with Wahkiakum County. This agreement should be included in the Final Environmental Impact Statement, should you approve this project. The agreement is necessary to ensure the needs of Wahkiakum County are permanently aligned with the permit.

Entering into a binding Community Benefit Agreement would be in the interest of all parties interest. We raise this issue because Wahkiakum County is rarely mentioned in the DEIS, despite its close proximity to the proposed facility. In fact, Puget Island is only 500 yards from the proposed facility. The Bradwood Landing LNG terminal may increase the public safety and emergency service costs in Wahkiakum County. The LNG terminal may also affect the county's natural resources, environment, safety, transportation systems, and economy.

Wahkiakum County specifically requests F.E.R.C to require Northern Star Natural Gas (Bradwood Landing) to fund an assessment by an independent entity to determine the emergency service and security requirements of Wahkiakum County, including any gaps in personnel, services, financial resources, and infrastructures. The assessment should also determine the impact the LNG terminal and the proposed dredge disposals will have on Wahkiakum County. An assessment of the economic impacts on the county, both positive and negative also need to be studied. The Final Environmental Impact Statement should include this assessment.

LA4-1

It is not the FERC's practice to require such agreements with local government units as conditions in the EIS process. However, NorthernStar must work with local agencies in development of its ERP. Wahkiakum County is included in the assessment of regional impacts of the project, particularly with respect to the LNG marine waterway. See also our response to comment LA3-55.

LA4-1
cont'd

The results of the assessments will be used to form the basis of the Community Benefits Agreement. Wahkiakum County also requests F.E.R.C. require the Community Benefits Agreement as a condition to be completed as part of the Final Environmental Impact Statement. Along with this, the Community Benefits Agreement should be a condition to the issuance of the F.E.R.C. permit. There are similar agreements in place at other L.N.G. facilities.

Wahkiakum County has requested Northern Star Natural Gas fund the independent assessment that the county requires. It is appropriate for F.E.R.C. to make this a permit requirement and a condition for the Final Environmental Impact Statement.

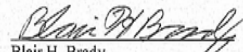
Sincerely,



George A. Trott
Chairman of the Board



Daniel L. Cothren
County Commissioner, District #2



Blair H. Brady
County Commissioner, District #3

Local Agencies

Bradwood Landing LLC) Docket No. CP06-
365-000

COMMENT ON FILING DRAFT EIS
COLUMBIA COUNTY, OREGON and the
COLUMBIA COUNTY DEVELOPMENT AGENCY

I.

Communication and correspondence regarding this proceeding should be directed to the following:

COMMENT ON FILING DRAFT EIS

Facsimile: 503.397.7243 Facsimile: 503.366.3926
Email: hydet@co.columbia.or.us Email:
hansons@co.columbia.or.us

II.

Description of Proceeding

On June 5, 2006, Bradwood Landing LLC filed an application with the Federal Energy Regulatory Commission (the "Commission") pursuant to Section 3 of the Natural Gas Act ("NGA") seeking authorization to site, construct and operate a Liquid Natural Gas ("LNG") terminal in Bradwood, Clatsop County, Oregon, for the purposes of importing LNG into the United States. Also on June 5, 2006, NorthernStar LLC filed an application pursuant to Section 7(C) of the NGA and parts 157 and 284 of the Commission's regulations for (1) a certificate of public convenience and necessity authorizing the construction, installation, ownership, and operation of the Bradwood Landing Pipeline and other facilities, (2) a blanket certificate to construct, operate and/or abandon certain eligible facilities, and services related thereto, and (3) a blanket certificate to provide open-access firm transportation services.

In August, 2007, the Commission issued its Draft EIS and indicated that any person wishing to comment on the proposed

COMMENT ON FILING DRAFT EIS

Page 2

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EIS must do so on or before December 24, 2007. These comments are pursuant to and comply with that notice.

III.

Position Statement/Background

The Columbia County Development Agency was formed on March 28, 2000, with the mission to alleviate blight in Columbia County as defined in Oregon Revised Statutes 457.010 and specifically to alleviate blight in the Port Westward Industrial Area which had precluded industrial development. On September 11, 2001, the Port Westward Urban Renewal Plan became effective, authorizing Columbia County to incur debt in order to make needed road improvements, among others, to attract development at the Port Westward Industrial Site (the "Site").

Urban Renewal Area Developments

Since September of 2001, Columbia County has incurred substantial debt to make road and access improvements to the Site from Highway 30. The total estimated cost of planned road improvements is 16.5 million dollars, which has been partially funded through grants from the US Department of Commerce, Economic Development Administration. The road and access improvements are scheduled to be completed by summer, 2009. The Columbia County Development Agency will use tax increment

captured from the development on the Site to service the Columbia County debt for the road projects. Therefore, it is imperative that these infrastructure improvements are not delayed or otherwise hindered.

The Site consists of approximately 800 acres of property owned by the Port of St. Helens. Part of the Site is subject to a long term lease with Portland General Electric Company ("PGE"). The Site has a deep draft marine facility with a 1200 foot dock on the Columbia River. As a result of the infrastructure improvements mentioned above, three industrial developments are siting at the Port Westward Industrial Site. The first development is a 400 megawatt gas fired power plant operated by PGE which has now been completed, a 260 million dollar investment. The second development is an ethanol plant currently being built by Cascade Grain Products, LLC. The ethanol plant will generate an additional 125 million dollar investment. The third development is also a 536 megawatt power plant to be built by Summit Westward Energy, LLC. This power plant will generate a 320 million dollar investment. All told, the three developments will generate 705 million dollars in the Clatskanie Community and will provide many needed jobs within Columbia County. Therefore, Columbia County must

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seriously consider any proposed development outside of the Industrial Site that could jeopardize the planned developments and correlating jobs for its citizens.

Concerns with Bradwood Landing Project/Pipeline Alignment

LA5-1

1. Pipeline Interference with Port Westward Access Improvements. The proposed pipeline will run from the Bradwood Island site to the Port Westward Industrial Site to connect with the Kelso-Beaver and Mist natural gas pipelines. The route proposed by NorthernStar will run approximately 37 miles, crossing approximately 13.2 miles of property within the County, and running through the Site. NorthernStar's Proposed Route Alignment as shown in Appendix B of the draft EIS, shows the pipeline alignment following Hermo Road from the Collins Road Intersection into the Site. This map shows the pipeline on the east side of the Road, the same side as proposed for the road project expansion. Columbia County is concerned that the 85-100 foot wide construction right-of-way and 50 foot wide permanent right-of-way may interfere with the road improvements. The County has completed engineering and is preparing to construct improvements to Hermo Road, including widening and overlay, an investment of over 11 million dollars. It would be very expensive at this point to make changes to the

COMMENT ON FILING DRAFT EIS

Page 5

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5

LA5-1

Section 4.7.3.3 has been revised to include a discussion about Hermo Road, including our recommendation that NorthernStar document that it has consulted with the Port of St. Helens, the Columbia County Development Agency, and other appropriate agencies and representatives of Columbia County, to determine if its pipeline may have impacts on county improvements in the vicinity of the Port Westward Industrial Area.

LA5-1
cont'd

road project. No final drawings have been provided to Columbia County showing the exact location of the proposed pipeline in relation to the road improvements. NorthernStar has not coordinated its pipeline alignment with the County so as to avoid unnecessary delays and increased costs of Columbia County's project.

The Draft EIS at page 2-53, indicates that NorthernStar plans to use HDD or the bore method only for "major paved highways and railroads where traffic cannot be interrupted". The County is concerned that Hermo Road will not be considered a "major paved highway" and that NorthernStar will use intrusive construction methods, including road interruptions during its pipeline construction. Several industrial developers are dependent upon having Hermo Road open and available for use after completion of the road improvements. Interruptions from pipeline construction will not be acceptable. In addition, Columbia County is expecting that significant wetland mitigation work will need to be done in conjunction with the Hermo Road improvements and is currently waiting for a Wetland Permit from the Corps of Engineers. While representatives of NorthernStar have repeatedly represented that the pipeline easement will not interfere with Columbia

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K-567

LA5-1
cont'd

County's improvements, Columbia County has no assurance that there will be no such interference, and has no assurance that the project will not increase the wetland mitigation burden or impact wetland conditions in the area.

In summary, the Hermo Road improvements are of vital importance to the three industrial developers described above, as well as to Columbia County's ability to encourage new development within the Port Westward Industrial Site. Therefore, NorthernStar's immediate coordination and cooperation with Columbia County is imperative.

LA5-2

2. Pipeline Interference with Private Property Ownership in Columbia County.

Approximately 13.2 miles of the pipeline is proposed to be built on private property within Columbia County. Yet, Columbia County has received very little information from NorthernStar as to how NorthernStar intends to mitigate the impacts that the proposed pipeline will have on private property owners within the County. Specifically, NorthernStar has not addressed in detail how it will fairly compensate property owners for the required easements or the terms of such easements. Nor has NorthernStar addressed in detail who will be responsible for damage that may be caused by the pipeline

Local Agencies

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LA5-2 Landowner compensation and the easement negotiation process are discussed in section 4.8.3.3.

LA5-2
cont'd

while in operation or for environmental damage related thereto. The Draft EIS does not specify any protections that must be included in landowner agreements. The Draft EIS indicates that NorthernStar will need approximately 553 acres of land during construction of the property and 234 during operations. The rights-of-way will ultimately be 50 feet during operations. Columbia County is concerned about the amount of impact this much acreage will have on its citizens, and that its citizens will be unduly burdened by the proposed pipeline. Columbia County desires to assure that its citizens are treated in a fair and open manner during the easement acquisition process.

REQUESTS

LA5-3

1. Columbia County requests that the Commission require as a condition of approval that NorthernStar immediately consult and agree with Columbia County as to the location of the pipeline route alignment along public roads in Columbia County, the timing of construction, the type of construction methods, and liability for any changes or costs incurred by Columbia County as a result of the proposed pipeline alignment and operation.

LA5-4

2. Columbia County requests that the Commission require as a condition of approval that any change in the pipeline

COMMENT ON FILING DRAFT EIS

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Local Agencies

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LA5-3

Section 4.7.3.3 has been revised to include our recommendation that NorthernStar consult with Columbia County to determine if its pipeline may have impacts on county improvements.

LA5-4

Section 4.7.3.3 has been revised to include our recommendation that NorthernStar should document consultation with the Port of St. Helens, the Columbia County Development Agency, and other appropriate agencies and representatives of Columbia County, to determine if its pipeline may have impacts on county improvements in the vicinity of the Port Westward Industrial Area.

LA5-4 | route alignment that may affect the Hermo Road improvements or
cont'd | any public road within the County be approved by the Columbia
County Public Works Director prior to construction.

LA5-5 | 3. Columbia County requests that landowner protections
be required of NorthernStar as a condition of approval.

Conclusion

This proposal stands to have potential substantial impacts on Columbia County residents, on the property owners in the Clatskanie area, on the current industrial development at the Site, on anticipated construction of new industrial projects at the Site, and on the recent investments in road infrastructure made to attract new business to the Site. While Columbia County takes no position either in favor or in opposition to the proposed LNG facility and pipeline, the County's concerns must be addressed during this permit process.

Respectfully submitted,

/s/ Sarah Hanson
Sarah Hanson, County Counsel
Columbia County
Courthouse
230 Strand, Room 318

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LA5-5 See our response to comment LA5-2.

St. Helens, OR 97051
Telephone: 503.397.3839

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Certificate of Service

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at St. Helens, Oregon, this 19th day of December, 2007.

/s/
Sarah Hanson
Sarah Hanson

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K-572

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Bradwood Landing LLC	)	Docket No.	CP06-365-000
Northern Star Energy LLC	)	Docket Nos.	CP06-366-000 CP06-376-000 CP06-377-000

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT BY THE
CITY OF ASTORIA, OREGON

Movant-Intervenor the City of Astoria, a municipal corporation, through its City Council, the duly elected governing body for the City of Astoria (the "City" or "Astoria"), hereby submits its comments on the Draft Environmental Impact Statement ("DEIS").

Background

As described in the DEIS, the City of Astoria, Oregon is a municipality consisting of approximately 11.5 square miles in geographic jurisdiction located near the mouth of the Columbia River, in Clatsop County, Oregon. According to the 2000 United States Census data, the City's year round population is 9,813, however based on proposed development plans and population projections, this is expected to increase to 11,205 by the year 2015 as per the April 2007 Clatsop County Coordinated Countywide Population Projections. The summer time population increases with the influx of tourists to the area. The City is directly and significantly impacted by the proposed vessel transits carrying liquefied natural gas ("LNG") to the proposed Northern Star Natural Gas LLC ("NSNG") facility at Bradwood Landing, located at approximately river mile ("RM") 38 upstream.

Included within or immediately adjacent to Astoria are a diverse number of private and critical government occupancies. Among these are Tongue Point Job Corps Training Center and the U.S. Post Office (Federally owned facilities), two US Coast Guard stations (one mooring for USCG cutter vessels and one buoy tender station) and USCG housing area, the County Seat (Courthouse, jail, and central County government offices and services, including the Emergency Operations Center), regional health services (Columbia Memorial

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Hospital, which serves as the region's only trauma center, and various medical facilities), Columbia River Pilots and Bar Pilots services (pilot services for all ships crossing the bar or traveling the Columbia River), Port of Astoria docks and offices, two major recreational and commercial fishing boat mooring basins, and one transient tour boat moorage facility. U.S. Highways 101 and 30 join in Astoria and meet at the Columbia River at the Astoria-Megler Bridge, a major access point between the States of Oregon and Washington.

Public Safety is provided by local police and fire departments. The Astoria Police Department is comprised of sixteen full-time officers and several reserve officers, who are responsible for 24 hour protection of the City's 11.5 square mile area. The Astoria Fire Department consists of twelve full-time personnel, twelve volunteer firefighters, and four response vehicles, including Hazmat van. The Fire Department's service area is approximately 12 square miles and includes the numerous facilities noted above with contract services to the Tongue Point Job Corps. Center. In addition, through existing Mutual Aid Agreements, Astoria supports the Knappa-Svensen-Burnside Rural Fire Protection District, in which the proposed LNG terminal would be located. The City currently has no marine law enforcement or shipboard firefighting capabilities except with land-based shipboard firefighting with the Maritime Fire Safety Association.

The City has very limited funding resources available for public safety services. It relies on limited property tax revenues that are used primarily for existing personnel expenses. In recent years equipment purchases have depended on grants and loans.

The City's public safety responsibility extends for approximately nine (9) miles along the southerly bank of the Columbia River beginning at approximately Smith Point (Youngs Bay Bridge/Highway 101) continuing eastward to and around Tongue Point. Approximately six (6) miles of the Columbia River shipping channel, from Warrenton city limits near Smith Point, east to Tongue Point are within the municipal jurisdiction of the City of Astoria. Astoria is the second Oregon municipality potentially impacted once the LNG Carrier enters the Columbia River. As described in the DEIS (Section 4.7.1), major portions of the City are located within Zone 1 of concern, including the Astoria waterfront, the downtown retail and governmental center, the Astoria waterfront River Trail, City Aquatics Center, Columbia Memorial Hospital and other major regional medical

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Section 4.7.1, the police and fire stations, three public mooring basins, numerous City parks, six motels, and several residential housing areas (including two large condominiums and four proposed, senior housing facility, housing for the disabled, and several single-family residential neighborhoods). Each of these public assembly areas is sufficiently close to the vessel transit route to warrant heightened safety and security measures.

Procedural History

On June 26, 2006, during the Pre-Filing Process, the City of Astoria wrote to the Commission to advise them that the City had a number of safety related concerns regarding the potential transit of LNG carriers through the corporate limits of the City of Astoria, which would occur should the Bradwood Landing site be approved by the Commission. A copy of that June 26, 2006 letter was also included in the Safety Advisory Report submitted to the Commission by the Oregon Department of Energy, attached as Appendix K to the DEIS. On June 26, 2006, City timely moved to intervene, Accession No. 20060706-0181. Since that time, both Astoria's Police Chief and Fire Chief have participated in various meetings and workshops held in conjunction with preparation of the U.S. Coast Guard Waterway Suitability Assessment Report ("WSR") dated February 28, 2007, attached as Appendix H to the DEIS, and with respect to development of an Emergency Response Plan ("ERP").

Comments on the DEIS

LA6-1 The DEIS repeatedly refers to the same discussion concerning waterway safety and security throughout the voluminous report. Specifically, the DEIS recognizes significant potential impacts within Zones 1 through 3 due to an accidental or intentional breach of an LNG vessel resulting in a release of LNG during transit or while at the berth. It acknowledges the risk of severe consequences, with injuries ranging from mild to fatal, being most severe in Zone 1 and decreasing outward through Zones 2 and 3. See, e.g., DEIS, p. 4-322. Yet, the DEIS uniformly concludes that "with the implementation of the safety and security measures and conditions outlined in the Coast Guard's WSR (see Appendix H), an LNG release along the waterway would be highly unlikely." Id. See also DEIS, p. 4-273 ("Effects on structures within Zone 1 would be most severe, while buildings within Zone 3 would be less impacted. However, with implementation of the mitigation measures

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LA6-1 See our response to comment LA2-1.

LA6-1 cont'd	<p>described in the Coast Guard's WSR, an LNG release along the waterway would be highly unlikely."); DEIS, p. 4-275 ("With the implementation of the safety and security measures outlined in the Coast Guard's WSR, it is highly unlikely that there would be a release of LNG from a passing LNG ship that would lead to a spill and related pool fire affecting planned commercial or residential developments along the waterway."); DEIS, p. 4-279 ("Those facilities within Zone 1 could sustain damages to structures, features, or vegetation. Facilities within Zone 3 would be less affected. However, with the implementation of the safety and security measures outlined in the Coast Guard's WSR, the chance of a spill would be extremely remote.").</p> <p>As a result of these findings, the FERC staff made a number of recommendations which are described in detail in sections 4.11.5.5 and 4.11.6 of the DEIS (pp. 4-429 through 4-436) and further documented in Section 5.2, Conditions 42, 62 and 63. These conditions fail to properly acknowledge, however, that the Coast Guard measures are <i>necessary requirements</i> and not simply preliminary recommendations with the details to be worked out later. <u>Compare</u> DEIS, p. 4-432 ("the WSR recommends additional facilities and infrastructure to make the waterway suitable for LNG marine traffic") <u>with</u> WSR, App. H ("I have determined that to make the Columbia River suitable for the type and frequency of LNG marine traffic associated with this project, additional measures will be necessary ... [and] must be put into place"). Additionally, the DEIS minimizes and generalizes the specific requirements outlined by the Coast Guard. For example, on page 4-432, the DEIS identifies one item as "augmentation of shore side firefighting capabilities to provide protection services to the facility as well as communities along the river" when the original WSR (p.4 of 6) stated "shore side firefighting resources and training will need to be augmented ... [including] adequate cost-sharing arrangements for project related training, equipment, maintenance, and staffing ... for all communities impacted by the project."</p>
LA6-2	
LA6-3	<p>Representatives of NSNG have had approximately two years to make firm commitments to state, county and local law enforcement and fire agencies concerning these requirements, and have not done so. The proposed conditions that the WSR be updated annually and NSNG commit prior to commissioning to implement the required measures is simply too little too late. Additionally, the conditions recommending the Emergency Response Plan ("ERP") and cost-sharing plan be submitted prior to initial site preparation likewise</p>

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LA6-2 See our response to comment LA2-2.

LA6-3 See our response to comment LA2-3.

LA6-3 do not provide sufficient certainty for local communities, like Astoria.

cont'd

As documented throughout the DEIS, implementation of these measures is critical to the viability of the project and the validity of the DEIS assessment. Absent binding agreement with the state, county and local fire and police agencies concerning security and safety requirements, the project cannot proceed and the entire DEIS safety and security analysis is rendered meaningless. Therefore, NSNG should be required, *prior to issuance of the final order issuing certificates ("Order" or "Certificate")* to reach an agreement in principle, in a form acceptable to each respective agency, with each state, county and local municipality affected on the level of resource funding it will commit for safety and security requirements including, without limitation, capital requirements for new equipment, resources for additional staff, and training for all affected personnel (both career and volunteer). The agreements should address the effects of heightened security alerts and unfunded future governmental mandates. These critical decisions cannot and should not be put off until after the Certificate issues.

The Commission cannot fulfill its statutory duty to address state and local safety considerations required by 15 U.S.C. § 717b-1 (Section 311(d) of the Energy Policy Act of 2005) by simply stating that these important details will be worked out after the Certificate issues. See DEIS, Appendix K, Response of the Federal Energy Regulatory Commission to the Safety Advisory Report of the Oregon Department of Energy for the Bradwood Landing Project (referring to proposed Conditions 42, 62, and 63). The statute requires meaningful resolution of state and local safety considerations "prior to issuing an order pursuant to section 717b." See 15 U.S.C. § 717b-1(b) and (c). Therefore, NSNG must be required to address Astoria's requirements (as well as the other jurisdictions affected), outlined in its June 26, 2006 letter, and commit to the funding necessary to implement these requirements, prior to issuance of any Order approving the project.

LA6-4

Secondly, with respect to "the current capacity of the local public services to respond to an incident or fire at the LNG terminal," the DEIS recognizes "that significant gaps exist in fire fighting capacity for both shore and water side fire fighting response." DEIS, p. 4-342. These gaps were also described in the State Advisory Report (Appendix K) filed pursuant to 15 U.S.C. § 717b-1. The DEIS states that "NorthernStar has

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LA6-4 See our response to comment LA2-4.

LA6-4
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indicated that trained personnel and fire fighting equipment would be maintained at the LNG terminal in the event of an emergency." Id. However, there is nothing in the DEIS to indicate that NSNG has committed to anything more than that which is required by applicable regulations and requirements found in 49 C.F.R. Part 193 and NFPA 59A. The proposed solution to address this acknowledged issue, the requirement to produce an ERP prior to construction, is simply inadequate.

Given the lack of local capacity and the distance from supporting fire fighting services, NSNG must be required to *enhance* fire protection. It is insufficient that operations and maintenance personnel will be trained in safe shutdown and evacuation procedures, etc. as already required by applicable regulations. If an incident occurs at night, when only a limited operations crew is working, there may be insufficient personnel to man all of the fire fighting equipment likely to be present. The Commission and the public can be assured that dedicated fire fighters with proper training and equipment will be readily available to address any incident at the terminal. Local public safety services will require increased resources to meet this need at the facility and in the community.

LA6-5

Lastly, with respect to protection of Cultural Resources in the event of an incident, the DEIS states that "NorthernStar indicates that it would produce a Cultural Resources Management Plan that would outline procedures for coordination with first responders in order to protect historic properties." DEIS, p. 4-359. Astoria is the oldest city west of the Rockies, and has three National Register Historical Districts, two of which abut the Columbia River. The City has about 800 historic properties and over 70% of the City's housing stock was built prior to 1950. This commitment to protect historic properties is not reflected in any of the proposed conditions prepared by FERC Staff. See Section 5.2. Therefore, Condition no. 36 (requiring such Cultural Resources Management Plan) must be modified to include a requirement to coordinate, and reach agreement, with first responders on the method and means to protect historic properties which are located within the Zones of Concern, especially historic buildings along the waterway which are most likely to be adversely impacted.

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LA6-5 See our response to comment LA2-5.

Conclusion

As described herein and in its prior correspondence (incorporated by reference), Astoria requires a commitment to fund necessary capital and on-going expenditures related to police and fire protection before it can agree to any proposed ERP. NSNG should be required to document such commitments, in a form agreeable to Astoria, before any final Order from the Commission issues. The proposed mitigation conditions, which delay finalizing such monetary commitments until after the Certificate issues, are inadequate and contrary to statutory requirements enacted as part of the Energy Policy Act of 2005. Additionally, based on the recognized need, NSNG should be required to implement and maintain an Industrial Fire Brigade as described in NFPA 600. Lastly, the required Cultural Resources Management Plan must contain provisions addressing the risk to historic properties located within the Zones of Concern and include agreements with local first responders documenting the method and means for protecting these properties and sites.

December 21, 2007

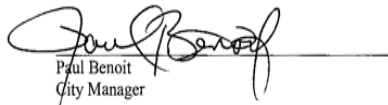
Respectfully submitted,



Willis L. Van Dusen, Mayor
City of Astoria
1095 Duane Street
Astoria Oregon 97103
Telephone: 503-325-5824

CERTIFICATE OF SERVICE AND MAILING

I hereby certify that I have this day served the foregoing document on each person designated on the official service list compiled by the Secretary in this proceeding on December 21, 2007, by first class mail, postage prepaid.



Paul Benoit
City Manager

Attest:



Paul Benoit, City Manager

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UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

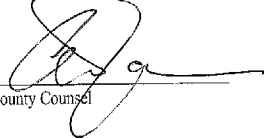
Bradwood Landing LLC	)	Docket No. CP06-365-000
NorthernStar Energy LLC	)	Docket Nos. CP06-366-000 CP06-376-000 CP06-377-000

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT BY
INTERVENOR, CLATSOP COUNTY

Intervenor Clatsop County, Oregon hereby responds to the Commission's request for comments on the Draft Environmental Impact Statement (DEIS) in this matter.

Due to emergency conditions in Clatsop County resulting from recent high winds and flooding, the County has been unable to independently review the DEIS in a timely manner. However, the County has contracted with the Columbia River Estuary Study Taskforce (CREST), an intergovernmental agency in Clatsop County charged with the responsibility of providing technical advice to member jurisdictions regarding matters pertaining to Coastal Zone Management and the Columbia River Estuary, to conduct the DEIS review on the County's behalf. That review by CREST is attached hereto as Exhibit A and is submitted herewith.

For Clatsop County


County Counsel

Local Agencies

EXHIBIT A



750 Commercial Street, Room 205, Astoria, Oregon 97103
Phone: (503) 325-0435, Fax: (503) 325-0459
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Website: www.columbiaestuary.org

DATE: 12/21/2007

To: Kimberly D. Bose, Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street N.E., room 1A
Washington, D.C. 20426

From: Columbia River Estuary Study Taskforce (CREST), representing Clatsop County, OR
750 Commercial Street, room 205
Astoria, OR 97103

RE: Bradwood Landing Draft Environmental Impact Statement Review
Docket No. CP06-365-000, CP06-366-000

Dear Ms. Bose,

Clatsop County of Northwest Oregon contracted with CREST on October 5, 2007 to review the Bradwood Landing Draft Environmental Impact Statement (DEIS) and provide the following comment letter. Upon approval by the Clatsop County Board of Commissioners and CREST Council, CREST has been authorized to submit this document directly to FERC *on behalf of the County*. Please note that CREST remains neutral in regards to this project and does not intend to submit its own comments on the DEIS.

We have focused our technical review efforts on the project concerns and impacts voiced most often by Clatsop County residents, including environmental impacts to the communities and the estuary, as well as associated recreational and commercial uses supporting the regional economy. Our review excludes project reliability and safety, Chapter 4.11 of the DEIS; please refer to Clatsop County's July, 2007 *Public Safety Assessment for the Proposed Bradwood Landing LLC/NorthernStar Gas LNG Project* report (prepared by PBS&J consultants) for discussion of these issues. In addition, our review excludes the land use issues that are affected by the County's land use decision-making process. Please refer to the local land use process for the Counties' comments on those issues.

Over the last several decades Clatsop County has participated in extensive scientific studies in the Lower Columbia River estuary through membership in the ongoing

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Columbia River Estuary Study Task Force and partnership in major restoration projects and plans. Researchers have shown that the estuary provides critical habitat for a variety of salmon life history stages, from fry to adults. Importantly, juvenile salmonids utilize the estuary as a rearing, refuge, and feeding area prior to transitioning into the ocean environment. Comprehensive plans have been developed by all levels of government over the last 30 years, addressing fish and wildlife restoration in the Columbia River and its estuary. Maintaining and restoring the estuary is a critical part of the long-term multi-billion dollar Columbia River restoration effort. Despite weakened fish stocks, commercial and recreational fishing in the region is still very significant, providing tens of millions of dollars in county revenue annually (Clatsop County Fisheries Project, commercial and sport crab / salmon / sturgeon commercial fishing, etc.). The eventual success of the long-term fishery restoration efforts will yield increased economic benefits to the regional economy by restoring fishing opportunities lost to the protection of weak stocks.

Because the scale of this project is unprecedented in the Lower Columbia, and we feel the DEIS is inadequate in several ways, we recommend that FERC proceed slowly through the permitting process to ensure that the final EIS (FEIS) address all of the concerns brought forward by Clatsop County and the various involved state and federal agencies.

General Review of Clatsop County's Overarching Issues

I Consequences of Major Liquefied Natural Gas and Vessel Fuel Oil Spills to Clatsop County Communities and the Waterway

The risk of a major LNG spill and an associated vessel fuel oil spill on the waterway is taken very seriously by Clatsop County, even though the DEIS indicates there is a low probability of such an occurrence in any given year. The adverse consequences of a major LNG shipping disaster to citizens of affected communities and biological resources of the estuary would be vast, requiring assurances for post disaster remedies. There is no predictive capability for such disasters, and prevention control for LNG transit disasters is worsened post September 11th due to the fact LNG vessels in particular have been identified as a prime target for malicious intent. In addition, this particular LNG transit corridor is very narrow in places and adjacent to shoreline communities, making it difficult or impractical to fully defend. The County wants to make sure that all possible funding mechanisms are in place to assure any major, accidental or intentional, LNG transport incident will be followed up with timely and complete remediation, restitution and recovery to both the human and natural environments.

We understand the difficulty in estimating the level of damage to life and property under different spill scenarios. The DEIS and its references do offer enough information for us to conclude that if a major accident/incident occurred adjacent to a near shore community like Astoria, life and property damages would be substantial and long

K-582

LA7-1

LA7-1 See our response to comment FA2-35.

LA7-1
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lasting. When a small community endures a major disaster there is a potential to permanently change its character, especially if post emergency disaster response is lacking. In addition, restoration is complicated in old cities like Astoria (oldest west of the Mississippi) having large numbers of heritage sites.

There is also a serious threat to the estuary once an LNG vessel's gas containers become damaged, not due to the LNG, but rather shattering and break-up of the ship allowing a major spill of vessel fuel oil into the water. The Resource Report 9 (Air and Noise Quality) that Bradwood LLC/NorthernStar submitted to FERC states that bunker fuel oil will be used in approaching, maneuvering, and departing from the terminal berth. Industry resources also show that conventional LNG carriers, although often cited as exclusively using LNG cargo boil-off when underway, get about 50% of their energy requirement from heavy fuel oil. Released gas vapors that are trapped in confined areas of the ship after an incident can damage the ship's structure upon ignition or detonation. A spill of tens of thousands of bunker fuel oil would be quickly distributed throughout the estuary by swift river currents and tides to wetlands and shorelines. Bunker fuel oil is made up of compounds harmful to fish and wildlife and known to sometimes cause off-flavor in harvested fish species. During an LNG / oil spill emergency, safety issues delay clean-up, allowing distribution of contaminants.

A major spill of bunker fuel oil could potentially result in significant economic impacts to the region, including suspension of some commercial fisheries due to contamination and possible reduced fishing opportunity over the long term. For example, if there is documented loss of a significant number of salmon listed as endangered species, it may be deemed necessary to further restrict the already severely restricted fishing opportunities in the estuary. A major oil spill would also impact tourism and recreation based economies like those on the Lower Columbia because of the visual blight, off-flavor in fish and pollutant odors.

In order to assure full remediation, restitution and recovery of the community and the estuary following an LNG and/or fuel oil spill it is necessary to have the Federal Energy Regulatory Commission's license require LNG shippers and Bradwood facility operators and their successors to be fully bonded and insured for the worst case spill clean-up and response. This includes damage compensation/restitution obligations for all lost uses over the entire recovery period.

We believe there is Federal guidance for FERC to use license terms and conditions to provide surety for full remediation and compensation. First, LNG vessel transit on the Columbia River is an integral part of the Bradwood project; without it the proposed project could not exist. Federal designations for the Columbia River estuary indicate it is one of the Nation's most important and environmentally sensitive waterways (one of seven nationally designated by Environmental Protection Agency's National Estuary Program). Guidance to FERC is provided by the Federal Power Act requirement "... to consider the extent to which a project is consistent with Federal or state comprehensive

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LA7-1
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plans for improving, developing, or conserving a waterway or waterways affected by the project" (FPA Section 10(a)(2)(A)). FERC has adopted 25 Comprehensive Plans that address improvement /restoration of the Columbia River for fish and wildlife resources and recreation. The permit authorized by FERC should provide adequate protection and mitigation of fish and wildlife and other beneficial public uses such as recreation. The Federal definition of mitigation does include compensation for an unavoidable impact. Since spills may occur despite every required prevention measure, such spills would be considered unavoidable and therefore require compensation for impacts.

Another source of guidance to FERC is the federal endangered species program recovery plan for the Columbia River, which includes the estuary as critical habitat. The health of the estuary is essential to achieving recovery of the listed anadromous species, all of which spend time in the estuary. Given that recovery plans examine the exposure of weak populations to harmful events over a 100 year period, even events that occur infrequently like LNG / oil spills could reduce chances of recovery for the species without remediation and compensation.

II Recreational and Commercial Fishing Impacts

The DEIS does not adequately analyze or mitigate the significant potential conflicts between the LNG ships using the waterway and recreational and commercial boating activities (sport fishing, commercial fishing, power boating, sailing, paddling, waterfowl hunting). The Oregon Department of Fish and Wildlife (ODFW) estimates the angler boat count downstream of the Astoria-Megler bridge to range between a low of 613 in April to a high of 19,644 in August, with a total of 46,547 boats annually engaged in recreational and commercial fishing for crab, sturgeon, salmon, halibut/bottomfish, tuna, and whiting.

LA7-2

The DEIS states an LNG vessel will initially be seen on the river approximately every 1.5 days. All other vessels are expected to move out of the 500 foot security exclusion zone for a quarter hour or more before resuming their position. Commercial fishermen may face an even longer delay, given the time it takes to retrieve and deploy nets and other gear. In some reaches of river, excluded vessels may have to move to shallow areas where they must contend with wakes larger than other shipping vessels, sand bars at low tide and obstacles in the fog. Some recreational boaters may choose to leave the river, impacting traffic at boat ramps. When considering the entire volume of boat anglers and pleasure boaters cumulatively and the channel conditions, we believe the impact to boat traffic is significant rather than the inconvenience conclusion in the DEIS. Mitigation considered for this significant impact could include: (1) timing LNG transit to avoid peak recreational boating or fishing periods/times of day identified by local and state knowledge, including the Astoria Regatta, Great Columbia Crossing and peak fish migrations; (2) for those fishing periods that cannot be avoided, redirect angling effort to areas outside the exclusion zone by funding the development of strong fisheries in tributaries and side bays of the estuary, and (3) improvement of boat ramp facilities.

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LA7-2

Our EIS does not specify any time period (such as a quarter hour or longer for commercial fishing boats) that other vessels may be required to move out of the way of LNG carriers transiting up the waterway to the proposed Bradwood Landing LNG terminal. If the LNG carriers travel at speeds between 8 to 12 knots up, they would be past other boats in a matter of minutes. Thus we are able to conclude, in section 4.7.1.4, that the project would not have any significant impacts on other river users.

LA7-3

The communities on the Columbia River estuary presently have a focus on developing tourism and recreational uses. LNG carriers and their heavily armed escort vessels have a high potential to create an unwelcome and/or unsafe appearance not conducive to many tourists and recreational fishermen seeking a relaxing experience. The uncomfortable response of visitors to LNG transit would be expected to worsen if there are future LNG shipping disaster(s) anywhere in the county. If visitors choose other coastal recreation opportunities because they are uncomfortable with the LNG transit, the regional economy would lose millions of dollars over the long-term spent on retail, hotel and guide services. The DEIS should disclose and analyze the economic value of tourism and recreation to the region and then estimate a range of potential long-term lost visitor use relating to LNG transit, including recreational fishing, visiting cruise ships, the Lewis and Clark National Heritage Park, and the proposed Columbia Pacific Heritage Area. We believe the lost value over the long-term could be significant and recommend conducting an opinion survey of potential visitors that gauges recreational and tourism conflicts with LNG transit in general (thus avoiding potential tourism impacts of the survey itself). If significant losses are estimated, mitigation could be considered in the form of funding tourism promotions to off-set estimated losses.

III Incomplete and Inadequate Draft Environmental Impact Statement

LA7-4

Importantly, there has not been a third-party market analysis concerning whether or not the LNG gas provided via the project fulfills the purpose and need of the project. Spokespersons for the William's Northwest Pipeline say that the company doesn't have room for all of the gas the Bradwood facility would provide and that, even with project declines in supply from Canada and the Rocky Mountains, there is not enough demand for natural gas in Oregon and Washington to utilize all of the Bradwood supply. The evidence indicates that the Bradwood Landing project will be most fully realized when, in the foreseeable future, the Palomar pipeline is connected to the proposed facility. We believe that the Palomar pipeline is therefore not a *related* foreseeable project (i.e. a potential cumulative impact as cited in the DEIS), but rather a project the proposed LNG facility is *dependent* upon. If this is the case, FERC staff should require that the final DEIS be amended to include environmental impacts associated with the Palomar pipeline.

LA7-5

In addition, FERC and EPA approved comprehensive plans for protection and restoration of the Lower Columbia River are an important guide to the Federal licensing process for this large scale project but are omitted from the DEIS analysis. The intent of these comprehensive plans is to restore the fishery, ecological function and fishing opportunity, providing a significant value to the local economy. We recommend the DEIS list and review the 25 FERC approved Comprehensive Plans and use them to guide development of a mitigation package that fully mitigates for all the project impacts to the Columbia River estuary and its tributaries.

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LA7-3

We do not believe that LNG marine traffic in the waterway would represent a safety risk to adjacent communities, as explained in section 4.11.5. Nor do we think that the project would have any negative impacts on the local tourist industry. We do calculate the value of recreation and tourism in the region in sections 4.7.1.4, 4.8.1.8, and 4.8.2.8.

LA7-4

As discussed in section 1.0, the Williams Northwest pipeline would have capacity for the natural gas from the Bradwood landing pipeline project. We do not agree that there is not enough demand for natural gas in the Pacific Northwest to utilize the Bradwood Landing Project supply. See our discussion of purpose and need in section 1.1. Also see our response to comment PM1-58. As described in section 3.1.2.2, we consider the Palomar Project to be a separate undertaking from the Bradwood Landing Project. Neither project is inter-dependent on the other. If Palomar is not authorized or built, the Bradwood Landing Project could still go forward, and vice versa.

LA7-5

See our response to comment PM5-28.

LA7-5
cont'd

Clatsop County, Oregon state agencies, and federal agencies commenting on the DEIS have identified currently unmitigated project impacts in the waterway, on the site and along the pipeline(s) and we recommend that their comments produce binding mitigation commitments. In this manner, Clatsop County recommends that NorthernStar use their project development funds for full and complete *mitigation* of the project impacts consistent with the underlying intent of Federal, state and local rules and guidance. We expect that funding such a complete mitigation package would approximate the project proponent's voluntarily offer to spend \$59 million dollars on unspecified salmon *enhancement* (e.g. endowments for mitigation areas, bonding and insurance for spill contingency and damage compensation, various omitted mitigation needs, etc.). This Salmon Enhancement Initiative will be completely outside of any license or permit requirements (enhancement is not ruled to be a necessary environmental commitment for a project). One of the realities of enhancement offers is that they can be readily disregarded by a successor company or owner.

LA7-6

Finally, the DEIS alternatives analysis is superficial and incomplete. We recommend completing a robust alternative analysis worth of the guidance in the comprehensive plans and the community's focus on the estuary. Potentially significant impacts for which we recommend additional analysis in the DEIS are detailed further in the specific comments (including references on key points), including recreational conflicts, wetland mitigation areas and their management, and geologic hazards.

IV Geologic Hazards Associated with the Bradwood Landing Location

LA7-7

The geology and geologic hazards associated with the location of NorthernStar's proposed facility at Bradwood are critical issues. The Oregon Department of Geology and Mineral Industries (DOGAMI) labels the site as having severe natural hazard potential. The DEIS attempts to address the applicable geologic hazards, but in many sections the research is incomplete. The County believes that for the DEIS to be considered complete and adequate it must disclose new specifications and mitigation measures for foundation problems at the facility related to liquefaction and ground stability during major subduction-zone earthquakes, adequate tsunami wave modeling, accurate pre-construction landslide and debris flow characterizations (including records of historical landslides omitted from the DEIS) and new pipeline routes in response to geologic hazards. In addition, it is necessary to address HDD stream crossing methods and landslides associated with pipeline construction potentially impact important tributaries.

V CZMA Consistency Requirements Regarding Federal Actions

The Coastal Zone Management Act of 1972 is based on the premise that such management is best achieved at the state and local level (CZMA Sec. 302(i)). This plan directs the states to create coastal management programs that are consistent with this Act. Oregon's Coastal Management Program, which is federally approved, directs local governments in the coastal zone to create laws and policy consistent with CZMA

Local Agencies

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LA7-6

We disagree. We believe our alternatives analysis in the EIS is robust and complete.

LA7-7

Concerns raised by DOGAMI regarding geologic hazards are discussed in the responses to comment letter SA1. See also our responses to comments PM3-39, LA7-25, and LA7-31.

objectives. In conjunction with the State program, Clatsop County has integrated the CZMA into its local comprehensive plan and thus become an agent of the State. This gives the County, as directed by the CZMA, the authority to determine if a federal action, such as the siting of energy facilities, is consistent with local land use laws. (CZMA Sec. 307). Specifically, CZMA Sec. 307 states that, "No license or permit shall be granted until the state or its designated body has concurred with the applicant's certification".

LA7-8

The proposed Bradwood Landing LNG terminal site is located within the authority of the CZMA under Oregon designation. Due to this fact and the County's role as an agent of the state on this issue, FERC has the responsibility to integrate Clatsop County's land use decisions relevant to the CZMA into the final EIS. Thus, the decision of the County to concur with or object to the Bradwood Landing proposal must be an integral part of the final FERC approval process. As a result, any conditions attached to a County approval that is relevant to the CZMA must be incorporated into the final EIS by the authority of the CZMA. If the County's decision is to deny, or if NorthernStar asserts that some of the conditions are too restrictive and wants them removed, FERC must prove that the activity is consistent with the CZMA or otherwise necessary in the interest of national security (CZMA Sec. 307(c)(3)(A)).

At the time this document was written, the County is currently in the process of analyzing and deliberating on NorthernStar's consolidated land use application for approval or denial. It is important for FERC to understand that the Oregon DLCD cannot issue the mandatory CZMA consistency certification for NorthernStar's proposed project unless Clatsop County finds it consistent with its Comprehensive Plan, Land and Water Development and Use Ordinance, Standards Document and the Columbia River Estuary Management Plan. All of these documents have been acknowledged by the State as being in compliance with the statewide planning goals and thus are a part of CZMA consistency.

LA7-9

In the final EIS, FERC should be guided by specific CZMA goals regarding development on the coast and the siting of an energy facility. A management objective of coastal development is minimizing the loss of life and property caused by improper development in flood-prone, storm surge, geological hazard and erosion-prone areas. (CZMA Sec. 303(2)(B)). In NorthernStar's case, the Bradwood terminal and pipeline locations are prone to flooding, geologic hazards, erosion and other hazards associated with heavy storms. In addition, the CZMA states that priority consideration should be given to coastal-dependent uses and orderly processes for siting major facilities, such as energy, in locations that are in or adjacent to areas where commercial or industrial development already exists (CZMA Sec. 303(2)(D)). In regards to NorthernStar, the Bradwood location is on property designated for industrial use, but that use is limited by the local comprehensive plan to industrial uses smaller than the proposed facility. Also, there is no adjacent industrial or commercial development near the Bradwood site. The site is surrounded by forested lands and the nearest industrial operator is several miles away.

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LA7-8

We have revised the EIS to indicate that on March 20, 2008, Clatsop County made a final decision to approve the land use changes proposed by NorthernStar, subject to specific county-imposed conditions.

LA7-9

See our response to comment LA7-8.

VI Other Primary Clatsop County Concerns

Other County impacts that will be addressed in brief in the Specific Comments section include:

- LA7-10
- Sediment impacts in watersheds along the pipeline route: The focus is on streams tributary to the estuary included in comprehensive restoration plans and/or supporting anadromous fish spawning. Potential sediment impacts can be derived from active landslides triggered by pipeline activities, and pipeline crossings, both open trench and borings. Mitigation measures should include careful monitoring of streams and watersheds for sediment discharges followed by clean up of significant deposits in spawning riffles and juvenile rearing areas.
- LA7-11
- Mitigation Plans: Clatsop County requests to be included among the applicable agencies that will participate in finalizing the Bradwood compensatory mitigation package and third-party monitoring and reporting programs. Site-specific mitigation area agreements are recommended that will minimally include: (1) An endowment to manage each of the areas in perpetuity in a manner that avoids impacts to neighboring properties, (2) funds covering all start-up costs (3) designation of a qualified land management agency, and (4) providing the county with in lieu taxes if the land owner/manager is tax exempt.
- LA7-12
- Fish entrainment at water intakes: Although the proposed facility will have a ballast water and engine cooling installation that prevents entrainment, it is not compatible with all the ships that transport LNG. A requirement is recommended that limits the LNG facility to contract with ships having compatible equipment and an associated monitoring and compliance program.
- LA7-13
- Shoreline erosion caused by LNG vessel wakes: The LNG vessel produces a wake that is larger than the typical cargo vessels. The DEIS does not disclose the presence of numerous dikes along the Columbia River that protect homes and property. Many of the dikes are in need of maintenance and upgrading. County recommends analyzing shoreline erosion affects upon dikes due to the LNG vessel wake and mitigating any unavoidable impacts found to be significant.

Specific Comments Related to Clatsop County's Overarching Issues

Alternatives Analysis

- LA7-14
- The Alternative Analysis should be more robust and complete to utilize the Federal guidance of FERC approved Comprehensive Plans concerning restoration of the Columbia River and its estuary and EPA special designation of the Columbia River in the National Estuary Program (Section 10 of the Federal Power Act). Specifically, off-shore facilities alternatives that avoid impacts to the estuary should receive more analysis

Local Agencies

- LA7-10
- The impacts of pipeline construction and sedimentation on surface waters and aquatic habitats are discussed in sections 4.3.2.4 and 4.5.3.1, respectively. To minimize impacts on surface waters, NorthernStar would implement its Waterbody and Wetland Construction Procedures Plan, pipeline ESC Plan for Oregon, and SWPPP for Washington as well as our Plan and Procedures. In addition, NorthernStar is consulting with the FWS, NMFS, and state agencies regarding potential mitigation for replacement of in-stream habitat. We have included a recommendation that NorthernStar finalize its Waterbody and Wetland Construction and Mitigation Procedures Plan that describes the specific methods of in-water habitat mitigation to be conducted, and file that plan for our review and approval prior to pipeline construction. NorthernStar would compensate for impacts on surface waters and aquatic resources that could not be avoided by setting aside or developing a number of mitigation sites, which are described in its Compensatory Mitigation Plan. See our response to comment FA2-10 regarding compensatory mitigation.
- LA7-11
- County-level involvement is typically welcomed as part of establishing wetland mitigation within the CWA permitting process. Contacting the ODEQ to facilitate such involvement is recommended.
- LA7-12
- See our response to comment PM1-31.
- LA7-13
- See our response to comment FA4-14.
- LA7-14
- We disagree. We believe that no more analyses are necessary for our consideration of a potential offshore LNG terminal alternative. Our detailed feasibility analysis of this alternative is presented in section 3.1.4. The ABS report summarized in our discussion indicates that conditions offshore in the Pacific Northwest result in rougher seas than found offshore of the Northeast and Gulf coasts. See our responses to comments PM2-24, FA2-4, LA3-15, and IND115-2.

LA7-14
cont'd

than that provided in the DEIS. The DEIS does state that "an offshore LNG import terminal alternative would avoid some of the environmental impacts of the proposed Bradwood Landing Project, such as effects associated LNG marine traffic up the Columbia River, critical salmon habitat in the river, nearby population and visual effects, and impacts on terrestrial resources, including wetlands." It then goes on to conclude: "However, based on our review of the analysis conducted by ABSG and NorthernStar, we do not consider an LNG terminal off the coast of Oregon to be a viable alternative to the proposed project because of the rough sea and weather conditions and the additional environmental impacts associated with the longer send out pipeline." The DEIS should place greater weight on protecting the Columbia River and its estuary than the sandy bottomed sea floor area supporting the send out pipeline to the off-shore facility based upon the Federal guidance in both the FERC approved Comprehensive Plans that appear relevant to natural resources and recreation in the Lower Columbia River (see the following list), and EPA's inclusion of the Columbia Estuary in the National Estuary Program (program description also provided below) and the Nation's Great Water Body program. Furthermore, in a relative sense the off shore area has much more dilution capacity than the estuary for assimilating fuel oil spills. In terms of the feasibility of using the off-shore facility, such engineering analyses are outside of our capability; however we note in the following figure from a FERC staff presentation that there are proposed LNG facilities on the New England Coastline, which is at times known for rough ocean conditions, and the Gulf of Mexico which at times has hurricane conditions (see proposed sites number 40 to 43). Therefore it appears appropriate to provide a detailed feasibility analysis of an off-shore facility.

*FERC LIST OF COMPREHENSIVE PLANS
REVISED AUGUST 2007*

Documents that satisfy the Commission's comprehensive plan criteria listed for the Columbia River under Oregon and Washington that are potentially relevant to the Lower Columbia River where Bradwood LNG Project transit corridor and facility site is located include:

Northwest Power and Conservation Council. 2000. Columbia River Basin fish and wildlife program. Portland, Oregon. Council Document 2000-19.
Northwest Power and Conservation Council. 2005. The Fifth Northwest electric power and conservation plan. Portland, Oregon. Council Document 2005-07.
Northwest Power and Conservation Council. 1988. Protected areas amendments and response to comments. Council Document 88-22 (September 14, 1988). Portland, Oregon.
Northwest Power and Conservation Council. 2003. Mainstem amendments to the Columbia River Basin fish and wildlife program. Portland, Oregon. Council Document 2003-11.
Oregon Department of Energy. 1987. Oregon final summary report for the Pacific Northwest rivers study. Salem, Oregon. November 1987. 89 pp.
Oregon Department of Environmental Quality. 1978. Statewide water quality management plan. Salem, Oregon. November 1978. Seven volumes.
State of Oregon. State of Washington. State of Idaho. Confederated Tribes of the Warm Springs Reservation of Oregon. Confederated Tribes of the Umatilla Indian Reservation. Nez Perce Tribe. Confederated Tribes and Bands of the Yakima Indian Nation. 1987. Settlement Agreement pursuant to the

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September 1, 1983, Order of the U.S. District Court for the District of Oregon in Case No. 68-5113. Columbia River fish management plan. Portland, Oregon. November 1987. 61 pp. and tables.

State of Washington. State of Oregon. State of Idaho. Confederated Tribes of the Warm Springs Reservation of Oregon. Confederated Tribes of the Umatilla Indian Reservation. Nez Perce Tribe. Confederated Tribes and Bands of the Yakima Indian Nation. Settlement Agreement pursuant to the September 1, 1983, Order of the U.S. District Court for the District of Oregon in Case No. 68-513. Columbia River fish management plan. Portland, Oregon. November 1987.

Washington State Department of Ecology. 1982. Instream resource protection program for the main stem Columbia River in Washington State. Olympia, Washington.

Oregon Department of Fish and Wildlife. 1982. Comprehensive plan for production and management of Oregon's anadromous salmon and trout: Part I. General considerations. Portland, Oregon. June 1, 1982. 33 pp.

Oregon Department of Fish and Wildlife. 1982. Comprehensive plan for production and management of Oregon's anadromous salmon and trout: Part II. Coho salmon plan. Portland, Oregon. June 1, 1982. 118 pp. and appendices.

Oregon Department of Fish and Wildlife. 1991. Comprehensive plan for production and management of Oregon's anadromous salmon and trout: Coastal Chinook salmon plan. Portland, Oregon. December 18, 1991. 62 pp.

Oregon Department of Fish and Wildlife. 1996. Species at risk: Sensitive, threatened, and endangered vertebrates of Oregon. Portland, Oregon. June 1996.

Oregon Department of Fish and Wildlife. 1997. Oregon coastal salmon restoration initiative (Oregon Plan). Roseburg, Oregon. March 1997. Five volumes.

Oregon Department of Fish and Wildlife. 1997. Oregon plan for salmon and watersheds. Salem, Oregon. December 1997.

Oregon Land Conservation and Development Commission. 1984. Oregon coastal management program. Salem, Oregon. 63 pp.

Oregon Water Resources Department. 1988. Oregon water laws. Salem, Oregon. 240 pp.

U.S. Fish and Wildlife Service. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C. 11 pp.

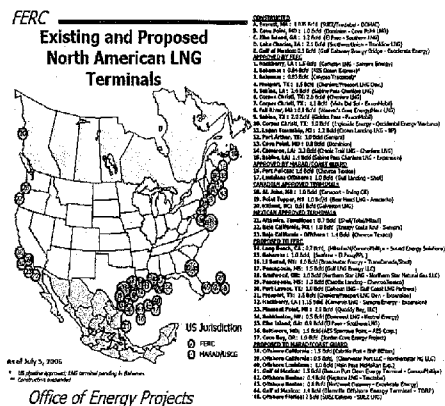
Interagency Committee for Outdoor Recreation. 2002. An assessment of outdoor recreation in Washington State: A State Comprehensive Outdoor Recreation Planning (SCORP) Document 2002-2007. Olympia, Washington. October 2002.

Lower Columbia Fish Recovery Board. 2004. Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan. Washington. December 15, 2004.

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY NATIONAL ESTUARY PROGRAMS

The United States Environmental Protection Agency National Estuary Programs was charged with developing and implementing a Comprehensive Conservation and Management Plan (CCMP) which establishes priorities for activities, research, and funding for the estuary. The CCMP serves as a blueprint to guide future decisions and actions and addresses a wide range of environmental protection issues including water quality, habitat, fish and wildlife, pathogens, land use, and introduced species to name a few. The CCMP is based on a scientific characterization of the estuary and is developed and approved by a broad-based coalition of stakeholders. (<http://www.epa.gov/owow/estuaries/ccmp/>) Lower Columbia CCMP, completed in 1999, contains 43 specific actions designed to protect and restore the lower Columbia River. The actions are broadly grouped into three categories - Actions 1-12 address habitat and land use; Actions 13-28 address education and management; Actions 29-43 address conventional and toxic pollutants. www.epa.gov/owow/estuaries/programs/cre.htm

K-590



Source:

The FERC Permitting and Review Process

Medha Kochhar, Office of Energy Projects, Federal Energy Regulatory Commission

October 24, 2006. Atlantic States Marine Fisheries Commission 65th Annual Meeting

Geology

LA7-15

Page 4-3, Paragraph 2: As stated by Oregon DOGAMI, this is an erroneous technical statement because erosion features do not form deposits. The County is in agreement with DOGAMI that a technical review of the DEIS by URS and relevant consultants needs to be performed to ensure adequate integration of technical analyses and results.

LA7-16

Page 4-3, Paragraph 7, Second Sentence: The statement that most of the natural shoreline is resistant to erosion is unsubstantiated and needs scientific data to support. The DEIS discusses that there has been little change in the river's location over the last 6000 years. However, there is no study cited to support this. In addition, even a minute change in one reach of the river's course can affect County landowner's properties along the river. The DEIS needs a more complete study of the LNG traffic's affect all along the river channel due to channel modifications for the project.

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LA7-15 See our responses to comments SA1-4 and SA1-93.

LA7-16 As a clarification, the Columbia River navigation channel would not be modified for this project. See also our response to comment FA4-14.

K-592

- LA7-17 | Page 4-5, Paragraph 6, Second Sentence: Since it is difficult to determine what additional impacts on shorelines the proposed LNG marine traffic would contribute, a baseline study and monitoring program should be implemented.
- LA7-18 | Page 4-9, Paragraph 2, Second Sentence: The DEIS states that debris flows would not reach the terminal site. However, there is no study or modeling shown to prove this point. This type of event should include adequate scientific data to support the conclusion the DEIS reached. A large landslide could potentially damage the terminal facilities and should be better researched to determine if such an event can or cannot occur.
- LA7-19 | Page 4-9, Paragraph 5: The DEIS states that FERC staff could not find any data on a large landslide that occurred in 1965 very near the Bradwood location which caused a tsunami on Puget Island. However, the Wahkiakum County Eagle, a newspaper out of Cathlamet, WA, dedicated an article with pictures to the event (W.C. Eagle, Thursday, Feb. 4, 1965). This is evidence of a lack of complete data on historic landslides in the terminal and pipeline areas. A more complete analysis needs to be performed.
- LA7-20 | Page 4-10, Figure 4.1.3-1: This map identifies only some of the known faults in the area. DOGAMI has stated that this map is incomplete and shows a lack of confidence in the scientific data. A new map showing all of the known faults is needed.
- LA7-21 | Page 4-11, Paragraph 5: This discussion does not include earthquakes with a magnitude between 8.0 and 8.5. In addition, the County agrees with DOGAMI that analysis of OBE-SSE between 8.0 and 8.5 is needed, along with an evaluation of earthquakes not located along the Cascadian subduction zone.
- LA7-22 | Page 4-12, Paragraph 3: In addition to the LNG tanks being supported on deep foundations, the other portions of the facility should be considered for ground improvements beyond vibroflotation and engineered fill.
- LA7-23 | Pages 4-12 and 4-13: The County would like to see that all of the FERC staff recommendations on these two pages be integrated into the final EIS. These include recommendations that the final engineering design needs to incorporate, including detailed seismic specifications and other measures to mitigate the impacts of seismic hazards.
- LA7-24 | Page 4-14, Paragraph 4: Some regional tsunami maps cited by the DEIS are over 10 years old. The terminal site and pipeline areas should be evaluated on a site-specific basis. The data should include the most up to date information available, including the tsunami research currently being performed by Oregon State University.
- LA7-25 | Page 4-20, Paragraph 5: 110 potential landslide areas have been identified along the proposed pipeline route. The DEIS states that these landslide areas may cause changes

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- LA7-17 | See our response to comment FA4-14.
- LA7-18 | See our response to comment SA1-100.
- LA7-19 | See our response to comment PM3-39.
- LA7-20 | See our response to comment SA1-98.
- LA7-21 | See our response to comment SA1-102.
- LA7-22 | See our response to comment SA1-105.
- LA7-23 | We have included and/or expanded and clarified the same recommendations for the final engineering design in the final EIS as were in the draft EIS. See for example the responses to comments SA1-4 and LA7-25 and related FERC staff-recommended conditions. Should the project be approved, these recommendations would become conditions of the authorization.
- LA7-24 | See our response to comment SA1-106.
- LA7-25 | Additional field mapping and subsurface investigations are required before the final pipeline design geotechnical report can be completed, and access is not available for all of the areas needing to be investigated. Proposed mitigation measures for geological hazards along the pipeline route would be subject to review by the Board of Consultants recommended in sections 4.1.3.3 and 4.1.4.3. The FERC staff has modified the draft EIS recommendation regarding completion of the geotechnical report on the pipeline route to clarify that all significant geological hazards must be further investigated and mitigated through final design measures. The recommendation specifies that NorthernStar must consult with and seek comments from the designated state coordinating agencies (WDE and ODE) prior to filing the report with FERC.

LA7-25
cont'd in the pipeline route or other additional precautions. Alternate routes and precautions are suggested in Table 4.1.4-3 (Page 4-21), however, the DEIS fails to show the final pipeline route. This uncertainty causes great concern to area residents. The final EIS needs to include a final pipeline design geotechnical report showing the chosen pipeline route and its relation to the landslide areas.

Soils and Sediments

LA7-26 Page 4-28, Paragraphs 3 and 4: The environmental site assessment identified six Recognized Environmental Concerns (RECs) on the terminal site. These represent areas have the potential to contaminate the surrounding soils or may already be contributing to their contamination. FERC staff recommends a Contaminated Materials Management Plan (CMMP), if final design demonstrates the need. The County would like a CMMP developed no matter what the outcome. The potential for discovering contaminated soils during construction is high due to the RECs and therefore a CMMP should be included in the final EIS.

Water Resources

LA7-27 Page 4-52 and 4-54: Groundwater uses and Withdrawals. The County would like assurances that the water appropriation at the site will not cause injury to existing users or over-appropriation of the resource. Wells appropriating groundwater for ballast and cooling must comply with Oregon Water Resources Department's statutes and rules governing well construction. The County urges FERC to comply with OWRD's request to require a funding agreement for consultation with OWRD on water rights issues.

LA7-28 Page 4-60, Paragraph 4, second sentence: FERC staff recommend that NorthernStar prepare a CMMP (Contaminated Materials Management Plan) that would specify the procedures to identify, characterize and properly manage potentially contaminated materials, including groundwater, to be submitted to appropriate agencies for approval before construction. This recommendation needs to be incorporated into Section 5.1.3 (Conclusions and Recommendations for Aquatic Resources) and the results need to be disclosed prior to the development of the FEIS so FERC staff can evaluate the contaminant risk of project implementation.

LA7-29A Page 4-66, Paragraph 4, fourth sentence: The DEIS states that LNG vessels "have the potential to resuspend, and subsequently redeposit, sediments, resulting in impacts similar to dredging. Impacts associated with propeller wash would occur more frequently than dredging". The DEIS does not offer any mitigation for these impacts, or monitoring to ensure that ODEQ total maximum dissolved solids requirements are met. Instead, the DEIS states "we do not anticipate that propeller wash from LNG ships and tugs would result in a significant degradation of water quality in the Columbia River".

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LA7-26 The FERC staff's recommendation already would require a CMMP be filed with the Secretary prior to beginning construction regardless of the final design results. It is not necessary for the CMMP to be included in the final EIS.

LA7-27 It is not the FERC's practice to require funding agreements with state and local agencies as conditions in the EIS process. However, other regulatory bodies at the federal, state, and local levels could, if deemed necessary and appropriate, include such agreements as conditions to their permits. Groundwater would not be used for ballast or cooling water requirements at the wharf.

LA7-28 Section 5.0 is a summary of our findings and is restricted in length. Therefore, we are limited in the amount of information that can be included. A CMMP would not provide information on contaminant risk and it is not necessary that it be included in the final EIS.

LA7-29A Mitigation measures are not proposed for propeller wash because the impacts would be localized and minor. The wakes produced by an LNG carrier are only slightly larger than those of the large vessels currently using the Columbia River. In addition, the speed of LNG carriers on the Columbia River would be limited by the tethered tug, thus reducing the potential for shoreline erosion. Shoreline erosion is discussed further in section 4.1.2.3. The volume of LNG carrier traffic is not expected to increase during the life of the project.

- LA7-29A cont'd The EIS should analyze and disclose the level of risk to localized water quality and the structural integrity of the many dikes in the area from the wake and subsequent shoreline erosion caused by LNG transit. The long-term impacts of LNG vessel wakes may be grossly underestimated because the DEIS leaves open the possibility for future increases in capacity and gas send-out, requiring more vessels transiting the waterway. Possible mitigation measures may include reduced speeds to reduce the wakes, installing erosion protection on dikes, and a monitoring plan for TMDL compliance.
- LA7-29B Page 4-72, Paragraph 3, Sentence 3: The DEIS says that if the hydrostatic testing of the two storage tanks is done in conjunction with each other, then it would save 30 million gallons of water. The County requests that this be the only approved process in order to preserve the water resource.
- LA7-30 Page 4-84, Paragraph 4: The DEIS claims that Northern Star's HDD contingency plan provides procedures and measures to mitigate an inadvertent release of drilling mud to the water body. Under Oregon's definition of mitigation there are not suitable mitigation measures contained in the contingency plan. The plan simply commits to stop the discharge of pollutants 30 minutes after detection followed by an inspection of biological resource damages. Feasible mitigation measures recommended for any significant discharge of drilling mud into a fish bearing stream should include: removal of the thicker deposits of drilling mud in stream bottom using sludge pumps and/or restoration of the stream system to mitigate for the lost productivity following a spill. Many streams support spawning salmonids (cutthroat trout, rainbow trout, salmon and steelhead) and the discharge of the drilling mud over spawning beds can suffocate eggs and larvae located within the gravel bed by entombment or sealing off intergravel flow (the drilling mud is used in the bore hole as a sealing compound). In the case of streams that support spawning of resident and anadromous salmonids the HDD crossing should be restricted to the dry season after all the early life stages have left the stream. . In addition, the contingency plan should include on-site quality control monitors/inspectors stationed on a real time basis some reasonable distance downstream from the bore hole. Given the geologic characteristics of the region drilling mud can erupt or vent to the stream bed some distance from the bore hole and the thick rain forest vegetation can restrict its detection.
- LA7-31 Page 4-84, Paragraph 5: The DEIS states that geotechnical investigations were conducted at 13 proposed HDD water body crossing locations to determine suitability of the method. Table 4.3.2-3 of the DEIS, however, lists 19 potential HDD water body crossings. Results from existing geotechnical studies need to be disclosed in the EIS and geotechnical studies of the remaining sites need to be performed and reported to the appropriate agencies prior to the end of the DEIS comment period.

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- LA7-29B NorthernStar intends to schedule construction activities so that water used to test the first tank can be reused to test the second tank. However, if construction does not proceed as planned and delays are experienced, the two tanks may need to be tested at different times.
- LA7-30 NorthernStar's HDD contingency plan has been revised. Directions for accessing NorthernStar's HDD Contingency Plan (Frac-out Plan) via the eLibrary can be found in the response to comment FA3-13. See also our response to comment SA3-6.
- LA7-31 The final geotechnical analysis for the HDD boreholes was not completed in time to be incorporated into the final EIS. Geotechnical investigations will be conducted at the remaining HDD locations when access is obtained and the results will be provided to the FERC and made available on the FERC's eLibrary. Also see the response to comment LA7-25.

Wetlands

LA7-32

Page 4-91, Paragraph 3, sentence 7: The DEIS states that "if the LNG vapor cloud were to burn, wetland vegetation along the Columbia River could be damaged" and "with implementation of the mitigation measures described in the Coast Guard's WSR, a release would be highly unlikely". Prevention and low probability of occurrence are not mitigation according to Oregon State Law. Binding language should be inserted into the EIS that requires NorthernStar to produce bonding and insurance for cleanup and restoration of wetlands damaged by an accidental or intentional release of LNG or fuel oil.

Page 4-96, Paragraph 2: NorthernStar has drafted a Mitigation Plan to account for the permanent loss of some wetlands. The following are some of the identified deficiencies in the plan and recommended improvements:

LA7-33

- Some designated mitigation sites, such as Svensen Island, are already functioning as wetlands such that they do not qualify as mitigation (i.e. double counting). Substitute mitigation areas are needed for these sites.

LA7-34

- A mitigation area agreement needs to be developed for all of the mitigation areas that minimally includes:
 - An endowment to manage each of the areas in perpetuity in a manner that does not impact adjacent properties owned by citizens of the county; including proper management of wetland function and water supply, controlling noxious weed seed reservoirs, appropriate control of public access, activities and litter etc.
 - Paying all costs associated with start-up of the mitigation area, including acquisition, transfer of property, water rights, water delivery system and an initial monitoring program that verifying wetland functions will be effective going forward into the future.
 - Turning over the lands to a qualified land management agency
 - Providing the county with in lieu taxes if the lands are turned over to a management agency that is exempted from county taxes.

LA7-35

4-109, Paragraph 1, sentence 2: The DEIS states that "the wakes produced by an LNG ship are only slightly larger than those of the large vessels currently using the Columbia River. As such, we do not believe the LNG shipping activities would adversely affect Priority Habitats found along the lower Columbia River." This statement is entirely inadequate without quantification of the size of the wake behind an LNG ship. The EIS should analyze and quantify wake size and the risk of shoreline erosion, particularly as it relates to potential impacts on priority habitats and man-made structures like dikes.

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LA7-32 See our response to comment FA2-35.

LA7-33 See our response to comment FA3-3.

LA7-34 See our response to comment LA7-11.

LA7-35 See our response to comment FA4-14.

LA7-35 cont'd	Possible mitigation measures may include reduced speeds to reduce the wakes, installing erosion protection on dikes, and performing periodic third-party habitat monitoring along the lower Columbia river.
LA7-36	4-109, Paragraph 2: The DEIS dismisses the consequences of a major LNG accident, intentional or accidental. LNG is said to burn back to the spill site, rather than outward towards shoreline habitats, but the DEIS acknowledges the possibility for ignition of LNG vapors to spark a forest fire. Prevention and low probability of occurrence are not mitigation according to Oregon State Law. Binding language should be inserted into the EIS that requires NorthernStar to produce bonding and insurance for the cleanup and restoration of natural and human landscapes damaged by a worst-case scenario accidental or intentional release of LNG or fuel oil. In addition, the EIS needs to discuss not just the possibility of LNG release, but a major spill of bunker fuel oil (used when approaching/maneuvering/departing the berth and, increasingly, the primary fuel in new LNG vessel designs). A fuel oil spill would be very difficult to contain in the dynamic estuary and the ecological and economic consequences would be vast and lasting. Bunker fuel oil is made up of compounds harmful to fish and wildlife and known to sometimes cause off-flavor in harvested fish species. The compounds can linger in the estuary for decades and cause temporary commercial fishing closures, long-term fishing restrictions, and a decrease in tourism. The potential for a fuel oil spill is not acknowledged in the DEIS and needs to be discussed and mitigated fully. In addition, the discussion should disclose if a spill is related to a terrorist incident would that be considered as an act of war under the insurance policy carried by the shipper? If so sufficient bonding should be in place to cover the clean up and damage compensation for a worst case scenario without any assistance from insurance. If the spill places more liability than assets held by the shipper the operator of the Bradwood facility should also have sufficient bonding to step into the shoes of the shipping company should it dissolve due to the incident.
LA7-38	
LA7-39	Page 4-117, Paragraphs 3 – 5: The DEIS states that "reasonable" efforts will be made to obtain straw bales for erosion control that are free of noxious weeds and clean fill soil that is free of noxious weeds. Given the scale of this project, and the very large number of vehicles and people involved, there exists very significant potential for spreading invasive species that, in some parts of the estuary, have all but taken over native habitats. The EIS needs to erase the word <i>reasonable</i> and require the project to procure clean straw bales and fill so as to reduce the likelihood of the pipeline serving as a vector for the spread of noxious weeds. In the same vein, the DEIS should not say "when available, Oregon or Washington certified seed or equivalent will be used for revegetation". This should instead be a FERC condition of approval.

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LA7-36	See our response to comment LA3-55.
LA7-37	Potential impacts from an accidental spill or release of hazardous materials on aquatic resources and terrestrial wildlife are discussed in sections 4.5.2.1 and 4.5.2.3, respectively.
LA7-38	See our response to comment FA2-35.
LA7-39	See our response to comment FA3-10.

Wildlife and Aquatic Resources

- LA7-40 Page 4-123, Paragraph 4, first sentence: The DEIS states that "LNG ships transiting the lower Columbia River over the operation life of the LNG terminal are likely to result in the stranding of some sub-yearling fish". Given that strandings will include ESA listed species of salmon, mitigation for strandings should be described. Instead the DEIS states that FERC staff will continue to study this issued and incorporate findings into the revised BA. These findings should be disclosed for FERC consideration prior to the construction of the FEIS, with strategies for lessening the impact, like slower transit to reduce wakes or increased juvenile salmon habitat mitigation.
- LA7-41 4-124, Paragraph 4, first sentence: The DEIS states that "fuel (e.g. diesel) used for vessel propulsion or auxiliary/emergency generators could potentially spill or leak", but claims that the double hull and shipboard SOPEP plans are sufficient to prevent and contain a fuel release. Given that LNG carriers have a heightened risk for incidents because of their status as a terrorist target, binding language should be inserted into the EIS that requires NorthernStar to produce bonding and insurance for the cleanup and restoration of natural and human landscapes damaged by a worst-case scenario accidental or intentional release of LNG or fuel oil. In addition, the EIS needs to discuss not just the possibility of LNG release, but a major spill of bunker fuel oil. Please see Specific Comments for page 4-109 for further discussion.
- LA7-42 4-128, Paragraph 4, first sentence: The DEIS states that adverse affects on Essential Fish Habitat (EFH) "would be limited to accidental spills or leaks of hazardous materials". It goes on to say that minimization of these impacts will be discussed in detail in section 4.5.2.1, but on page 4.148 there is only a brief mention of the ESC Plan being sufficient mitigation for these impacts. Specific measures from the plan need to be detailed in the FEIS, with mitigation for unavoidable impacts.
- LA7-43 4-132, Paragraph 2: The DEIS is inadequate in describing mitigation of potential LNG spills on unique or sensitive wildlife habitats. Please see Specific Comments for pages 4-109 and 4-124 for further discussion.
- LA7-44 4-136, Paragraph 1, first sentence: NorthernStar's hydrodynamic modeling "do not show significant changes to the overall bed conditions in the Clifton Channel" according to the DEIS. Furthermore, for the fish in Clifton Channel, "there will be little impact". These impacts appear to be under-analyzed and underrepresented in the DEIS and need reconsidered by FERC over the long-term life of the project before FERC constructs the FEIS.

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- LA7-40 Wake stranding is discussed in the response to comment FA2-19.
The adequacy of compensatory mitigation for impacts on federally listed species is discussed in the response to comment FA2-10.
- LA7-41 See our response to comment FA4-18.
- LA7-42 As described in section 2.4.1, NorthernStar's terminal ESC Plan includes BMPs recommended by the ODEQ's 2005 Erosion and Sediment Control Manual, which describes specifications for hazardous material transportation, handling, storage, spill prevention, and spill response. Because the EIS is a summary document, we feel that the analysis provided on the potential impacts from accidental spills or leaks of hazardous materials in section 4.5.2.1 (including implementation of the terminal ESC Plan) adequately meets NEPA requirements. However, a comprehensive analysis of potential impacts on EFH due to the Bradwood Landing Project will be included in the revised BA and EFH Assessment.
- LA7-43 Section 4.5.1.3 has been revised to include additional discussion regarding potential impacts on unique or sensitive wildlife habitats.
- LA7-44 See our response to comment IND82-5.

K-598

LA7-45 4-141, last paragraph, first sentence: The DEIS states that "filling the log pond at the LNG terminal site would result in a permanent loss of suitable off-channel refugia" for federally listed ESA species. The applicant states that the footprint of the site could not be reduced further to avoid this significant impact, but the DEIS Alternatives Analysis has been cited by various state and federal agencies as insufficient. FERC should preferentially consider project sites that avoid direct impacts on ESA species or Essential Fisheries Habitat.

LA7-46 4-145, last paragraph, first sentence: FERC staff recommend that "prior to beginning initial site preparation at the LNG terminal, NorthernStar should prepare a plan, for the review and written approval of the Director of ODP, which outlines how NorthernStar would ensure that only LNG ships that are retrofitted to use the screened water supply system at the berth are allowed to unload cargo at the Bradwood Landing LNG terminal". Because the measures that NorthernStar has proposed to reduce the potential for introduction of invasive species through ballast water fouling, fish entrainment through ballast water / engine coolant intake, etc., hinge on the ability of a docking LNG vessel to use this system, FERC staff should be provided written documentation of how this guarantee can be made prior to the construction of the FEIS. The FERC permit should include a contracting restriction mitigation measure requiring Bradwood facility to only use LNG transport ships equipped with compatible water intake system for preventing entrainment (incentives are not suitable as there is no assurance they will produce the equipment). Monitoring and reporting for the permit should include the compliance of the contract requirement for shippers to have compatible equipment and effectiveness monitoring of the fish screen system.

Threatened and Endangered Species

LA7-47 Page 4-208, fourth paragraph: The DEIS states that LNG marine traffic would affect salmonids and/or their critical habitat through various activities, including: fish strandings, shoreline erosion, ship ballast and cooling water appropriations and discharges, accidental spill or leak of hazardous materials, and an accidental or intentional breach of an LNG ship. Potential impacts and mitigation are described in brief in Table 4.6.2-1, and in the previous section 4.5.1.1. Regarding wake stranding of small fish, the DEIS claims that strandings appear to be negligible in the lower part of the river where LNG vessels will be transiting. The DEIS also notes, however, that the Pearson et al. (2006) study that identifies contributing factors for wake stranding drew exclusively from studies of three locations upriver of the terminal site. Without additional research, and careful consultation with local experts like NMFS and FWS, FERC staff can not accurately assess the impact of LNG transit on juvenile salmonids in

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LA7-45 None of the alternative sites would avoid impacts on ESA species or EFH.

LA7-46 See our response to comment PM1-31.

LA7-47 Wake stranding is discussed in the response to comment FA2-19.

K-599

this regard. Please see Specific Comments on pages 4-109, 4-145, 4-128 and 4-124, respectively, for comments and recommendations regarding shoreline erosion, ship ballast and cooling water appropriations and discharges, accidental spill or leak of hazardous materials, and an accidental or intentional breach of an LNG ship. All impacts regarding salmonids, or other threatened or endangered species, should be carefully considered within the context of ongoing Columbia River estuary restoration efforts and the FERC approved comprehensive plans listed above.

Page 4-235, third paragraph: The DEIS states that the Bradwood Landing LNG terminal would affect salmonids and/or their critical habitat through various activities, including: dredging, shoreline development, pile driving, log pond filling, bridge and railroad improvements, powerline construction, ship ballast and engine cooling water appropriations, hydrostatic testing and fire suppression activities, terminal lighting, accidental spills, routine discharge of condensate water, and operational acoustic effects. Given the diversity and magnitude of these impacts, their cumulative impact is very significant; please see Specific Comments page 4-96 for concerns regarding the inadequacy of mitigation. FERC staff should consider permanent impacts (e.g. log pond filling), and on-going maintenance impacts (e.g. turning basin dredging), to carry more weight than impacts that will be unnoticeable in a matter of years (e.g. pipeline construction or staging areas in non-forested areas). The relative significance of each impact, as well as its cumulative effect over the life of the project, should be disclosed in the FEIS. All impacts regarding salmonids, or other threatened or endangered species, should be carefully considered within the context of ongoing Columbia River estuary restoration efforts and the FERC approved comprehensive plans listed above.

Land Use, Recreation and Visual Resources

Page 4-289, Paragraph 4: This paragraph lists eight noise attenuation measures that NorthernStar would consider to reduce the noise in the nearby noise-sensitive areas (NSAs). The County requests that all of these measures be employed during the construction and operating phases of the project. In addition, the final EIS should demonstrate why it is necessary for the dredging operations to occur 24 hours a day, rather than restricting that activity to daylight hours. If the dredging operations exceed regulatory noise limits, then there should be adequate demonstration of the reasons why those operations should not be limited to daylight hours.

Page 4-294, Paragraph 6: The dredging of the turning basin will interfere with recreational use of the Columbia River. The County recommends that the dredging operations work to minimize its obstruction to navigation on Clifton channel and not allow complete blockage of the channel for extended periods of time.

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LA7-48 We agree that long-term and permanent impacts are more significant than short-term impacts. Therefore, portions of the EIS describing potential impacts on various resources (e.g., geology, wetlands, threatened and endangered species) distinguish between temporary and permanent impacts. A description of ongoing recovery efforts will be included in the environmental baseline portion of the revised BA and EFH Assessment; however, because the EIS is a summary document, we do not believe that this level of detail is appropriate.

LA7-49 Noise mitigation would be completed as described in section 4.10.2 of the EIS. As indicated in the EIS, dredging may be conducted up to 24 hours per day due to the time constraints placed on the project over which dredging may occur. We are recommending a noise mitigation plan to minimize dredging noise impacts during construction of the facility.

LA7-50 Dredging activities would be conducted in accordance with applicable laws and regulations under the jurisdiction of the COE, the ODSL, and the ODWR.

Socioeconomics

LA7-51 Page 4-346, Paragraph 2: The DEIS states that operation of the terminal itself would not affect commercial or recreational uses of the Columbia River. This statement is incorrect. The DEIS acknowledges that cruise ships reach Astoria, however, it fails to reflect ongoing cruise ship operations that go from Portland to Astoria. These ships pass right by the terminal and would be impacted by the LNG ships that they would have to pass. These encounters could pose significant economic and scheduling issues. Two cruise lines that should be included in the final EIS are the Majestic America Line and the Cruise West division of West Travel, Inc. In addition, there are various other cruise ships that go by the Bradwood terminal location and additional research into these other operations is needed.

LA7-52 Page 4-350, Paragraph 2: The DEIS references the INGAA Foundation Natural Gas Pipeline Impact Study (INGAA, 2004) and states that the study found that there was not a significant impact on the sales price of properties located along natural gas pipelines. In addition, the DEIS references a Whatcom County, Washington study as well. The County would like the final EIS to reflect exactly what questions the studies were asking as well as a review of all other studies available that reference this subject.

Cultural Resources

LA7-53 Page 4-366, Paragraph 2: To ensure responsibilities under the National Historic Preservation Act, the County requests that all of the recommendations listed by FERC staff be followed and that consultation with the State Historic Preservation Office continue throughout the project construction phase.

Air Quality and Noise

Noise: Please refer to the comments above on Page 289, paragraph 4 for comments on noise.

LA7-54 Page 4-383, Paragraph 2: In addition to the measures proposed here to limit the tailpipe emissions from vehicle traffic, the County also would like to see the following measures added to the project: installing electrification at the dock to reduce ship hotelling emissions, switching to cleaner fuels on all diesel engines, and installing retrofit devices on all diesel engines.

Conclusions and Recommendations

LA7-55 Page 5.1, last sentence: The DEIS geology analysis for the terminal facilities is not complete because it does not disclose the extent of the seismic hazard and specify mitigation for the poor foundation conditions at the site. It has been determined that a

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LA7-51 See our response to comment PM2-17.

LA7-52 We believe the discussion in section 4.8.3.3 adequately summarizes the studies regarding the potential for natural gas pipelines to affect property values.

LA7-53 To ensure compliance with the NHPA, sections 4.9.4 and 5.2 include our recommended condition that NorthernStar be required to provide all cultural resources investigation reports and plans to the Oregon and Washington SHPOs and file comments from the SHPOs with the Secretary before construction of its proposed facilities. If cultural resources are discovered during construction, those resources would be handled according to the Unanticipated Discovery Plan discussed in section 4.9.2.

LA7-54 See our response to comment SA1-87.

LA7-55 See our responses to comments SA1-4, SA1-103, SA1-4, and SA1-105.

K-601

- LA7-55 cont'd number of additional detailed seismic specifications and mitigation measures are necessary and they are not yet developed and presented for public review.
- LA7-56 Page 5.2, First sentence: The DEIS analysis for the pipeline route is not complete as it as it has been determined that pipeline route through landslide areas may be relocated to undisclosed/undetermined locations or mitigated with other measures. The more important open questions for the relocated segments of the route include the geologic, cultural and biological conditions. There are also known landslide sites along the pipeline route that are not identified as such in the DEIS; such as the 1965 slide near Puget Island. Any landslide sites not yet identified in the document need to be disclosed and addressed with relocation or other mitigation measures.
- LA7-57 Page 5.2, Paragraph 4, first sentence: The DEIS concludes LNG marine traffic may contribute to shoreline erosion along the waterway and that this impact will be further studied. The document is incomplete as it does not make a determination if the impact is significant and if mitigation measures are necessary. The document should disclose that there are numerous dikes in the Lower Columbia where the LNG ships will transit that protect homes and property. Many of these dikes are in very poor condition and do not meet current standards making them very vulnerable to shore erosion. Dike districts lack the funding to improve the dikes. The DEIS should analyze and disclose the level of risk to the dikes face from the wake erosion and develop mitigation measures. Possible measures may include reduced speeds to reduce the wakes, installing erosion protection on dikes and purchase of properties on the interior of high risk dikes to limit property damage associated with dike failure. See Specific Comments pages 4-66, 4-109 and 4-123 for further discussion.
- LA7-58 Page 5-4, Paragraph 2, Sentence 4: The DEIS does not disclose how the proposed terminal would only accept LNG ships that are equipped with the water intake system to prevent entrainment of juvenile fish into the ship ballast water. See Specific Comment 4-145 for further discussion.
- LA7-59 Page 5-4, Paragraph 3, Sentence 3: The DEIS claims that Northern Star's HDD contingency plan provides procedures and measures to mitigate an inadvertent release of drilling mud to the water body. See Specific Comments page 4-84 for further discussion.
- LA7-60 Page 5-5, Paragraph 2, First Sentence: NorthernStar has drafted a Mitigation Plan to account for the permanent loss of some wetlands. See Specific Comments page 4-96 for further discussion.

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- LA7-56 Minor adjustments may be made to the pipeline route prior to the start of construction and even during construction for various reasons. See also our responses to comments LA7-25 and PM3-39.
- LA7-57 See our response to comment FA4-14.
- LA7-58 See our response to comment PM1-31.
- LA7-59 See our response to comment LA7-30.
- LA7-60 See our responses to comments FA3-3 and LA7-11.

- LA7-61 Page 5-5, Paragraph 2, Last Sentence: Clatsop County requests to be included among the applicable agencies referred to here that will participate in finalizing the Bradwood compensatory mitigation package. Also the County is interested in reviewing any mitigation agreements that cover the mitigation package.
- LA7-62A Page 5-5, Last Paragraph, Last Sentence: Concludes that: "Typically, mobile species would relocate to similar adjacent habitat during construction, and return after the area is restored." In practice this assumption is not correct necessitating a mitigation plan. Fundamentally, if there is similar habitat adjacent to the disturbance area it will already support a population of species like that forced to relocate; meaning it typically lack sufficient carrying capacity to support more individuals of that species. The relocated individuals are subjected to the rigors of competition and predation and it is unlikely they would survive for years while the disturbed area grows back to the status of the original habitat. In the case where habitat is being converted from one type to another the relocated species will not find suitable habitat to return to because of the conversion. We recommend eliminating this assumption from the conclusion and compensate for all habitat alteration associated with the proposed project (without accounting for relocation and survival). The mitigation plan should provide sufficiently high ratios of replacement lands that compensate for the lost use while the reseeded habitat grows back.
- LA7-62B Page 5-6, Paragraph 6: The paragraph on Essential Fish Habitat needs to add a fuel oil spill as a potential impact and detail appropriate mitigation. See Specific Comments page 4-109 for further discussion.
- LA7-63 Page 5-7, Paragraph 4, Last Sentence: The DEIS is not complete as it does not disclose a completed Water body Mitigation Plan for public review. We are interested in reviewing the level of protection provided in the more important anadromous streams that are included in the Comprehensive Plans for the Columbia River identified under Section 10 of the Federal Power Act. The DEIS should also mention that pipeline crossings and failed underground borings can produce excessive turbidity in the streams that can interfere with angling activity.
- LA7-64 Page 5-7, Paragraph 6, Third Last Sentence: For the conclusion that the mitigation package represents values equal or greater than habitat permanently lost it will be necessary to add mitigation areas to substitute for Svensen Island which is already undergoing restoration via a natural breach.
- LA7-65 Page 5-7, Paragraph 6, Last Sentence: Although not included as part of the project's compensatory mitigation, NorthernStar has also developed a voluntary SEI that would

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- LA7-61 See our response to comment LA7-11.
- LA7-62a The reference to NorthernStar's Compensatory Mitigation Plan has been removed from this paragraph. As described in section 4.5.2.3, animals displaced by construction activities may relocate into similar habitats nearby; however, the lack of adequate territorial space could force some animals into suboptimal habitats. The influx and increased density of animals in some undisturbed areas caused by these dislocations could increase inter- and intra-specific competition and also reduce the reproductive success of animals that are not displaced by construction. The loss of these individuals could result in a decrease in the food stock available for predators of these species. The adequacy of NorthernStar's Compensatory Mitigation Plan is discussed in the response to comment FA2-10.
- LA7-62b Potential impacts on EFH due to an accidental spill or leak of hazardous materials are discussed in the environmental analysis portion of the final EIS, as appropriate. However, because discussion within section 5 of the EIS is limited to a summary of the FERC staff's environmental analysis, it is not the appropriate portion of the EIS to address detailed comments on potential impacts on EFH. See also our responses to comments FA4-13, LA7-36, LA7-37, and LA7-38.
- LA7-63 NorthernStar has filed its Waterbody and Wetland Construction and Mitigation Procedures Plan with the FERC. Directions for accessing NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan via the eLibrary can be found in the response to comment FA2-17. Potential impacts on water quality and water resources due to waterbody crossings are discussed in sections 4.3.2.4 and 4.5.3.1, respectively.
- LA7-64 See our response to comment FA3-3.
- LA7-65 See our response to comment FA4-12.

- LA7-65 cont'd contribute about \$50 million over the life of the project to the recovery of salmon in the Lower Columbia River ecosystem. We are concerned that the funding may be somewhat illusory because this is discretionary funding that does not include any criteria for how or when and under what conditions it can be spent. Because it is not a requirement there will be little incentive to spend this much money on a timely basis. It is difficult to put restoration projects together with multiple funding sources without clear understandings conditions the funding is available. Furthermore, we are concerned that the funding offer may be transitory because NorthernStar could very well turn over the Bradwood facility to another operator or successor not involved in any way with the voluntary offer. We recommend the best use of the funding in the SEI is to fully apply it to mandatory mitigation and monitoring programs associated with the project which are in several instances deficient and need a larger funding commitment.
- LA7-66 Page 5-9, Paragraph 1 Sentence 1: Recommend changing sentence to: The Bradwood Landing Project would have impacts on commercial fishing and recreational users of the Columbia River.
- LA7-67 Page 5-9, Paragraph 1 Sentence 3: Add waterfowl hunters on islands in the Columbia River to the list of boaters that would have to move out of the way of LNG marine traffic heading upriver to the LNG terminal to comply with the Coast Guard moving 500-yard safety and security zone around LNG ships. There is a National Wildlife Refuge in the lower Columbia River that includes hunting areas along with islands outside the refuge.
- LA7-68 Page 5-9, Paragraph 1, Sentence 4: Qualify the sentence as follows: Jet-skiers, wind-surfers, kayakers, and canoeists typically stay in shallow water outside of the navigation channel; however much of the shallow water areas outside of the navigation channel is within the moving 500-yard safety and security zone around LNG ships along the 39 mile reach of river. In some cases at low tide there is no where to go outside of the moving 500 yd exclusion zone due to sand bars that are impassable by boat. The document should describe how the 500 yard safety and exclusion zone will work under heavy fog or storm conditions when poor visibility prevents recognition of an LNG vessel. Will there be a sound used to announce the position of the vessel? If so the document should analyze the noise impact.
- LA7-69 Page 5-9, Paragraph 1, after last sentence add: For many communities, estuaries are the focal point of tourist-related activities and this is the case with Astoria, Warrenton, Ilwaco and Cathlamet. As such the view shed is just as important for visitors as residents.

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- LA7-66 We have revised relevant portions of the EIS. While the project may affect commercial and recreational fishing and other river users, those impacts would be brief and not significant.
- LA7-67 It is implicit that all boaters, including hunters, would have to move out of the way of LNG carriers in transit in the waterway to the proposed Bradwood Landing LNG terminal. Section 4.7.1.4 also addresses use of National Wildlife Refuges along the waterway,
- LA7-68 As discussed in section 4.8.1.7, the Coast Guard's moving safety/security and moored vessel security zones would not be treated as absolute exclusion zones that would preclude all other vessel movements. Rather, other vessels may be allowed to transit through the moving safety/security and moored vessel security zones with the permission of the COTP. The expectation is that the COTP's Representative would work with the pilots and patrol assets to control traffic, and would routinely allow vessels to transit the safety/security zone based on a case-by-case assessment conducted on scene. In the case of fog or other low-visibility situations, the security escorts would likely approach recreational river users and communicate verbally regarding the presence of the LNG carrier and security zone. Final details regarding the security zone would be included in the Vessel Traffic Management Plan.
- LA7-69 The suggested text has been added to section 5.1.7.

LA7-69
cont'd

The presence of LNG carriers and their heavily armed escort vessels have a high potential to create an unwelcome or dangerous appearance that is not conducive to tourists or fisherman choosing to recreate in this area.

Page 5-12, Last Paragraph in Socioeconomics Section, First Sentence: Change as indicated in underlined segment: The LNG ships transiting the river during the tourist season have the potential to adversely affect businesses related to tourism. Then add the following: "Perhaps most important, the presence of LNG carriers and their heavily armed escort vessels have a high potential to create an unwelcome or dangerous appearance that is not conducive to tourists or fisherman choosing to recreate in this area. For many communities, estuaries are the focal point of tourist-related activities and this is the case with Astoria, Warrington, Ilwaco and Cathlamet. If these visitors choose other coastal/estuary recreation opportunities, millions of dollars spent locally on retail, hotel and guide services would be lost over the long term." The DEIS should thoroughly disclose the regional economic value of tourism and estimate the range of that economic value that could be potentially lost over the long-term, including, but not limited to, the substantial tourism associated recreational fishing, visiting cruise ships, the Lewis and Clark National Heritage Park, and the proposed Columbia Pacific Heritage Area. Also see comment for Page 5-6.

LA7-70

Section 5.2: Please consider incorporating into this section the mitigation recommendations contained in this comment letter for the waterway, site and pipeline. Thank you for your considerations.

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LA7-70

The mitigation recommendations made by the Columbia River Estuary Study Taskforce on behalf of Clatsop County will be incorporated into the environmental analysis portion of the final EIS, as appropriate. However, because discussion within section 5 of the EIS is limited to a summary of the FERC staff's environmental analysis, it is not the appropriate part of the EIS to address detailed comments on NorthernStar's proposed mitigation for project impacts.



December 24, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Dear Ms. Bose:

Below are the comments of the Port of Vancouver, USA regarding the draft Environmental Impact Statement (EIS) concerning the Bradwood Landing Project proposed by Bradwood Landing LLC and NorthernStar Energy LLC (collectively referred to as NorthernStar).

Port of Vancouver, USA Overview

The Port of Vancouver, USA, is a multi-purpose port authority located in Vancouver, Washington along the banks of the Columbia River and is a critical hub of marine, rail, highway and air cargo transportation for regional, coastal and inland consumers.

Located at the natural transportation hub of the Pacific Northwest on the Columbia/Snake River System, the Port of Vancouver, USA, is an ideal transfer point for cargoes moving to and from the Pacific Rim and the world. Annually, the Port handles over 500 ocean-going vessels, as well as river barges, with a total cargo volume exceeding 5 million metric tons.

The Port is adjacent to north/south and east/west national highways and offers on-site connection to river grade rail traveling between Canada and Mexico and east to Chicago

The Port of Vancouver, USA, has handled a variety of bulk and break bulk cargoes since 1912.

Comments on the Draft EIS:

Vessel traffic destined to upriver ports is critical to the local, regional and national economies and must be allowed to transit the river without additional

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Port of Vancouver, USA Letter to the Federal Energy Regulatory Commission, dated December 24, 2007, SUBJECT: Comments on Draft EIS for the Bradwood Landing Project

constraints and costs. Adding LNG vessels to the river will add additional constraints and potential delays if not properly managed.

- LA8-1 a. The EIS indicates that impacts to other commercial traffic would be minimal unless there was an LNG release into the waterway. Annually, approximately 125 LNG vessels would be expected to travel to the LNG facility. While navigating in the waterway, the LNG vessels would have a 500 foot safety zone. Vessels could not enter the zone without receiving permission from the US Coast Guard Captain of the Port (COTP). According to the COTP letter to the Federal Energy Regularly Commission (FERC) in February 2007, the COTP's representative will, in concert with the river pilots, routinely allow vessels to transit the zone *based on case-by-case assessment conducted on-scene.* (emphasis added)

Concern: Although nice to read, carriers and ports upriver from Bradwood have no assurance that this initial procedure will continue to be followed when LNG vessels actually start transiting the river. No additional information on how the assessments will be conducted (policies, etc) have been made public. For example, what happens to vessel navigation when the region is in Maritime Security (MARSEC) levels two or three?

- LA8-2 b. Regarding vessel meeting situations, the EIS outlines four passing zones along the transit route that would allow two-way traffic. Although the EIS mentions that these traffic patterns are expected to resemble those already in use by deep-draft traffic today, it also mentions that these transits would require careful traffic planning – something already in use today.

Concern: What constitutes careful traffic planning with LNG vessels? How much additional pilot man hours would be required to additionally plan and manage LNG transits? Will those additional costs be solely born by the LNG vessels? Does careful traffic planning also mean that a federal administered vessel traffic system (VTS) would be required to plan and manage vessels traffic on the Columbia River?

- LA8-3 c. The EIS mentions that a marginal increase in ship traffic could occasionally increase the wait time for ships in Astoria. The study indicates that ships may have to wait for pilots. The COTP letter to FERC indicates that *at least initially (first 6 months)*, there will be two pilots on LNG vessels. Additionally, before LNG vessel arrival (at least 24 hours before), federal authorities, and others (including bar and river pilots) will meet to coordinate inbound and outbound transit details.

Concern: Who pays for the extra pilot man-hours required? Making vessels wait for pilots is not acceptable. Current vessel charter rates

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- LA8-1 The procedure described is not an "initial" procedure but the procedure expected for the operation of the project. Under higher security levels, all ships would be subject to tighter security measures and a MARSEC level three could shut down the river for all vessels.

- LA8-2 As part of the WSR requirements, an expanded vessel traffic information system would be implemented. We anticipate the cost of this system would be included in NorthernStar's Cost Sharing Plan.

- LA8-3 Scheduling of the pilots and the potential for increased costs due to having to wait for pilots would need to be worked out between NorthernStar and the other river users as the vessel traffic management system is developed.

Port of Vancouver, USA Letter to the Federal Energy Regulatory Commission, dated December 24, 2007, SUBJECT: Comments on Draft EIS for the Bradwood Landing Project

LA8-3 | average \$2300 per hour. In the worst case, a vessel waiting up to 12 hours for
cont'd | the next favorable tide would lose \$27,600. Additionally, liner vessels would
lose at least a half day's travel time – putting them behind in their schedule.
This could result in carriers omitting a Columbia River port call due to
potential delays. At the very least, the vessel would have to increase speed
(with increased fuel costs) to meet its schedule.

LA8-4 | d. The EIS mentions pilot savings for other vessels traveling the river
because Northern Star would contribute approximately 1.6 million in fixed
costs. This is new information not previously known. More information would
be needed to evaluate this claim. Northern Star also claims that additional
pilots would not be needed for LNG vessel traffic – something not confirmed by
the pilot associations.

Summary:

The Port of Vancouver, USA concerns are centered around two areas:
1) Unhindered navigation for vessels transiting to upriver ports and 2)
Additional costs (particularly pilot labor costs) that the maritime transportation
sector may have to assume. The draft EIS does not adequately address these
issues at this time.

PORT OF VANCOUVER USA



Michael J. Schiller
Operations Manager
Port of Vancouver, USA

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LA8-4 We have confirmed with Paul Amos, President of the Columbia River Pilots, NorthernStar's statement that additional pilots would not necessarily be required for the LNG carriers. Mr. Amos states that the pilots regularly experience fluctuations per year of larger numbers of vessels without needing to hire additional pilots. They generally look at the previous year and new commodities traveling the river to determine if additional pilots would be needed.

Mr. Amos also clarified that an increase in pilots does not increase costs to anyone else, because the ship's tariff pays for the pilots.

December 26, 2007

FERC
Office of the Secretary
Washington, DC 20426

RE: BRADWOOD LANDING DOCKET # CP06-365-000
SUBJECT: VESSEL TRAFFIC MANAGEMENT COORDINATION

ORIGINAL
PORT OF PORTLAND
Marine Division
121 NW Everett Portland OR 97209
Box 3529 Portland OR 97208
T 503 944 7000 F 503 944 7250

2007 DEC 28 P 2:22

LA9-1 The Bradwood Landing Draft Environmental Impact Statement Executive Summary
States on Page ES-4:

"About 125 ships per year would enter and travel along the Columbia River to deliver cargo to the LNG terminal, resulting in about a 7 percent increase in traffic. LNG marine traffic in the waterway may have some minor impacts on shoreline erosion; however, we do not believe that commercial or recreational river users would be adversely affected."

The Port of Portland believes that, as a community of navigation system users on the Lower Columbia River, we have developed a safe, robust, and flexible navigation infrastructure system over many years. This navigation system is in place and benefits all Oregon and Washington shippers and a growing economy based on trade and waterborne transportation.

Our river system can handle additional vessel traffic, and we are continuously improving its capacity to handle the growing volume of trade handled by the Columbia/Snake River system. However, we would be extremely concerned about the impact of new facilities in the Lower Columbia River should their presence place significant restrictions on existing vessel traffic that must transit past the facility and/or utilize the same navigation channel.

It is our understanding, based on the Waterways Suitability Report, that vessel traffic management measures will be required and that vessels' transits (of LNG vessels) will be coordinated to minimize conflicts with other deep-draft vessels, recreational boaters, seasonal fisheries, and other marine events. It is essential for the continuity of existing commercial navigation and the existing maritime investments on the entire river that vessels destined for or departing from locations upstream of the proposed Bradwood facility be able to utilize the channel fully without the creation of a de-facto one-way channel. This will require safe passing zones and implementation of multiple improvements to the navigation system as identified in the WSR report.

Local Agencies

9

LA9-1 The safety/security zone would establish the Coast Guard's authority in the area surrounding the LNG vessel to allow control of the movements of vessels in the security zone area. With expansion of the vessel traffic information system, we do not anticipate significant impacts on shipping traffic during operation of the project. The WSA assumed the larger LNG vessels would be in use and the project would be authorized for 125 LNG vessel round-trips per year.

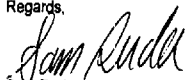
K-608

FERC - Office of the Secretary
Page 2
December 26, 2007

LA9-1
cont'd

It is our specific concern that additional vessel traffic restrictions may be identified in the future based on size of LNG vessels, frequency of LNG vessel calls, or other factors as yet not determined. If this were to happen, it is the Port of Portland's position that liner services, such as the automobile and container carriers which are on fixed schedules and/or tight rotations, need to be provided priority in vessel passage and not unduly restricted by LNG vessel traffic.

Regards,



Sam Ruda
Director, Marine & Industrial Development

Local Agencies

9

K-609

ORIGINAL

2007 DEC 26 P 4:42

PORT OF PORTLAND

Marine Division
121 NW Everett Portland OR 97209
Box 3528 Portland OR 97208
T 503 944 7000 F 503 844 7250

December 21, 2007

FERC
Office of the Secretary
Washington DC 20426

RE: Bradwood Landing Docket #CP06-365-000

LA10-1

This letter is in regard to the application by Northern Star LLC and Bradwood Landing LLC to establish an LNG facility on the Columbia River. As a sponsor of the Columbia River Channel Improvement Project, we wish to ensure that the proposed facility will not interfere or impede established or projected commercial vessel traffic in the river.

Accordingly, as a condition of granting a permit for construction and operation of any LNG terminal on the Columbia River, we respectfully request that FERC require Northern Star to analyze and address the following:

Will the advent of LNG on the Columbia River, as currently proposed, cause commercial or vessel safety impacts that result in the need for increased and/or improved ship anchorages along the river from its mouth to the Portland/Vancouver area?

If thorough study indicates that the arrival of LNG on the river will in fact result in such a need, the establishment of such new anchorages by Northern Star should be made a condition of FERC's siting approval. We also respectfully request the results of this analysis be publicly available for review.

Regards,



Sam Ruda,
Director Marine & Industrial Development

Local Agencies

10

LA10-1

Increased or improved ship anchorages would not be necessary. With careful traffic management, prearrangement of meeting locations in the four established passing zones, and an expanded vessel traffic information system, traffic delays are expected to be negligible.

K-610

CP06-365 CP06-366

Clatsop County



November 12, 2007

Paul Friedman, Manager
Bradwood Landing Project
Office of Energy Projects
Federal Energy Regulatory Commission
Washington, DC 20426

800 Exchange St., Suite 310
Astoria, Oregon 97103

SUBJECT: Conditions of Approval in Clatsop County's Review of Application from Bradwood Landing, LLC, for Land-Use Permits for LNG Marine Terminal at Bradwood, Oregon

Dear Mr. Friedman:

Clatsop County expects to complete its review of the local land-use permit application from Bradwood Landing soon. We conducted two public hearings before our planning commission in July and one public hearing before our Board of County Commissioners on October 22, 2007. The Board of Commissioners will hold another hearing on November 19, 2007, and is expected to reach a decision on the application a few weeks after that. If the board decides to approve the application, the commissioners are likely to adopt conditions of approval regarding critical issues such as emergency services, road access, plant retirement, wetland mitigation, and habitat restoration.

Board of
County Commissioners

Phone (503) 325-1000
Fax (503) 325-8325

At the board's October 22, 2007, hearing we were surprised to hear testimony suggesting that FERC might be able to preempt overrule such local conditions of approval. This is contrary to our understanding of federal law on consistency with the Coastal Zone Management Act and of the Energy Policy Act as well. We therefore ask for your views on this crucial question: *Does FERC have authority to invalidate, waive or modify local land use regulations or local conditions of approval adopted pursuant to the Coastal Zone Management Act, and if so, what criteria does FERC employ in deciding whether to take such action?*

As you know, most of Clatsop County, including the Bradwood site, is in Oregon's coastal zone. The county's comprehensive plan and land-use regulations have been acknowledged by the state's Land Conservation and Development Commission to be the controlling documents for all land use decisions in the coastal zone and for implementing the state's federally approved coastal management plan. We understand the federal consistency

Local Agencies

11

K-611

LA11-1

LA11-1

On April 4, 2008, Mark Robinson, Director of the FERC's OEP, wrote a reply to this letter from Mr. Derickson (see accession number 20080404-3020). While the EPCA 2005 gave the FERC the authority to site onshore LNG terminals, it also stated that the rights of the states under the CZMA would not be affected. The EIS addresses local land use zoning in section 4.7. The EIS acknowledges that NorthernStar has not yet received a determination that its project is consistent with the CMP and recommends that prior to construction, NorthernStar must file documentation from the ODLCD that the project is consistent with the Oregon CMP.

Local Agencies

11

LA11-1
cont'd

provisions of the CZMA to require that any federal action occurring in Oregon's coastal zone that would affect coastal land or water uses or natural resources must be consistent with Oregon's coastal management program and with the local plans and land use regulations that implement it. We further understand the federal consistency provisions to extend to all local decisions that apply the local plans and land use regulations that implement Oregon's coastal management program. We therefore conclude that (a) any decision on Bradwood by Clatsop County to deny, continue, approve, or approve with conditions will be subject to federal consistency provisions of the CZMA, and (b) FERC has no authority to waive or modify any such decision.

We appreciate your attention to this important question and look forward to hearing from you at your earliest convenience.

Sincerely,



Scott Derickson, Clatsop County Manager
800 Exchange Street, Suite 410
Astoria, OR 97103

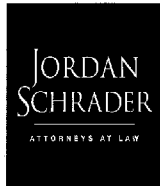
Copies to:

Clatsop County Board of Commissioners
Dale Blanton, Oregon Department of Land Conservation and Development
Adam Bless, Oregon Department of Energy

K-612

Local Agencies

12



JORDAN SCHRADER RAMIS PC

February 22, 2008

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Re: Bradwood Landing LLC, Docket Nos. CP06-365-000, CP06-366-000,
CP06-376-000, CP06-377-000
Our File No. 44548-35140

Dear Secretary Bose:

This office represents Clatsop County, Oregon (the "County"), in the above referenced proceedings regarding the Bradwood Landing LNG ("Bradwood") facility and associated pipeline. As the FERC decision-making process nears completion, the County Board of Commissioners remains concerned over the status of local conditions of approval and the adequacy of environmental and safety review. The purpose of this letter is to outline for FERC various questions proposed by the Board of County Commissioners regarding the remainder of the FERC process.

After Bradwood submitted its formal application to FERC, a debate arose regarding the breadth of FERC's jurisdiction over the project. The County initially believed that FERC had exclusive jurisdiction and that the Oregon Department of Energy would review the proposal on behalf of the state and affected local governments. After several months of discussion, however, it was determined by all affected agencies, and at the County's insistence, that Bradwood should seek County land use approval. Bradwood consented to this request and submitted a consolidated land use application to the County for approval of a wide variety of plan and zone changes, variances, and permits to assure compatibility of the proposal with County land use policies and regulations.

The County held two days of hearings before the County Planning Commission and two days of hearings before the Board of Commissioners. The Board of Commissioners ultimately accepted the Planning Commission's recommendation to approve the project subject to a variety of conditions regarding road improvements, dredging, mitigation of environmental damage, and safety, among others.



JORDAN SCHRADER, PC
ATTORNEYS AT LAW

February 22, 2008
Page 2

Contemporaneous with the local land use process, the County contracted with Columbia River Estuary Study Taskforce ("CREST") to prepare comments on the Draft Environmental Impact Statement ("DEIS") issued on August 17, 2007. Those comments were submitted to FERC on December 21, 2007, along with comments by other affected parties. It is the County's understanding that FERC is currently analyzing the comments received in response to the DEIS and preparing a Final EIS that will address the comments filed by the affected parties.

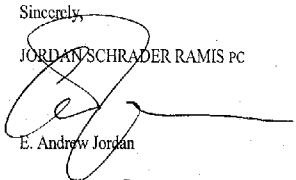
Based on the above background, the County has the following questions:

- | | |
|--------|--|
| LA12-1 | (1) In what manner is FERC going to address the questions, concerns, and comments filed by state, federal, and local agencies in response to the DEIS? |
| LA12-2 | (2) Does a conflict of interest arise when FERC requests that a consultant hired by Bradwood complete a study in order to respond to a comment filed in response to the DEIS? If so, how does FERC manage such a conflict? |
| LA12-3 | (3) If FERC ultimately approves the Bradwood application, will FERC require Bradwood to satisfy the conditions placed upon local approvals by local governmental bodies having jurisdiction over such approvals? |

Once a Final EIS is issued, it is the County's understanding that FERC will prepare an order approving or denying the Bradwood application. Because the County represents the local public interest in this proceeding, it is important that the above concerns be addressed so that the County can take whatever action it deems necessary to ensure the environment and public safety are adequately protected.

Sincerely,

JORDAN SCHRADER RAMIS PC


E. Andrew Jordan

cc: Clatsop County

44326-35140 127174.doc\O\N\2-22-2008

Local Agencies

12

- | | |
|--------|---|
| LA12-1 | On April 4, 2008, Mark Robinson, Director of the FERC's OEP, wrote a reply to this letter from Mr. Jordan (see accession number 20080404-3020). All comments on the draft EIS have been addressed in the final EIS by providing direct responses to specific questions and concerns, as well as by modifying the text in the EIS, as appropriate (see volume 2, Appendix K). |
| LA12-2 | We do not consider this to be a conflict of interest. All of the information used by the staff to complete its environmental review is independently evaluated. The FERC staff assesses the validity of the study, verifies facts, and reviews the claims of any consultant's study done on behalf of an applicant, before accepting any data for inclusion into our environmental document. |
| LA12-3 | The Commission encourages cooperation between the applicants and state and local authorities, and we expect the project sponsors to submit applications for necessary permits. However, this does not mean that state and local agencies, through application of state and local laws, may prohibit or unreasonably delay the construction or operations of facilities approved by the Commission. Further, state and local permits must be consistent with the conditions of any authorization the Commission may issue. |



Swanson Bark
& Wood Products, Inc.

ORIGINAL

2007 SEP 17 P 3:03

September 7, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D. Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Reference Docket #CP06-365-000

Dear Ms. Bose,

Swanson Bark & Wood Products, Inc. in Longview, WA is a manufacturing facility involved in wood residual products. Based on our rather limited knowledge of the NorthernStar Natural Gas Bradwood Landing proposal, we stand in support of this project.

CO1-1 | Businesses need gas, and we're short on natural gas in this area. Specifically, the price of natural gas is hurting southwest Washington's ability to dry wood, as well as generally to attract new business to our county. Approving the Bradwood Landing project will help fill the pipeline, expanding business opportunities and business competitiveness in our part of the state.

CO1-2 | We are confident in your agency's ability to safeguard the population and river habitat surrounding such a facility, and therefore do not feel safety is a major concern.

Sincerely,

John Leber
President/CEO

Companies and Organizations

1

CO1-1 | Comment noted.

CO1-2 | Comment noted.

K-615



Swanson Bark
& Wood Products, Inc.

ORIGINAL

FILED
OFFICE OF THE
SECRETARY

October 1, 2007

OCT 9 P 4:01

Clatsop County Board of Commissioners
800 Exchange St. Suite 310
Astoria, OR 97103

Re: Bradwood Landing's land use application

CP06-365-000

Dear Commissioners,

CO2-1

We really need natural gas in this area at this time. The price of gas is really hurting industrial manufacturing and, as the pipeline from Canada gets more users than capacity, the problem will get worse.

At this point, the NorthernStar Natural Gas Bradwood Landing project appears to be the best option that's been presented and we urge you to allow it to go forward.

That said, and perhaps as an aside, I've had bad experiences with government condemnations of land. We would rather see you be overly fair with the silly people who demand too much than in any way stomp on the fair people who allow it to go forward with a relatively small amount of resistance.

Sincerely,

John Leber
President

cc: Federal Energy Regulatory Commission

Companies and Organizations

2

CO2-1 Comment noted.

K-616

Teevin Bros
Teevin Bros Land & Timber Co., LLC

ORIGINAL

FILED
OFFICE OF THE
SECRETARY

October 8, 2007

2007 OCT 16 P 3:21

FEDERAL ENERGY REGULATORY COMMISSION

Federal Energy Regulatory Commission
Attn: Kimberly D. Rose, Secretary
888 First Street NE, Room 1A
Washington DC 20426

Re: Docket # CP-06-365-000

Dear Board of Commissioners:

I am writing on behalf of Teevin Bros Land & Timber Co., LLC, a regional employer near Bradwood Landing, the proposed location for the NorthernStar Natural Gas facility, in Clatsop County, Oregon. We are also a neighbor to the proposed facility. Many of our business lines (timber, forestry, and quarry) fall within the impact area of the facility; and many of our employees and their families live nearby.

We have read the information provided by both the proponents and opponents of the project, and after review of facts and empirical evidence, and careful deliberation, we are in agreement with the draft Environmental Impact Statement. We live here, we raise our families here, and we hunt, fish, hike, camp, and otherwise recreate here. We see the project as proposed, having a short-term negative quality of life impact during construction; followed by a long-term positive impact to our community.

Weighing all parts of change, we see this as a net positive for our community. The proposed project will have minimal short-term impacts on the environment, with the mitigating projects having a substantial positive impact on our environment.

This project brings to our community diversification of the local economy, diversification of employment opportunities, sincere focus on preserving and enhancing our flora and fauna, with regional and national benefits of diversifying our source of supply for natural gas.

We realize this has become an emotional issue for many. And many of those opposed do not live here. We live here. We accept there will be some impact. We believe the project will contribute to the greater good of our region and our nation. The draft Environmental Impact Statement answers our concerns. We recommend approval of the EIS and the issuance of permits to construct this project.

Sincerely,

Paul Langner
Property Manager
For Teevin Bros Land & Timber Co., LLC

KNAPPA
OFFICE
12/2/04
CHIEF OF BUREAU
ASTORIA
OREGON
97103

OFFICE
FOR
ASTORIA

CO3-1

133
-113
556 2805

WWW.
TEEVINBROS.
COM

Companies and Organizations

3

CO3-1 Comment noted.

K-617

Companies and Organizations

4

Susan B. Bergles, Esq.

325 Broxton Rd.
Baltimore, MD 21212
Ph. 410-433-0413
Fax 410-433-5016
sbb@nwnatural.com

November 21, 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C., 20426

Re: Comments of NW Natural on Draft Environmental Impact Statement for the
Bradwood Landing LNG Terminal Docket Nos. CP06-365-000, et al.

Dear Secretary Bose:

Northwest Natural Gas Company (NW Natural) has received and reviewed the Draft Environmental Impact Statement (DEIS) for the Bradwood Landing LNG terminal project and the associated pipeline proposed by NorthernStar Energy LLC. The proposed project regards an LNG terminal to be built near Bradwood, Oregon, and the associated send-out pipeline would be located in Clatsop and Columbia Counties, Oregon and Cowlitz County, Washington.

NW Natural is an Oregon corporation that is a natural gas local distribution company serving about 641,000 customers through separate facilities located in western Oregon and southwestern Washington and is regulated by the Oregon Public Utility Commission and Washington Utilities and Transportation Commission, respectively.¹ Additionally, NW Natural is one of the members of Palomar Gas Holdings, LLC, the parent of Palomar Gas Transmission, LLC, which has proposed to build a new interstate natural gas pipeline in Oregon and which has initiated a pre-filing process at the Commission in Docket No. PF07-13-000.

NW Natural files these comments on the Bradwood project DEIS to clarify some inaccuracies in Section 2.1.6 of the DEIS regarding the Palomar pipeline project and its potential interconnections with NW Natural's local distribution system facilities, including its Mist underground natural gas storage facility (Mist). NW Natural's specific comments are set forth below.

In Section 2.1.6, Palomar Pipeline, the tenth and eleventh sentences in this section state, "The Palomar pipeline would then proceed northwest to interconnect with Northwest Natural's existing storage field at Mist. From Mist, the Palomar pipeline could branch

¹ NW Natural is exempt from FERC jurisdiction under Sections 1(b) and 1(c) of the Natural Gas Act for its systems, facilities, and services in Oregon and Washington. Portland Gas and Coke Company, 17 FPC 638 (1957).

CO4-1

off to serve the proposed Bradwood Landing LNG import terminal.” The discussion continues to say, “If the Bradwood Landing Project is not authorized, or not built, Palomar could still serve the Portland metropolitan area, and extend its pipeline out to Northwest Natural’s Mist storage field. Palomar would just not build the last segment between Mist and Bradwood Landing.” These statements are not accurate and must be revised in the FEIS. As explained more fully below, the Palomar pipeline will not directly connect to Mist.

In 1989, NW Natural’s Mist storage field began storage operations for its core gas local distribution customers. Since 2001, NW Natural has made excess and new storage capacity that is pre-built in advance of core need available to customers in the interstate market pursuant to a limited jurisdiction blanket certificate issued by the Commission under its regulations set forth in 18 CFR § 284.224.² The Mist interstate services consist of bundled firm and interruptible storage and related transportation services on NW Natural’s system to and from the Mist storage facility. NW Natural’s primary use of Mist, however, is to provide reliable gas supplies to its core customers. As the needs of its retail customers grow, NW Natural can reduce the amount of storage capacity, not under contract, that is made available to the interstate market.³

Currently, the physical facility set up at Mist is such that it is not possible for a new pipeline to directly connect to Mist. Thus, the statement in the DEIS that indicates that Palomar would directly connect to the Mist storage field is not accurate and needs to be revised. In fact, if there will be any new interconnection(s) between the Bradwood send out pipeline, Palomar, or any other interstate pipeline and NW Natural’s facilities capable of reaching Mist, such interconnection(s) would be accomplished through an interconnection between NW Natural’s local distribution system facilities and the new interstate pipeline facility(ies). NW Natural prefers to expand its own infrastructure to any new facilities because this would enable it to design its facilities consistent with the needs of its system, including any associated upgrades, and will provide additional takeaway capacity from Mist that will facilitate future expansions that can be used for NW Natural’s core customers. It is also possible that any new interstate pipeline interconnection(s) with NW Natural’s system could be used as a receipt or delivery point for NW Natural’s interstate storage customers.

Further, with respect to Palomar, NW Natural would also likely request to have other interconnections on the western zone of the Palomar system located further south (between Mist and Molalla) to enable it to more easily receive gas from Palomar at various locations on NW Natural’s local distribution system where such gas is needed, and to potentially serve other new local distribution customers as well. Such interconnections are still being contemplated and thus no definitive plans currently exist for any such interconnections.

² Northwest Natural Gas Company, 95 FERC ¶ 61,242 (2001); see also 111 FERC ¶ 61,406 (2005) (rate settlement).

³ *Id.* at p. 4.

Companies and Organizations

4

CO4-1

The discussion of the Palomar pipeline project has been moved from section 2.1.6 to section 3.1.2.2 and revised. Section 4.12 has been revised to reflect that the Palomar pipeline’s proposed western zone may have multiple interconnections with Northwest Natural’s local distribution system facilities and would not connect directly to the Mist storage facility.

Companies and Organizations

4

CO4-1
cont'd

For the reasons indicated above, NW Natural respectfully requests revisions to Section 2.1.6 to correctly reflect the facts that (1) Palomar's proposed western zone may have multiple interconnections with NW Natural's local distribution system facilities, and (2) interstate pipeline facilities will only connect to Mist through NW Natural's local distribution system facilities. Since there will not be any direct connection between the Palomar pipeline and Mist, any such references should be removed or revised.

We suggest the following language to replace the relevant portion of Section 2.1.6:

"The Palomar pipeline would then proceed northwest to interconnect with various points on NW Natural's distribution system. The Palomar pipeline could branch off to serve the proposed Bradwood Landing LNG import terminal...The Palomar pipeline would then proceed northwest to interconnect with Bradwood Landing's proposed pipeline near Wauna. If the Bradwood Landing Project is not authorized, or not built, Palomar could still serve the Portland metropolitan area via a planned interconnection at Mollala and via probable future interconnections with NW Natural's distribution system between Mollala and the terminus of the Palomar pipeline's western zone. Palomar would just not build the last segment to the Bradwood Landing pipeline."

CO4-2

Additionally, in this same Section, the sixth sentence should be updated to reflect that Palomar has initiated the pre-filing process at the Commission.

Thank you for the opportunity to provide these clarifying comments. If you have any further questions about NW Natural's comments, please feel free to contact me.

Sincerely,

/s/ Susan B. Bergles

Susan B. Bergles
Attorney
On behalf of Northwest Natural Gas Company

CO4-2

Sections 4.12 and 5.1 have been updated to indicate that Palomar has begun the FERC's Pre-filing Process. See also our response to comment CO4-1.

Companies and Organizations 4

CERTIFICATE OF SERVICE

I hereby certify that I have this day caused a copy of the foregoing document to be served upon each person designated on the official service list compiled by the Federal Energy Regulatory Commission in this proceeding.

Dated at Baltimore, Maryland, this 21st day of November, 2007

/s/ Susan B. Bergles
Susan B. Bergles



Willapa Hills Audubon Society

P.O. Box 399, Longview, WA 98632-7255
Gloria G. MacKenzie, Director at Large ggmack@qwest.net

December 21, 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Subject: DEIS Comments

Request for: A Comprehensive Needs Assessment
A Programmatic EIS

Docket Nos. CP06-365 and 366
NorthernStar Bradwood Landing LNG Project

Dear Secretary Bose,

Thank you for the opportunity to submit comments regarding the proposed project.

Section 4.6.1.2 State Listed Threatened and Endangered Species

CO5-1 Please refer to the Governor Kulongoski/Oregon State Agencies submittal to FERC #20071218-5063, pages 32 and 33 for specific bird information that was not included in the DEIS. Please add this information.

Section 4.6.1.3 Migratory Bird Treaty Act

CO5-2 The DEIS recognizes that the Columbia River estuary is one of the most important sites on the Pacific Flyway for migratory birds, more than 300 species occurring in the area throughout the year. Peak counts in the estuary during migration have been almost 150,000 birds.

Companies and Organizations

5

CO5-1 See our response to comments SA1-146 through SA1-153, SA1-158, and SA1-159.

CO5-2 Sections 4.6.2.2 and 4.6.2.3 have been revised to include additional information relating to the potential impacts on migratory birds due to operation of the Bradwood Landing Project. We believe the analysis of cumulative impacts on wildlife have been addressed adequately in section 4.12. Potential cumulative impacts on wildlife are recognized, but not considered significant due to implementation of our recommendations.

K-622

Secretary Bose
Page Two - 12/21/07

CO5-2
cont'd | While the DEIS does recognize potential impact during construction, there is no mention of the impact to migratory routes arising from noise and light of the terminal during the operational phase. There is no explanation of the cumulative overall impacts, which can be expected over the lifespan of the facility. Please explain.

Section 4.7.2.4 Coastal Zone Management

CO5-3 | Please explain the relationship between 306(c)(5) and ORS 196.435. It would seem that this is a typographical error, because CZMA 306(c)(5) refers to the 'Allocation of grants to coastal states'. 306 (d)(5) would make more sense.

CO5-4 | Coastal Zone Management Act Consistency Certification, was not made a part of the DEIS. It is my understanding that comments, and public hearing(s) regarding the application for certification will be accepted during the 6-month period, which began October 23, 2007.

CO5-5 | In conclusion, the current process of reviewing each LNG terminal proposal on a case-by-case basis is wasteful and draining. I would like to recommend that a Comprehensive Needs Assessment be made along with a Programmatic EIS. If the applicant seeks to involve the whole State of Oregon with its proposed terminal and adjunct pipelines, it is strongly suggested that this be done.

Sincerely,

Gloria G. MacKenzie
Director at Large
Willapa Hills Audubon Society

Companies and Organizations

5

CO5-3 The reference to the CZMA has been changed to section 306(d)(5) in the final EIS.

CO5-4 Section 4.7.2.4 has been revised to reflect this information.

CO5-5 See our response to comment PM5-74.

K-623

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Bradwood Landing LLC	)	Docket No.	CP06-365-000
NorthernStar Energy LLC	)	Docket Nos.	CP06-366-000
	)		CP06-376-000
	)		CP06-377-000

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT BY
THE NORTHWEST INDUSTRIAL GAS USERS

Intervenor¹, Northwest Industrial Gas Users ("NWIGU") respectfully submit these comments regarding the Draft Environmental Impact Statement in the above-referenced dockets. In support of its Comments, NWIGU states as follows:

I. BACKGROUND

NWIGU is a nonprofit association comprised of thirty-five industrial end users of natural gas with major facilities in the states of Oregon, Washington, and Idaho. NWIGU members include diverse industrial interests, including food processing, pulp and paper, wood products, electric generation, aluminum, steel, chemicals, electronics, and aerospace. The association provides an informational service to its members and participates in various regulatory matters that affect member interests. NWIGU member companies purchase substantial quantities of natural gas in order to operate their facilities in Oregon, Washington and Idaho. Because the proposed LNG terminal and related pipeline project would bring substantial quantities of natural gas into the Pacific Northwest, it is vitally important to NWIGU that FERC properly considers the needs of the Pacific Northwest industrial gas consumers for more gas supplies as it reaches a

¹ See NWIGU's Petition to Intervene filed July 6, 2006 in FERC Docket Nos. CP06-365-000 et al.

Companies and Organizations

6

K-624

decision on NorthernStar Energy's application to construct an LNG terminal and related pipeline facilities in Oregon and Washington.

II. COMMENTS

CO6-1

NWIGU concurs with the conclusions reached in the Draft EIS regarding the growing market demand for natural gas in Oregon, Washington and Idaho. As proposed, the Bradwood Landing LNG terminal and connected pipeline will have the capability to delivery approximately one BCF per day of natural gas into the heart of the Pacific Northwest gas markets. Such a significant new source of natural gas would be available year round to meet future demand for natural gas in our region.

The Northwest Gas Association in its latest update of the supply demand picture for the region shows that the Pacific Northwest needs access to new supplies of natural gas. NWIGU hereby incorporates as Exhibit A to these Comments a copy of Northwest Gas Outlook 2007, Natural Gas Demand Supply, and Service Capacity in the Pacific Northwest. See www.nwga.org

The study reaches the following conclusions that are highly relevant to this proceeding.

- Regional demand for natural gas will grow over the next five years, paced by demand for gas-fired electrical generation and continued growth in the number of residential customers.
- Natural gas consumption in the region (measured by energy content, or decatherms - Dth) can be expected to grow an average of 1.9 percent per year, with a cumulative projected growth rate of 7.2 percent through 2012 (see data table A.1., Appendix page 29). Most of this increase reflects an anticipated rebound in demand by electrical generation as well as continued growth in residential demand.
- Recently adopted climate change policies will drive additional demand for natural gas because its clean-burning attributes are vital in helping to reduce carbon emissions.

Companies and Organizations

6

CO6-1

We have used the Northwest Gas Association's report, Northwest Gas Outlook 2007, along with a number of other sources for information for our analysis of purpose and need in section 1.1.

K-625

CO6-1
cont'd

- Relatively higher natural gas prices and energy efficiency efforts continue to limit growth in industrial demand for natural gas.
- Other regions of North America will increasingly access gas supplies from production areas upon which the Northwest depends.
- To meet future regional and continental demand growth – particularly in response to climate change policies – North America will require new incremental supplies. Sources of additional natural gas are plentiful and include liquefied natural gas (LNG) imported from overseas and new supply sources closer to home such as Alaskan gas, Canadian frontier gas (Mackenzie River Delta), offshore resources and unconventional resources such as coal-bed methane, shale and biogas.
- Like most commodities, natural gas prices reflect the relative balance between supply and demand. Increased demand for natural gas – driven in part by regional climate change policies – and more competition from other North America markets will only tighten the region's demand/supply balance.
- In addition to ensuring that energy is utilized as efficiently and effectively as possible, policymakers must explore and encourage increased access to new and existing supplies.
- New energy policies to mitigate climate change are increasingly driving demand for natural gas both regionally and continentally because its clean-burning attributes are recognized as an important tool in reducing carbon emissions.

Northwest Gas Outlook pp. 1-2.

The uncontroverted fact is that the Pacific Northwest needs access to new gas supplies and that the LNG terminal proposed by NorthernsStar would help meet those needs. What is abundantly clear is that claims by opponents of LNG that new gas supplies are not needed in the Pacific Northwest are patently false. The energy supply picture in the Pacific Northwest overwhelmingly shows that our region will benefit from the siting of an LNG terminal in Oregon. To suggest, as some have, that the only beneficiaries of such a terminal would be California consumers ignores all the realities facing gas consumers in Oregon, Washington and Idaho.

Companies and Organizations

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CO6-2

Under federal law, FERC is directed to consider feasible alternatives to the proposed action, and address in the Final EIS the relative environmental impacts of the proposed action and feasible alternatives. Federal law does not require a need determination to be made because no natural gas ratepayers are at risk for higher rates or stranded investment resulting from construction of the marine terminal and the Bradwood Landing Pipeline. Only those that use the terminal and pipeline will pay for the facilities. NorthernStar investors have all of the financial risk of failure. Thus, no traditional utility need determination is mandated by federal law.

CO6-3

By providing more access to natural gas, however the NorthernStar LNG terminal would have positive environmental benefits. Natural gas is the cleanest fossil fuel source for end users, and is an important fuel source for electric generation in the Pacific Northwest. Gas-fired generation is being used in the Pacific Northwest to help replace power that was previously generated by coal, nuclear power plants and hydroelectric facilities. Electricity from coal, nuclear and hydroelectric sources has declined in the Pacific Northwest in the past fifteen years in response to environmental and public safety concerns raised regarding those sources of electric generation. Gas-fired generation fueled by LNG can replace lost generation from other sources that are deemed to have greater environmental impacts. Furthermore, natural gas-fired electric generation will be critical in order to back up new renewable sources of power, especially wind.

CO6-4

Through the National Environmental Protection Act (NEPA) process, FERC is considering the environmental impacts of the proposed action. The impacts are being carefully scrutinized through this process. NWIGU urges FERC to also consider the positive environmental impacts of the infrastructure that is avoided by siting a terminal in Oregon. Given the growing demand for natural gas, if the gas does not come from LNG,

Companies and Organizations

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CO6-2 Comment noted.

CO6-3 Comment noted.

CO6-4 An expanded discussion of newly proposed pipelines from the Rockies to Oregon has been added in section 3.1.2.2.

K-627

CO6-4
cont'd

it will have to come from Canada, the Rockies or eventually Alaska. To access any of those alternatives, at least hundreds, and more likely thousands, of miles of natural gas pipelines would need to be constructed to deliver an additional BCF of gas into the Pacific Northwest. To bring Rockies gas, pipeline facilities would be needed in Wyoming, Idaho, and Eastern Washington or Eastern Oregon. To deliver Rockies gas to the West side of the Cascades, either a pipeline expansion from East to West would be necessary through the Columbia Gorge, or a new pipeline would have to cross the Cascade Mountain Range. To bring new supplies from Canada, extensive new pipeline facilities would be required through Alberta and British Columbia in Canada, and then from the Washington/Canadian border south through Washington and Oregon. To have Alaskan gas reach this region would require thousands of miles of pipeline facilities and such facilities are many years away, if they are ever to be constructed.

CO6-5

NWIGU suggests that the Northwest Gas Outlook report clarifies that there is no "build no new gas facilities" option available for the Pacific Northwest if the region's energy needs are going to be met at all, let alone at reasonable prices. The LNG terminal proposed Bradwood Landing is part of the energy reality of the foreseeable future. The ways in which the energy requirements of Pacific Northwest consumers will be met are changing dramatically. Natural gas, including LNG, will help provide the region with a bridge to our energy future. Until a technological breakthrough enables us to meet all of our energy needs in an affordable way from energy sources that cause no environmental impacts, policy officials will be forced to make informed choices. NWIGU believes LNG is an important informed solution to meeting the region's energy needs for the foreseeable future.

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CO6-5 Comment noted.

CO6-6

New sources of natural gas from LNG also will help address unprecedented price increases that Pacific Northwest consumers have faced in recent years. Because of the tight regional supplies and increasing demand, by the winter of 2005-06, natural gas was selling for \$10 to \$12 per MMBtu. Just ten years ago, natural gas prices were regularly below \$2.00 per MMBtu in the winter, and at times sold for \$1.00 in the summer. The rapid rise in natural gas prices has placed unprecedented strains on NWIGU member companies. Large volume users of natural gas struggle to keep their manufacturing facilities profitable despite the price volatility they face when purchasing natural gas. Industrial use of natural gas has declined significantly in recent years, down 45 percent in 2005 from the consumption levels of 1998. Gas Outlook p. 1. *Id.* While some of the decline is due to aggressive implementation of conservation measures, much of the decline is due to demand destruction stemming from curtailed production at manufacturing facilities throughout the region with the corresponding loss of jobs and revenues for local communities.

For NWIGU member companies, high-priced natural gas is an impediment to retaining or expanding their businesses in the region. Many manufacturers in the Pacific Northwest have been forced to reduce production in part because of the exponential increase in natural gas prices, and these manufacturers continue to be constrained by the ongoing high level of natural gas prices. Access to LNG supplies through a marine terminal such as the Bradwood Landing Terminal proposed by NorthernStar would have positive benefits for the Pacific Northwest economy by helping to stabilize natural gas prices and provide industrial consumers with purchasing opportunities that will not otherwise exist.

Companies and Organizations

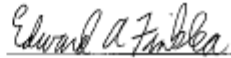
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CO6-6 Comment noted.

The record in this proceeding supports a finding in the final EIS that gas consumers in the Pacific Northwest will benefit greatly from the siting of an LNG terminal such as the one proposed by NorthernStar at Bradwood, Oregon. NWIGU urges the Commission to grant the necessary certificates.

DATED: December 21, 2007.

Respectfully submitted,



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Of Attorneys for the
Northwest Industrial Gas Users

Companies and Organizations

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CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on December 21, 2007 I caused to be served via electronic mail and/or US Mail (if no email address is provided) the foregoing COMMENTS OF THE DRAFT EIS BY THE NORTHWEST INDUSTRIAL GAS USERS on the attached Service List obtained on this date from the Federal Energy Regulatory Commission's Website as follows:

**Service List for CP06-365-000, CP06-366-, CP06-376 and CP06-377
Bradwood Landing LLC**

Party	Primary Person or Counsel of Record to be Served	Other Contact to be Served
Bradwood Landing LLC	John Buchovecky Van Ness Feldman P.C. 1050 Thomas Jefferson St., NW Seventh Floor Washington, DC 20007 jjb@vnf.com	Bradwood Landing LLC
Christian Bock	Scott Jerger Columbia Riverkeeper 610 SW Alder, Suite 910 Portland, OR 97205 Scott@fieldjerger.com	Christian Bock
City of Clatskanie	John Salisbury, Partner Salisbury & Callahan LLP P.O. Box 288 Clatskanie, OR 97016 salisbu@clatskanie.com	City of Clatskanie
CLATSOP, COUNTY OF	E. Jordan, Attorney Individual (No Detailed Affiliation Given) Two Centerpointe Drive, 6th Floor Lake Oswego, OR 97035 andy.jordan@jordanschrader.com	CLATSOP, COUNTY OF
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Columbia County, a political subdivision of	Sarah Hanson Assistant County Counsel Columbia County, a political subdivision of Oregon	Columbia County, a political subdivision of the State of Oregon

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Companies and Organizations

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NEZ PERCE TRIBE	Mike Lopez Staff Attorney	

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Port of Vancouver, Washington	Raymond Kindley Schwabe, Williamson & Wyatt, P.C. Pacwest Center, Suites 1600-1900 1211 SW Fifth Avenue Portland, OREGON 97204-3795 rkindley@schwabe.com	Port of Vancouver, Washington
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Port Westward LNG, LLC	Robert Ramage President Port Westward LNG, LLC P. O. Box 627 Centerport, NEW YORK 11721 ramage@pwlng.com	Port Westward LNG, LLC
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U.S. Fish and Wildlife Service	**Duane Mechem Senior Attorney U.S. Fish and Wildlife Service Pacific Northwest Region 500 NE Multnomah St Ste 607 Portland, OREGON 972322036	Joseph Zisa U.S. Fish and Wildlife Service 2600 SE 98th Avenue Portland, OREGON 97213 joe_zisa@fws.gov
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Washington State Department of Ecology	Joan Marchioro Senior Counsel Office of Attorney General P.O. Box 40117 Olympia, WASHINGTON 98504- 0117 JoanM2@atg.wa.gov	Washington State Department of Ecology
Washington State Dept. of Natural Resources	Terry Pruitt Assistant Attorney General Individual (No Detailed Affiliation Given) 1125 Washington St. SE PO BOX 40100 Olympia, WASHINGTON 98504 UNITED STATES terryp@atg.wa.gov	Lisa Faubion Aquatics Land Manager Washington State Dept. of Natural Resources 601 Bond Road PO Box 280 Castle Rock, WASHINGTON 98611-0280 lisa.faubion@wadnr.gov
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Willapa Hills Audobon Society	Scott Jerger Columbia Riverkeeper 610 SW Alder Suite 910 Portland, OREGON 97205 UNITED STATES Scott@fieldjerger.com	Willapa Hills Audobon Society

DATED this 21st day of December, 2007.

Respectfully submitted,

Edward A. Finkles

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Of Attorneys for the
Northwest Industrial Gas Users

CERTIFICATE OF SERVICE

Companies and Organizations



Portland General Electric Company
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J. Jeffrey Dudley
Vice President
General Counsel &
Corporate Compliance Officer

December 24, 2007

VIA ELECTRONIC FILING

The Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street N.E.
Washington, DC 20426

Re: CP96-365-000 et al

Dear Ms. Bose:

Attached please find a copy of Portland General Electric Company's comments on the Federal Energy Regulatory Commission's draft Environmental Impact Statement (EIS) in the above referenced docket and published in the Federal Register on August 17, 2007. Please accept these electronically filed comments of Portland General Electric Company.

Respectfully submitted,

A handwritten signature of J. Jeffrey Dudley in black ink.
J. Jeffrey Dudley
Vice President, General Counsel and
Corporate Compliance Officer

cc: Service list

Companies and Organizations

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K-639

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Bradwood Landing LLC	)	Docket No. CP06-365-000
Northern Star Energy LLC	)	Docket No. CP06-376-000
		Docket No. CP06-377-000

COMMENTS OF
PORTLAND GENERAL ELECTRIC COMPANY

I. COMMENTS

Portland General Electric Company ("PGE") hereby submits comments in the above referenced proceedings. PGE is a public utility, incorporated in Oregon. PGE provides electric service to approximately 775,000 retail customers throughout a 4,000-square-mile service area. PGE is owner and operator of the Beaver Generating Facility and the Port Westward Generating Facility in Clatskanie, Oregon. The Beaver plant has a 545,000 kW capability and Port Westward provides approximately 400,000 kW of generating capability. Both plants are used to serve PGE's customers.

PGE is a co-owner in the Kelso-Beaver Pipeline ("K-B Pipeline"), a natural gas pipeline that delivers natural gas to the Beaver and Port Westward plants. The K-B Pipeline is an interstate natural gas pipeline subject to FERC jurisdiction that extends from an interconnection with Northwest Pipeline Corporation in Kelso (Cowlitz County) Washington, to a delivery point at PGE's Beaver Generating Facility in Columbia County, Oregon.

Companies and Organizations

PGE supports the development of liquefied natural gas ("LNG") facilities in the Pacific Northwest. The Bradwood Landing LNG importation terminal, storage facility and associated natural gas pipeline (collectively "Bradwood Facility") proposed by Bradwood Landing, LLC and NorthernStar Energy, LLC (Owners) raises certain questions and concerns as it relates to the K-B Pipeline and our Port Westward and Beaver facilities. Those concerns are outlined below and we ask that they be considered in this permitting process.

CO7-1

The close proximity of the proposed Bradwood Facility natural gas pipeline to the K-B Pipeline necessitates safety precautions during its construction.

The Bradwood Facility natural gas pipeline is located approximately fifty (50) linear feet south of the K-B Pipeline for an extended distance. Because of the proximity of the Bradwood Facility natural gas pipeline to the K-B Pipeline, PGE has safety and operational concerns about the construction and operation of the Bradwood Facility.

During construction, physical disturbances, direct damage, erosion or other indirect impacts on the K-B Pipeline caused by the construction are possible. Such impacts could lead to safety risks to PGE employees or other persons located in the vicinity.

Additionally, Bradwood Facility natural gas pipeline construction activities could interfere with PGE or its operator's access and ability to properly maintain or repair the

K-B Pipeline as may be needed. Finally, outages of the K-B Pipeline caused by

Bradwood Facility natural gas pipeline construction may impact the operation of the

Beaver and Port Westward generating plants, ultimately harming PGE's ability to provide reliable electrical service to its customers.

Companies and Organizations

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CO7-1

As discussed in section 2.3.3, where the Bradwood Landing pipeline would be adjacent to the existing KB pipeline, the proposed temporary construction right-of-way would overlap onto the existing pipeline's permanent right-of-way. The overlap would be up to 10 feet on the spoil side of the pipe trench, but no closer than 15 feet from the existing pipeline. This would allow room to keep construction equipment off the operating pipeline, thus avoiding potentially damaging the existing pipeline. Various activities and practices would be implemented to reduce the risk of damage to existing utilities. For example, prior to construction, NorthernStar would survey and mark its right-of-way and pipeline centerline, and conduct electronic surveys to locate existing underground utilities in the construction work area. NorthernStar would implement an environmental monitoring program to ensure that construction activities are confined to approved work spaces and to address issues such as off-site erosion, should it occur. NorthernStar's erosion control measures are contained in the ESC Plan and SWPPP, which are available on the FERC's eLibrary for PGE's review. This document is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range.

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Companies and Organizations

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CO7-1
cont'd

To remedy these concerns, PGE requests that the Federal Energy Regulatory Commission ("FERC") impose the following conditions. Specifically, prior to construction of the Bradwood Facility natural gas pipeline, its developers/contractors ("Bradwood Contractors") shall perform field locations to determine the exact location of the K-B Pipeline and flag the existing right of way for the K-B Pipeline. PGE believes that by keeping the Bradwood Contractors off the K-B Pipeline right of way, it will help protect the K-B Pipeline from equipment damage and will also help keep the existing vegetation undisturbed, thereby reducing erosion problems. PGE requests a daily inspection report from Bradwood Contractors and Owners verifying that they have avoided entering or traversing through the K-B Pipeline right of way.

Additionally, PGE requests to review the Bradwood Facility natural gas pipeline drainage control plan, as well as erosion sediment control plans and to have the opportunity to modify or revise such plans as may be reasonably necessary to avoid potential harm to the K-B Pipeline. We are concerned that check dams, water bars and grade changes could affect the drainage around the K-B Pipeline and result in piping and sinkholes.

PGE is also concerned that construction of the Bradwood Facility natural gas pipeline could activate land slides. PGE requests any land slides activated due to construction or drainage issues related to the construction become the sole responsibility of the Owners and are promptly remedied.

The Bradwood Facility's natural gas pipeline crossing of the K-B Pipeline near PGE's Port Westward Facility requires additional safeguards.

K-642

K-643

CO7-2 In addition to general concerns and safeguards required by the close proximity of the Bradwood Facility natural gas pipeline to the K-B Pipeline, at one specific point the Bradwood pipeline crosses the K-B Pipeline. Such a crossing requires even greater precautions to avoid safety and reliability problems. PGE requests that in addition to the Owners performing field location of the K-B Pipeline prior to construction, that it shall have visually located the K-B Pipeline prior to the excavation of the bore pit. We request that PGE be allowed to be present during the visual location process, and that a forty-eight (48) hour notice be provided by the Bradwood Contractor and Owners to PGE prior to excavation around the K-B Pipeline in order to have PGE personnel or its pipeline operator on site during such work.

CO7-3 **The Bradwood Facility natural gas pipeline requires adequate cathodic protection to avoid harm to the K-B Pipeline.**

The close proximity to, and the crossing of, the K-B Pipeline by the Bradwood Facility also poses a potential cathodic protection ("CP") issue. The Bradwood Facility's chosen method of galvanic and/or impressed current CP has the potential to increase corrosion and possible hydrogen embrittlement on the K-B pipeline, which can ultimately lead to pipeline failure or costly repairs. These problems can be mitigated by coordinating design of CP systems between both the K-B and Bradwood pipelines, so that CP designed to protect one pipeline against corrosion will not negatively affect the other pipeline by reversing the polarity of the ionic charges in the soil in the vicinity of the other pipeline.

To avoid such cathodic harm to the K-B Pipeline, PGE requests that, prior to construction of the Bradwood Facility natural gas pipeline, the Bradwood Contractors

Companies and Organizations

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CO7-2 Language has been added to section 2.4.2 to address the concerns of PGE regarding crossing the KB pipeline.

CO7-3 The Bradwood Landing pipeline cathodic protection system would be designed and operated in accordance with 49CFR 192 which requires, among other things, the electrical isolation of new pipelines from other underground metallic structures (49CFR 192.467) and that impressed current cathodic protection systems be designed to minimize adverse effects on existing, adjacent underground metallic structures (49CFR 192.473). Additionally, NorthernStar has indicated it would coordinate with KB pipeline during design of the cathodic protection system and monitor for interference during required system surveys.

CO7-3
cont'd

and Owners are required to develop and install such a cathodic protection system for any pipeline that is within an underground distance of one hundred (100) feet of the K-B Pipeline. PGE also requests that it be allowed engineering review and approval of such a system prior to construction of the Bradwood Facility natural gas pipeline.

II. NOTICE

The following persons are authorized to receive notices and communications in the above captioned dockets:

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III. CONCLUSION

Based on the above comments, PGE urges the Commission to adequately consider the comments of PGE. PGE will continue to monitor these dockets and will continue to participate in future FERC proceedings.

Respectfully submitted,



J. Jeffrey Bodley,
Vice President, General Counsel and
Corporate Compliance Officer

Companies and Organizations

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K-644

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each
person designated on the official service list compiled by the Secretary in this proceeding
on December 24th, 2007.



J. Jeffrey Dudley,
Vice President, General Counsel and
Corporate Compliance Officer

Companies and Organizations

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K-645



December 24, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: Bradwood Landing Docket Numbers: CP06-365, 366 and 377;
Oregon LNG Docket Number: PF 07-10-000

Dear Secretary Bose,

The Oregon Chapter of the International Non-Governmental Organization, Physicians for Social Responsibility, strongly opposes all four Liquid Natural Gas Terminals and their pipeline delivery systems (three in the Columbia River and one in Coos Bay) that are slated for construction in our beautiful state. The destructive environmental impacts, the possible health risks to our citizens, the continued foreign energy dependence and the potential security risks are too many dangers that we are not willing to accept in trade for minimal economic benefit.

Our membership supports renewable energy resources that reduce carbon footprints for companies, individuals and government. Therefore, we oppose LNG for the following reasons:

- CO8-1 ☐ LNG is not sustainable or clean energy.
- CO8-2 ☐ It has expensive transportation costs since it is imported from countries like Indonesia, Nigeria, Russia and Iran.
- CO8-3 ☐ Oregon does not need this energy source and there is considerable evidence that California does not need it past 2015.
- CO8-4 ☐ Small businesses that we treasure, our local family-owned farms, would be irrevocably harmed, including the habitats and water sources that they work hard to protect.
- CO8-5 ☐ Bradwood Landing, the terminal on the fastest track to approval, will cause enormous ecological damage and consequence to Columbia River estuarine health that is not acceptable.
- CO8-6 ☐ Our forests and private landowners would lose their properties to multinational corporations that do not care about protecting our land as we do.
- CO8-7 ☐ And one accident or terrorist act could cause potential thermal radiation burns a half mile from the initial LNG pool fire.

Oregon Physicians for Social Responsibility works diligently to support energy sources that do not damage our environment or our citizens. We urge federal and state tax dollars that would be

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- CO8-1 We disagree. While natural gas is a non-renewable resource, we will not be running out of it any time soon. There are about 1,191 Tcf of recoverable natural gas reserves in the United States, and about 5,211 Tcf. world wide. Natural gas is the cleanest burning fossil fuel, and is the energy source most in demand for new electric generation plants because has less impact on air emissions than other fuels, such as oil and coal. Natural gas has and will play an important part in the energy mix of the Pacific Northwest, as explained in section 1.1.
- CO8-2 The cost of LNG may fluctuate over time and place. It could also be imported from Alaska, Australia, and Trinidad and Tobago. LNG may prove to be competitive with domestically produced natural gas, and its importation may result in price stabilization or perhaps even reductions in energy costs, as explained in section 1.1.
- CO8-3 The need for an additional source of natural gas is described in section 1.1. California is not a target market for the project. See our response to comment PM1-23.
- CO8-4 There is no evidence that the project would harm small businesses. In fact, as shown in section 4.8, the project should benefit the local economy. As discussed in section 4.7, the majority of agricultural land would be restored to its previous condition after installation of the proposed pipeline. As discussed in section 4.8.3.3, NorthernStar would compensate the landowner for crop damages and use of the land, through the easement negotiation process. Impacts on waterbodies are discussed in section 4.3.2 and potential affects on habitat are addressed in section 4.4.2.
- CO8-5 The Bradwood Landing is not on a fast track for approval. See response to comment PM2-20. The EIS documents that the Bradwood Landing Project would not cause enormous ecological damage to the lower Columbia River estuary, and the mitigation measures proposed by NorthernStar may result in net benefits for habitat.
- CO8-6 No private lands would be lost to multinational corporations. NorthernStar is incorporated in the United States. It would acquire a utility easement for its pipeline, and the land would still belong to the current owner. Potential impacts on forest and NorthernStar's mitigation measures to reduce impacts are discussed in section 4.4.2.
- CO8-7 With implementation of the mitigation measures described in the Coast Guard's WSR (Appendix H), an LNG release would be highly unlikely. Section 4.11 discusses the hazards associated with a release of LNG and section 4.11.8 discusses terrorism and security issues.

allocated to assist any LNG terminals or pipelines to be re-directed to renewable, local energies such as wind and solar power. We adamantly oppose any State or Federal endorsement of such a dangerous, unnecessary and costly expense to our environment and our health.

Sincerely,

Rachel Larson
Executive Director
Oregon Physicians for Social Responsibility
rachel@oregonpsr.org
503.274.2720

Oregon PSR would like to thank the supplying of materials that assisted in the composing of this letter from: National Physicians for Social Responsibility, Oregon Citizens against the Pipelines, Columbia River Intertribal Fish Commission, Columbia Riverkeepers and local farmers.

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December 24, 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C., 20426

Re: Draft Environmental Impact Statement (DEIS) for the Bradwood Landing
LNG Project (Docket Nos. CP06-365-000, et al.)

Dear Secretary Bose:

Thank you for this opportunity to comment on the proposed Bradwood Landing LNG facility and associated pipelines. The Pipeline Safety Trust was formed after the pipeline tragedy in Bellingham, Washington that killed three young people in a park, along with every living thing in two miles of a salmon stream that runs through Bellingham. After investigating and hearing that case the U.S. Justice Department and a federal judge saw the need for an independent organization to watchdog both the pipeline industry and the regulators that are supposed to ensure the public's safety. They provided money as part of the criminal settlement of that case to start the Pipeline Safety Trust for that purpose.

Staff of the Pipeline Safety Trust are members of the Washington State Citizen Committee on Pipeline Safety, and the U.S. Department of Transportation's Technical Hazardous Liquid Pipeline Safety Standard Committee and Pipelines and Informed Planning Alliance.

For the past month we have reviewed the DEIS for the Bradwood facility and associated pipelines, and would like to provide the following comments and requests for clarifications and corrections.

Proof of Need

CO9-1 | Clearly the best alternative from the point of public safety and environmental impact is no facility at all. If the need for natural gas is great enough, than a facility with mitigation measures to ensure public safety and

CO9-1 We discuss the no action alternative in section 3.1.1. We have revised section 1.1 to cite other studies from independent agencies and organizations regarding the need for this project. The Commission would make its comprehensive determination of need in the project Order.

CO9-1
cont'd

minimal environmental impacts may be justified. After reviewing the DEIS we did not find any compelling proof of the need for this facility or the associated pipeline. These are our specific concerns:

- In the DEIS (pages 1-4,1-5, 3-2), FERC justified the need for this additional gas by referencing reports from the Northwest Gas Association (NWGA) and Energy and Environmental Analysis (EEA) Inc. The Northwest Gas Association is a trade organization of the Pacific Northwest natural gas industry, and as such has a clear conflict of interest and should not be considered a valid independent source. EEA is a private consulting firm that does a lot of work for the natural gas industry. On their website (<http://www.eea-inc.com/ngservices/marketanalysis.html>) under "Gas Market Scenario Analysis" they state "Construct Your View Of The Future - EEA provides market projections that are based on your strategic planning assumptions." This clear statement that their market projections are based on a client's wishes, not the best available information, should also clearly make their report used to justify the need for this project suspect.

If this project is to be approved based on need, then a more complete, independent analysis of the future need in the Pacific Northwest needs to occur, and we ask that the states of Oregon and Washington be included in designing that analysis.

CO9-2

- The project's need is also based on the future need for more natural gas in the Northwest, yet there is no information in the DEIS that this project will provide **more** gas to market than is currently available. The proposed pipeline will connect the LNG facility at Bradwood to the William's Northwest Pipeline at Kelso, Washington. Williams has stated numerous times that their Northwest Pipeline is at capacity, and there is no indication in the DEIS that there is any plan to expand that capacity in any way. Without such expansion of capacity in the Williams pipeline then this proposed facility would not provide any **more** gas to market, only an alternative source of gas. The DEIS was not based on the need for an alternative source of natural gas, but on the need for additional natural gas. Again, the analysis for this DEIS is flawed and needs to be redone to either show how this facility will provide additional gas, or why an alternative source of gas is necessary enough to justify this proposal. We ask that such additional analysis occur, and that it includes a discussion of how this project compares to other proposals for additional gas to the region from the Rocky Mountains, Canada, and Alaska.

CO9-3

- There are at least four other competing pipelines - the Oregon Pipeline, the Palomar Pipeline, the Pacific Connector pipeline, and El Paso's Ruby Pipeline - proposed to bring natural gas to Oregon. There was no discussion in the DEIS about how these other proposed pipelines relate to the need for this project. In particular the Palomar Pipeline and the Oregon Pipeline

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CO9-2

The EIS states that the proposed project would bring in new supplies of natural gas through the importation of LNG. See section 1.1. The existing Williams Northwest system does not have to be expanded to handle the additional volumes that would become available through an interconnection with the proposed Bradwood Landing Project. See our response to comment PM1-10.

CO9-3

The EIS has been revised. Section 3.1.2.2 discusses Palomar and Ruby as newly proposed pipeline alternatives. The Oregon Pipeline is discussed as part of the Oregon LNG Project, and the Pacific Connector Gas Pipeline is discussed as part of the Jordan Cove LNG Project in section 3.1.3.4 Proposed LNG Import Terminals in Oregon.

CO9-3
cont'd appear to have the ability to serve this same LNG facility, but these alternative pipelines to the pipeline proposed with this facility was not discussed. If this is to be a regional facility, then the DEIS should address the regional impacts. Why build three pipelines, with three sets of environmental impacts, if one pipeline would be sufficient? This is a critical failure of the DEIS, and we ask that it be addressed by including, at a minimum, the Palomar and Oregon pipelines as part of the alternative review.

CO9-4 • The DEIS also fails to provide any discussion regarding the need for this particular LNG facility compared to the many others proposed for the west coast of the United States and Canada. It is clear that at most only a handful of these facilities will be needed, so why is there no discussion in the DEIS of which facilities will have the least environmental impact and pose the least threat to public safety? Does the Bradwood facility provide for better safety and less environmental impact than the other proposed facilities? Why does FERC continue to place such a financial and emotional burden on multiple states, local jurisdictions, and citizens to review multiple proposals when it is clear that economically not all of them will be built? We ask that a discussion of how this particular facility compares to other competing facilities regarding public safety and environmental impacts be included in the final EIS.

Public Safety of Ships Traveling the Columbia River

CO9-5 There are many unaddressed concerns raised by others more knowledgeable than us regarding the specifics of LNG spill models used in the DEIS to discuss potential public safety impacts. We hope these issues are more fully addressed.

One concern we have with all the LNG proposals we have reviewed is the lack of acknowledgement of the potential for a cascading failure of containment tanks if a terrorist attack was to occur. In February of this year the Government Accountability Office (GAO) made a recommendation to Congress that such a cascading failure of containment after such an attack is the leading concern not currently being addressed, and that further research needs to be done. There was no new research provided in the DEIS, and this concern was not addressed adequately. With LNG tankers transiting many miles up the Columbia River such a cascading failure, particularly near Astoria, Oregon, could have catastrophic effects. We ask that the possibility of a cascading failure be adequately addressed in the final EIS.

Pipeline Construction Issues

We agree with the concerns raised by the Washington State Citizen Committee on Pipeline Safety, and include them again below to lend our

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CO9-4 The need for this project is discussed in section 1.1. Our alternatives analysis explains why the Bradwood Landing Project would serve a specific purpose that may not be served as well by other LNG import terminals in Canada, Mexico, or California. We offer a comparison of environmental impacts for other proposed LNG import terminals proposed in Oregon, where we have data for those other sites, in section 3.1.3.4. No other project was identified that had significantly less environmental impacts. There is no great burden on states or local governments to review the LNG proposals, because under the NGA and EPCRA 2005 the FERC is the sole agency with authority to site onshore LNG import terminals, and it is our staff which has the burden of reviewing the applications and preparing this EIS. Any project authorized by the FERC would have equal protection for the public with regard to safety and security issues. The FERC does not choose between projects and would review each project independently on its own merits. See also our responses to comments PM2-23, PM2-27 and PM2- 31.

CO9-5 Section 4.11.5.3 includes a discussion on the effects of a cascading scenario on the overall fire hazard and has been updated to include a discussion on the GAO reports position on cascading issues.

support to making sure they are addressed before this project moves forward.

- CO9-6 • We agree with FERC that the current amount of information available regarding seismic and landslide hazards is insufficient, and ask that pipeline construction not begin until FERC, PHMSA, and the WUTC are satisfied with the analysis and any proposed routing changes and mitigation that come from it.
- CO9-7 • We are concerned about possible jurisdiction, coordination, and expertise issues between the Federal Energy Regulatory Commission (FERC), the Pipeline and Hazardous Materials Safety Administration (PHMSA), and the Washington Utilities and Transportation Commission (WUTC). For these reasons we ask that FERC allow the WUTC full access to the pipeline and related construction documents for the purpose of inspection during the construction phase. We also ask that PHMSA grant the WUTC permission to carry out these construction inspections as part of their delegated interstate authority. We ask that this be incorporated in the final EIS.
- CO9-8 • We are concerned that the DEIS does not clearly call for the non-destructive (e.g., radiographic or ultrasonic methods) inspection of every girth weld on the pipeline. Given the difficult terrain, the pipeline is highly susceptible to abnormal loading, we ask that the final EIS makes clear that every girth weld will be 100% inspected by non destructive testing, and that these girth weld nondestructive test records be retained and made available to governmental inspectors for the life of the pipeline.
- CO9-9 • We are concerned with the level of confidence that FERC seems to put in the use of strain gauges for providing warning against landslides. While strain gauges can be valuable for predicting problems on slow moving slide areas, they provide little or no protection for landslides in geologic formations that make them prone to catastrophic failures (e.g. slopes susceptible to high hydrology gradients such as that in Western Washington). This again points to the need for better analysis of landslide areas and rerouting if necessary.
- CO9-10 • The use of HDD to get under streams and landslide areas is extensive in the construction plans. While we do support the use of HDD in such situations, we also know that even with the best geologic analysis HDD can fail. For this reason we ask that the final EIS clearly state what methods will be used in each situation if the HDD methods turns out not to work in an area. For streams this would include which method would be used in place of HDD, and for slide areas this would include whether the pipeline will be rerouted to avoid the slide or what other mitigation may be employed.

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- CO9-6 Comments CO9-6 through CO9-16 were also submitted as part of comment letter SA3. For these comments, our responses refer to the response previously provided.
- See our response to comment SA3-3.
- CO9-7 See our response to comment SA3-1.
- CO9-8 See our response to comment SA3-2.
- CO9-9 See our response to comment SA3-4.
- CO9-10 See our response to comment SA3-5.

- CO9-11 • Sometimes, during the HDD process under streams frac-outs occur that can dump harmful quantities of fine silt materials into fish bearing streams. In the DEIS it states that response to such frac-outs would occur within 30 minutes. We believe that the detection and response to frac-outs should occur much quicker than 30 minutes and we would like to see this reflected in the final EIS.

Right-of-way Issues

- CO9-12 • It is our understanding that FERC has a policy to encourage the use of existing right-of-ways when possible. It is unclear from the DEIS exactly why this proposed pipeline from the Bradwood facility is not following the existing KB Pipeline for more of its route through Washington. Please either explain this more explicitly in the final EIS, or require this pipeline to follow that existing KB Pipeline right-of-way since they are both going to the same place.

- CO9-13 • The DEIS states that this proposed pipeline would be serving the Beaver power plants. This would appear to make the KB pipeline obsolete, and its existing right-of-way more available for this proposed pipeline. Please discuss the future need for the KB pipeline, and why the replacement of that pipeline with a larger pipeline was not considered as an alternative to the Washington part of this proposal.

- CO9-14 • The DEIS states that after construction trees will be planted on the right-of-way in forest areas and wetlands within 5-15 feet of the pipeline to reduce the visual impact and protect habitat. The DEIS also states that property owners will not be allowed to plant trees anywhere on the permanent fifty foot right-of-way. We support the planting of trees as suggested for forest and wetland areas, and ask that similar planting also be approved for property owners in consultation with the pipeline operator.

- CO9-15 • The DEIS states that after construction trees will be planted on the right-of-way in forest areas and wetlands within 5-15 feet of the pipeline, and that such plantings will create a nearly full canopy cover. While we support this planting of trees, and ask that it remains a part of this plan, it does bring up the question of how the company plans to meet its inspection obligations under CFR 49 Part 192.705. Please describe in the final EIS what inspection methods the company plans to use if a nearly complete canopy precludes aerial inspections.

Proximity to Residences

- CO9-16 • The DEIS states that there are six residences within Washington State, which are within 100 feet of the pipeline. We appreciate the care taken to try to avoid residential areas as much as possible, but according to the C-FER

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- CO9-11 See our response to comment SA3-6.

- CO9-12 See our response to comment SA3-7

- CO9-13 See our response to comment SA3-8

- CO9-14 See our response to comment SA3-9.

- CO9-15 See our response to comment SA3-10.

- CO9-16 See our response to comment SA3-11.

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CO9-16
cont'd

Technologies report (A Model For Sizing High Consequence Areas Associated With Natural Gas Pipelines - 2000) that is used to help determine high consequence areas, these residents, and probably others, are well within the hazard area. We ask that the final EIS include a list of all residences within the hazard area as defined by the C-FER Report, and that either the route be adjusted to remove these residences from the hazard area, or that an explanation of why that is not possible be given.

Thank you for considering our comments on this proposed facility. If you have questions feel free to contact me.

Sincerely,



Carl Weimer
Executive Director

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ORIGINAL

MONTINORE ESTATE

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

FILED
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2007 DEC 18 P 3:00
FEDERAL ENERGY
REGULATORY COMMISSION

Re: Docket No. CP06-365-000 et al.

Dear Ms Bose

CO10-1 I am writing you regarding the natural gas pipelines proposed to cross our state. I am a winery owner in the northern Willamette Valley farming 220 acres of wine grapes. I have met with representatives of the pipeline companies and based on the information they provided I have concluded that construction of these pipelines is and dangerous and unnecessary. They propose to bury a 3-foot diameter high-pressure pipeline 3 feet below ground. In the same section of our vineyard where they would like to place this pipeline just last summer my vineyard crew punctured a irrigation line 4 feet below grade when performing the routine maintenance of replacing an end post. If they had ruptured a gas line five of my crew would have been killed and most probably many members of the families that live adjacent to our vineyard. Farmers regularly disturb soil below 3 feet when installing drainage lines, water lines, fence posts or in the process of sub-soiling. The proposed pipeline installation is dangerous to our farmers, their families and our neighbors. I'm sure the Oregon Department of Agriculture shares these concerns.

CO10-2 The pipeline proposal does not make sense from a need/risk perspective. We don't need this volume of gas in Oregon. The majority of the gas to be carried is to be sent to California customers yet we Oregonians are expected to bear the risks of this project. If Californians need the gas let them accept the terminals on their coastline and the pipelines crossing their properties.

CO10-3 Another problem with this proposal is that the gas companies are not using existing right of ways but rather proposing to cross private lands near homes and schools and across agricultural and forestry lands. This is in direct opposition of the Oregon guidelines for this type of project.

CO10-4 Not least is the issue of environmental impact especially at the coast near the docking terminals. Our Oregon coast is on of the healthiest and most beautiful in the country and a great source of pride for all Oregonians.

As our government representative charged with balancing the energy needs of Americans with safety and impact I respectfully request that you oppose the LNG projects and require the Federal Energy Regulatory Commission to

3663 SW Dilley Rd • PO Box 490 • Forest Grove OR 97116-0490
Phone: (503) 359-5012 Fax: (503) 357-4313 Web: www.Montinore.com

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CO10-1 The Bradwood Landing pipeline would not cross any portion of the Willamette Valley, and therefore would not affect the Montinore Estate farm or vineyard.

CO10-2 The purpose and need discussion in section 1.1 has been expanded and clarifies that the natural gas would not be going to markets in California.


CO10-3 See our response to comment SA3-37. The Bradwood Landing pipeline follows existing rights-of-way to the extent possible, for about 22 percent of its route.

CO10-4 The proposed Bradwood Landing LNG terminal is not located on the Oregon coast, but 38 miles up the Columbia River from its mouth.

K-654

consider all of the Oregon LNG projects in a single environmental impact statement that specifically addresses why Oregon should host an LNG plant that is intended to send California gas.

Rudy Marchesi


President, Montinore Vineyards

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Due to the length of the Columbia Riverkeeper comment letter (comment letter CO11), we have summarized the issues raised and include them in the following table along with our responses. A copy of the complete letter follows the response table.

Comment Number	Comment (Summary)	Response
CO11-1	There is no proven “need” for the project in the Pacific Northwest. The EIS assumes that LNG is a vital resource for the future of the Pacific Northwest; however, no impartial information is given that shows the need for the enormous scale of the Bradwood Landing proposal. What evidence is there of the need for gas in Oregon; where would the gas that is planned for import to Oregon go?	See our response to comment PM1-8. The Commission will make its determination of need in the project Order.
CO11-2	The draft EIS states that the purpose of this project is to import LNG to supplement regional supplies, when in fact NorthernStar’s purpose for the project is to tap into the California market and supplement California’s natural gas supplies.	See our response to comment PM1-23.
CO11-3	California gas needs should be evaluated as part of the draft EIS needs analysis.	California is not a target market for the Bradwood Landing Project and therefore should not be included in the assessment of need.
CO11-4	LNG imports will help stabilize the supply and price for the region, is a false statement. LNG imports are notoriously unreliable because of uncertainties in the supply and demand of the global market. The purpose and need should be re-evaluated in light of these observations, the effects importing LNG will have on the regional supplies, and prices should be stated.	We disagree based on a number of sources as cited in our discussion of purpose and need in section 1.1.
CO11-5	The draft EIS rests its need analysis largely on a national presumption of need for LNG imports, and is inadequate in its evaluation of the regional need for LNG imports.	See our response to comment CO11-1.
CO11-6	Data from the Northwest Gas Association can not be considered unbiased, due to Northwest Natural Gas, a member of the Association, who is a partner and will likely be a future owner of the Bradwood Landing pipeline.	Section 1.1 was revised to cite a number of independent studies.
CO11-7	The details of Williams pipeline and its lack of capacity to accept NorthernStar’s gas needs to be addressed in greater detail.	Section 1.0 has been revised to include a discussion of the Williams Northwest pipeline capacity. See our response to comment PM1-10.
CO11-8	The size of the LNG ships that will transport LNG to the proposed Bradwood terminal is inconsistent.	The LNG terminal is designed to accept LNG carriers up to 200,000 m ³ . The WSR would limit the size of the LNG carriers to a capacity of 148,000 m ³ until a completed site-specific risk analysis for larger carriers is approved by the COTP. At that time, NorthernStar would prepare a follow-on WSA with the proposed LNG carrier size for approval by the Coast Guard.
CO11-9	The number of LNG storage tanks proposed has been inconsistent (two or three?).	The number of LNG storage tanks has consistently been presented as two in the EIS and in the current versions of the JPA and JARPA. Because two storage tanks were proposed in NorthernStar’s application to the FERC, and analyzed in the EIS, if the Commission authorizes the project, only two tanks could be built at the LNG terminal.
CO11-10	The draft EIS does not provide a description of the routes the LNG vessels will travel to and from the proposed LNG terminal, making it	We have modified section 4.6.2.1 to indicate that NorthernStar would minimize impacts on whales by contractually requiring that the LNG carriers travel in a defined area that would narrow to 10 nautical miles in width between 126

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Due to the length of the Columbia Riverkeeper comment letter (comment letter CO11), we have summarized the issues raised and include them in the following table along with our responses. A copy of the complete letter follows the response table.

Comment Number	Comment (Summary)	Response
	extremely difficult to assess vessel strikes.	degrees (west of the toe of the continental slope) to the marshalling area off the mouth of the Columbia River. Also we are recommending that NorthernStar coordinate with the NMFS to determine appropriate LNG carrier speed and seasonal restrictions, or other applicable measures, to avoid or minimize impacts on whales.
CO11-11	The draft EIS ignores the Palomar Pipeline as a connected action.	As discussed in further detail in section 3.1.2.2, we consider the Palomar Project to be a separate undertaking from the Bradwood Landing Project. Neither project is inter-dependent on the other. The two projects can be considered as competitors to supply natural gas from different sources to the same market. The FERC intends to do an independent environmental review of the Palomar Project. See our response to comment PM1-24.
CO11-12	An inadequate analysis of alternatives has been given due to the unreasonably narrow definition of the purpose and need of the project.	As indicated in sections 1.1 and 3.1, the primary objective of the Bradwood Landing Project is to provide a new source of natural gas to the Pacific Northwest through the importation of LNG. In order to accomplish that objective, NorthernStar would need to interconnect with the existing Williams Northwest jurisdictional interstate system, and the existing system of Northwest Natural, which is the nonjurisdictional LDC for northern Oregon and southern Washington. Related to that objective would be the ability to directly serve industrial customers in the Pacific Northwest, such as the Georgia-Pacific paper mill at Wauna, Oregon and the PGE Beaver Power Plant at Port Westward.
CO11-13	There are cleaner, safer, and more affordable energy alternatives.	See our response to comment PM1-12. Natural gas is the cleanest burning fossil fuel. Its affordability will vary with market conditions. See our responses to comments CO8-1 and CO8-2. As explained in section 4.11, natural gas is safe.
CO11-14	Evidence is not provided to support the conclusion that LNG is an economically reasonable source of gas supply for the region.	Market conditions will dictate whether LNG is economical in any given year. As indicated in section 1.1, NorthernStar believes that imported LNG can compete with domestically produced natural gas.
CO11-15	How would the siting of an LNG terminal, in the Lower Columbia act to stimulate or encourage the development of electrical power generating facilities and other energy intensive industries?	One of the goals of the Bradwood Landing Project is to supply natural gas to the Beaver Power plant. As discussed in section 1.1, natural gas is growing as the fuel of choice for electric generation plants because it produces less air emissions than other fossil fuels, such as oil or coal. The conversion of power plants from oil or coal to natural gas could have benefits in terms of better air quality, and lower production of GHG.
CO11-16	The DOE estimates there are decades of natural gas remaining in North America.	The supply and demand for natural gas is discussed in sections 1.1. It has been estimated that there are about 1,191 Tcf of recoverable natural gas reserves in the United States. However, it may not be possible to extract that gas and transport it to markets in the Pacific Northwest in the near future.
CO11-17	The EIS does not consider an alternative that would remove impurities (non-methane components) from the LNG.	See response to comment PM1-22.
CO11-18	How would the proposed project be consistent with Oregon's renewable	We discuss Oregon's renewable energy standard in section 3.1.1.2 of the EIS.

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Due to the length of the Columbia Riverkeeper comment letter (comment letter CO11), we have summarized the issues raised and include them in the following table along with our responses. A copy of the complete letter follows the response table.

Comment Number	Comment (Summary)	Response
	energy standard and how could it increase political pressure to weaken the standard to allow for greater combustion of gas?	In an editorial that appeared in The Oregonian newspaper on April 27, 2008, Gregg Kantor, President of Northwest Natural, indicated that renewable energy sources currently account for only 4 percent of Oregon's electricity, and new supplies of natural gas from imported LNG are needed in the near future to bridge the energy gap until Oregon's goal is reached of having 25 percent of its energy produced from renewables by 2025.
CO11-19	The EIS does not consider the Palomar pipeline as an alternative to the proposed sendout pipeline.	As discussed in section 3.1.2.2, the proposed Palomar pipeline would not be a substitute for the proposed Bradwood Landing sendout pipeline; but can be viewed as a newly proposed system that would provide an alternative path for gas supplies to reach markets.
CO11-20	The FERC should more thoroughly evaluate Rockies gas as an alternative, including the Bronco and Ruby pipelines.	The Rockies and Bronco pipelines have been analyzed as system alternatives to the proposed project in section 3.1.2.2.
CO11-21	The draft EIS does not evaluate a range of projections for Canada's natural gas exports to the United States.	Sections 1.1 has been revised to present predictions for future production of natural gas in the WCSB and potential export volumes to the Pacific Northwest.
CO11-22	The EIS should consider potential LNG terminal sites in northern California because a large proportion of the natural gas from the project is planned to go to California.	A large portion of natural gas from the project is not planned to go to California. We considered LNG import terminals in California as alternatives discussed in section 3.1.3.3.
CO11-23	The alternatives section does not justify why open-cut methods are being used to cross waterbodies in some areas.	As discussed in sections 2.4.2.2 and 4.3.2.4, the standard waterbody crossing method is the open-cut method. However, NorthernStar would use the HDD or conventional bore method to cross sensitive waterbodies.
CO11-24	The FERC did not consider a smaller sized facility or smaller sized LNG carriers as alternatives.	Section 3.1.6 of the EIS discusses alternative LNG terminal designs. We feel that NorthernStar's proposed LNG terminal is the smallest footprint feasible to meet its economic and engineering design objectives. An operating terminal covering only 40 acres would be smaller than many other existing and proposed LNG terminals in the United States.
CO11-25	The EIS dismisses alternative regasification strategies.	See our response to IND107-4.
CO11-26	The EIS does not provide adequate analysis of its major pipeline route alternatives.	The analysis of major pipeline route alternatives considered numerous factors (see table 3.1.3-1). We do not believe that any of the alternative routes offer an environmental advantage over the proposed pipeline route.
CO11-27	The dredge disposal alternatives analysis is inadequate.	We believe the various dredge disposal alternatives were analyzed adequately to determine that the proposed action of placing the dredged material at the terminal site and at the Wahkiakum County Sand Pit is a reasonable and environmentally sound alternative.
CO11-28	The alternatives analysis is inadequate and fails to consider reasonable alternatives that would avoid impacts on aquatic ecosystems.	We evaluated a variety of alternatives but did not find any feasible alternatives that had clear environmental advantages over the proposed project and that could meet all of the project objectives.
CO11-29	There are inconsistencies (e.g., with respect to wetlands) between the alternatives analysis in the draft EIS and the JPA and JARPA.	NorthernStar used different assumptions while calculating impacts to wetlands than we did. For example, it did not include permanent impact acreages with its

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CO11-30	The EIS should evaluate alternatives in light of SIGTTO standards.	temporary impact acreages, whereas our temporary impacts include the permanent impacts. The SIGTTO standards are taken into consideration and implemented as appropriate.
CO11-31	Due to the nature of this facility and its regional location the following geologic hazards were inadequately addressed. <ul style="list-style-type: none"> • Poor foundation soils that have potential to undergo liquefaction. • Volcanism • Seismicity • Tsunamis • Landslides/Rock fall/Debris flow • Slope stability • Shoreline erosion • Subsidence 	See our responses to comments SA1-4, SA1-92, and SA1-100 through SA1-112.
CO11-32	Evaluate OBE and SSE for magnitude 8.0 to 8.5 earthquakes not on the Cascadian Subduction Zone.	The OBE and SSE design response spectra were established per the requirements in the 2001 NFPA 59A standard. In their seismic analysis, URS (2006a) determined that the largest earthquakes producing the largest ground motions at the terminal site would occur on the CSZ. Therefore, the OBE and SSE are based on earthquakes that would occur on the CSZ.
CO11-33	The draft EIS failed to analyze: the adverse impacts on the location, structure, and dynamics of aquatic communities; shoreline and substrate erosion and deposition rates; the deposition of suspended particulates; the rate and extent of mixing of dissolved and suspended components of the waterbody; and water stratification.	The EIS discusses the impacts of dredging on the benthic community at the LNG terminal site as well as indirect impacts on the aquatic resources that forage on benthic species. We also addressed turbidity, sedimentation, and water quality issues associated with dredging.
CO11-34	The draft EIS fails to assess how aquatic life in the estuary will be harmed by the resuspension of contaminated sediments into the water column.	Based on the results of sampling and analysis of the sediments proposed for dredging, aquatic life would not be harmed by the resuspension of contaminated sediments into the water column.
CO11-35	The draft EIS fails to analyze what will be done with any possibly contaminated water from dredging activities.	Based on the results of sampling and analysis of the sediments proposed for dredging, contaminated water would not be generated during dredging activities.
CO11-36	The draft EIS fails to analyze whether the maintenance dredging is realistic, (i.e. NorthernStar predicts it will need to dredge every 2 – 4 years. However, maintenance dredging is required if the turning basin or channel fills in with 1 foot of sediment.)	The frequency of maintenance dredging is an estimate based on modeling. Permits, which require environmental review, would be obtained from the COE for maintenance dredging.
CO11-37	The draft EIS fails to consider the stability of the dredge side slopes.	We have confirmed with the COE that a side slope of 1 (vertical) to 3 (horizontal) is appropriate for the river sediments in the area of the LNG terminal. See also the response to comment IND82-3.

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CO11-38	The draft EIS failed to qualify how 0.5 percent spillage of sediments during dredging was ascertained.	WEST (2006) determined the spillage rate in its hydrodynamic and sediment transport assessment for the dredging of the ship berth and maneuvering area.
CO11-39	The draft EIS indicates that phytosterols were found in the proposed dredge sediments but fails to analyze the effects phytosterols will have upon aquatic organisms if the phytosterols are released from dredge material.	The relatively low TOC content of the sediments within the dredge prism suggests a limited potential to mobilize phytosterols from the sediments during dredging or from the leave surface during operation of the facility.
CO11-40	The draft EIS failed to produce a plan for contaminated sediments and water from dredging activities.	Based on the results of sampling and analysis of the sediments proposed for dredging, such a plan is not necessary.
CO11-41	The draft EIS does not analyze the capacity of the Wahkiakum County Sand Pit site, or show that the site will be able to accommodate all the dredged materials from initial dredging as well as future maintenance dredging.	The final EIS has been revised to reflect that NorthernStar would place less dredged material at the Wahkiakum County Sand Pit site, up to the amount of capacity that is available.
CO11-42	Bradwood should be required to conduct soil contaminant testing in areas likely to be disturbed during construction by clearing, grading, or excavation activities before any construction ensues.	Prior to construction, NorthernStar would prepare a CMMP that would specify the procedures to identify, characterize, and properly manage potentially contaminated materials.
CO11-43	The draft EIS fails to adequately evaluate the potential for releasing contaminants from the soil during Bradwood road construction.	See our response to CO11-41.
CO11-44	The draft EIS states that the infiltration capacity of the soils will be sufficient for the water to percolate into the ground before running off into the river, but does not provide support for these statements with any reference to calculations or other scientific evidence.	An assessment of the permeability of the soils at the site is based on the geotechnical analysis of the site performed by URS as detailed in "Final Geotechnical Report, Proposed LNG Import Terminal, Bradwood Oregon, 2005" available on the FERC's eLibrary. .
CO11-45	The study conducted by Bradwood to analyze the contamination in the sediments had a flawed design. The replacement cores were lost, and not enough information on these replacements was provided. It should be required that Bradwood not only redo sampling, but analyze individual samples without compositing.	We are satisfied that the sampling and analysis of the sediments at the LNG terminal site met the objectives of the study and provided sufficient information to properly evaluate the materials to be dredged. The sampling and analysis plan was approved by the RMT and we do not believe the deviations from the work plan adversely affected the study results.
CO11-46	The draft EIS does not adequately describe how impacts of dredging are being mitigated.	Some of the impacts of dredging, such as increased turbidity, are short-term and localized and do not require mitigation. We have included new text in section 4.1.3.3 regarding NorthernStar's plan to monitor shorelines in the area of the LNG terminal to determine if dredging has contributed to shoreline erosion and implement mitigation measures if necessary. Furthermore, we added a recommendation that NorthernStar monitor the side slopes of the maneuvering basin for lateral migration and implement slope protection measures if necessary.
CO11-47	Additional pollutants such as excess total organic carbon and total volatile solids were not addressed in the draft EIS.	The total organic carbon and total volatile solids content are an indication of organic matter in the sediments; they are not pollutants.
CO11-48	The Mitigation Plan on file for this project is insufficient. An updated and detailed mitigation plan to account for the full scope of the project	NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan provides details on different BMPs in wetlands and waterbodies. This document is available for viewing by the public on the FERC's Internet web

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	<p>including the following should be provided:</p> <ul style="list-style-type: none"> What will the final effects of the proposed project be? Provide more detail about how the mitigation measures would be required and if they are not required what basis FERC relies on to assume that they would actually be implemented. 	<p>page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e. CP06-365), and putting in the proper date range. As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. The revised plan will be submitted to the NMFS and FWS as part of the FERC's BA and EFH Assessment.</p>
CO11-49	The listing of BMPs to be used in the ESC Plans is inadequate for a proper analysis of the probative value of the proposed sediment control measures.	NorthernStar has indicated that it would follow applicable state and local sediment control measures. Furthermore, NorthernStar has agreed to follow the FERC staff's Procedures. In addition, we have recommended that NorthernStar revise its pipeline ESC Plan and SWPPP to include measures from the FERC staff's plan that would provide greater protection.
CO11-50	The draft EIS claims that any scale and sediments in the water from the pipeline hydrostatic testing will be filtered out by straw bales, but provides no basis for the accuracy of this statement.	Because clean, new pipe would be used for the pipeline, no measureable scale or sediment is expected to be produced from the hydrostatic testing.
CO11-51	The Mitigation Plan will be insufficient to mitigate the adverse impacts of the filling of the log pond. A more thorough analysis concerning the filling of the log pond should be provided.	As described in section 2.1.5, NorthernStar is currently revising its Compensatory Mitigation Plan. The revised plan will be submitted to the NMFS and FWS as part of the FERC's BA and EFH Assessment.
CO11-52	The draft EIS failed to consider the impacts from terminal construction on the changes in salinity gradient, nutrient balance, dissolved oxygen balance, and how these changes will adversely affect communities of aquatic life, introduce populations of nuisance organisms, modify habitat, reduce food supply, restrict movement of aquatic fauna, and change the adjacent upstream and downstream areas.	<p>We believe that sections 4.3.2.3 and 4.5.2.1 adequately discuss the potential impacts of construction and operation of the LNG terminal on water resources and aquatic resources, respectively. However, additional information on these topics will be included in the revised BA and EFH Assessment.</p> <p>Section 4.5.2.1 has been revised to reflect the extent of saltwater intrusion into Columbia River. The additional dredging that would occur for the terminal area would be an approximate 0.1 percent increase to the existing dredged navigation channel from the mouth of the Columbia River to Portland. Therefore, effects to saltwater intrusion along the Columbia River are not expected to be significant.</p>
CO11-53	The draft EIS fails to analyze how water temperature will be changed due to increases in turbidity and how any changes in water temperature resulting from increased turbidity due to dredging activities will exacerbate the ODEQ 303 (d) water quality limited status of these waters. How will dredging affect the dissolved oxygen?	As described in the COE's SEIS for the Columbia River Channel Improvement Project, "Navigation channel dredging... would not result in significant water quality impacts. Dredging of fine-grained organic rich sediments could result in limited short-term elevations of chemicals and possible decrease in dissolved oxygen in the immediate area of the dredging." Impacts from the significantly smaller area that would be dredged for construction of the terminal berthing area would also not be expected to be significant.
CO11-54	The draft EIS does not provide any information on the accuracy of turbidity models.	The EIS is a summary document. An assessment of the accuracy of turbidity models is outside the scope of this EIS.
CO11-55	The draft EIS fails to consider the impact on water quality and the fact the proposed dredging, filling, and pipeline construction will cause violations of both Oregon's and Washington's numeric and narrative water quality standards, including harming designated uses.	Potential impacts on water quality due to construction activities associated with the LNG terminal are described in sections 4.3.2.2 and 4.3.2.4, respectively. As described in table 1.3-1, NorthernStar would obtain section 401 water quality certificates from the ODEQ and the WDE demonstrating that the discharges

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		associated with the project comply with federal and state water quality standards.
CO11-56	The draft EIS does not assess the impacts that the lateral pipelines and power line will have on water quality.	The lateral pipelines are non-jurisdictional facilities that would be constructed by parties other than NorthernStar. No information is available on the routes in order to assess impacts at this time. Additional information discussing the potential impacts on water quality due to construction of the power line has been included in section 4.3.2.2.
CO11-57	The procedures for dechlorination of the hydrostatic test water being discharged back into the river are vague and insufficient to evaluate the procedure proposed.	See our response to comment FA1-12.
CO11-58	The draft EIS fails to assess the impact of permanently filling at least 14 acres of estuarine and freshwater wetlands at the terminal site, and the impact of destroying the log pond habitat.	Section 4.4.1.2 includes a discussion of both temporary and permanent impacts on wetlands at the LNG terminal site, including the log pond. Potential impacts on aquatic resources due to habitat modification at the LNG terminal site are discussed in sections 4.5.2.1 and 4.6.2.2.
CO11-59	The draft EIS fails to consider that construction activities, including terminal construction, replacement of the Hunt Creek Bridge, power line construction, relocation of the railroad tracks, and temporary parking lot construction, will destroy acres of vegetation. The draft EIS fails to adequately analyze the full scope of vegetation removal on surrounding habitats, and the problems associated with revegetating areas in the vicinity of the project site.	The total acres of vegetation impacted by construction and operation of the LNG terminal and associated facilities are provided in table 4.4.2-1. It is important to note that the railroad realignment, widening of Bradwood Road, and Hunt Creek Bridge replacement are included in the total acreage impacted. In addition, specific impacts on vegetation due to construction and operation of the LNG terminal are described in section 4.4.2.2. We believe that our analysis of potential impacts on vegetation, including revegetation, due to construction and operation of the LNG terminal is adequate.
CO11-60	The draft EIS fails to adequately analyze the quantity and type of vegetation to be destroyed as a result of construction activities at and around the proposed terminal site, road improvements, construction of temporary roads, or other various acts of construction.	See our response to comment CO11-58.
CO11-61	The draft EIS fails to take into account the difficulty of establishing some species of trees that will be removed during construction.	Section 4.4.1.2 has been revised to include additional information describing the proposed monitoring at the LNG terminal site to ensure survival and to verify that success criteria are met in areas planted for site restoration and compensatory mitigation.
CO11-62	The vegetation that will be cleared may be disposed of by being burned; the draft EIS does not discuss this source of pollution.	As stated in section 4.4.2.3, no trees, slash, or woody vegetation would be burned during construction of this project.
CO11-63	The draft EIS failed to consider the impacts to the changes in salinity, nutrient balance, dissolved oxygen balance, turbidity, temperature and how these factors will influence the aquatic wildlife.	See our responses to comments CO11-51 and CO11-52.
CO11-64	The draft EIS fails to analyze the effect of light pollution, and fish entrainment during dredging activities.	Section 4.5.2.1 includes a discussion of the potential impacts on aquatic resources due to terminal lighting and entrainment due to dredging activities.
CO11-65	The combination of losing shallow water habitat from dredging and losing shallow water habitat from filling wetlands will be a devastating hit to the	As described in section 4.3.2.3, no shallow water habitat would be impacted by dredging activities. However, potential impacts on aquatic resources due to

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	estuary ecosystem. The EIS must analyze the habitat loss of the dredge and fill cumulatively.	habitat modification are discussed in section 4.5.2.1.
CO11-66	The dredged hole at the head of the Clifton channel will cause a decrease in the velocity of the water which will harm salmon by increasing the travel time for smolts traveling to the ocean. The draft EIS fails to discuss how dredging and the project overall will affect salmon recovery.	Any decrease in velocity associated with dredging at the head of Clifton Channel would be localized to a relatively small area in relation to the migration path, and resulting impacts on travel time due to any decrease in velocity are not expected to have a significant impact on juvenile salmonid out-migration.
CO11-67	The draft EIS does not analyze the impacts of fish entrainment due to dredging.	Section 4.5.2.1 (see <i>Impacts on Aquatic Resources, In-water Construction Activities, Dredging, Entrainment</i>) describes the potential for small fish to be entrained during dredging operations. NorthernStar would minimize fish entrainment during dredging activities by keeping the cutterhead within 3 feet of the river bottom and conducting dredging activities during specified in-water work window when the densities of fish in the project area is lowest.
CO11-68	The draft EIS ignores the impacts of wave action on salmon stranding outside the terminal area.	See our response to comment FA2-19.
CO11-69	The draft EIS fails to adequately consider the impact to the millions of individuals of salmon, sturgeon, lamprey, and other resident species that utilize this area as habitat at various times in their lifecycles. This project will destroy habitat for 13 ESUs of Columbia and Snake River salmon that are threatened under the ESA.	Because the EIS is a summary document, we believe that the level of detail provided in sections 4.5 and 4.6.2 on the potential impacts from the proposed project on aquatic resources (including salmonids) is adequate. However, as they relate to federally listed species and designated critical habitat, these topics will be addressed in additional detail in the revised BA and EFH Assessment.
CO11-70	The draft EIS does not adequately describe the nature and effectiveness of the SEI, or alternatives to the SEI.	See our response to comment FA4-12.
CO11-71	The introduction of invasive species may harm the aquatic ecosystem.	Section 4.5.1.1 has been revised to include additional information on the potential for introduction of aquatic species to the lower Columbia River system.
CO11-72	The draft EIS does not adequately address the monitoring for the presence of pinnipeds and fails to discuss conditions under which more than one monitor could be used, under what conditions monitoring activities will be sufficiently doubtful to stop pile driving, and the methods Bradwood will use to monitor small and elusive marine mammals, such as harbor seals.	See our response to comment FA2-28.
CO11-73	Removal of vegetation near the shorelines of the Columbia River and Hunt Creek during construction activities will also adversely affect aquatic species by removing a source of food.	Potential impacts on aquatic resources due to habitat modification are discussed in section 4.5.2.1.
CO11-74	The draft EIS does not adequately describe how controlling noxious weeds will directly benefit salmon and offset the type of impacts the project will have at the site where terminal construction and dredging will destroy dozens of acres of critical habitat.	See our response to comment FA3-3.

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CO11-75	The draft EIS fails to consider that a 25 percent increase in deep draft vessels due to the LNG terminal will increase the risk of vessel strikes to marine mammals and sea turtles.	Section 4.6.2.1 discusses the potential for increased ship strikes to both sea turtles and marine mammals as a result of increased vessel traffic during operation of the Bradwood Landing Project.
CO11-76	The release of contaminated water back into the river can be highly toxic to aquatic life. The draft EIS fails to assess the complete impact of contaminants (including but not limited to metals) on salmon, macro-invertebrates, and other aquatic life.	Although discharges into the Columbia River would meet ODEQ standards and NPDES permit requirements, the long-term bioaccumulative effects of pollutants on fish, humans, and other wildlife resulting from construction and operation of the Bradwood Landing Project can not be characterized with the best available science. Bioaccumulative effects can result from a variety of physical, chemical, and biological processes. However, the concentration of contaminant levels reported in section 4.2.2.2 of the EIS does not indicate a significant biological effect is likely.
CO11-77	The wetland fill at the LNG terminal will degrade the habitat used by birds, amphibians, mammals, and invertebrates.	We agree that filling of wetlands at the LNG terminal site would result in a loss of potential habitat for both aquatic and terrestrial wildlife. However, only about 13 acres of wetlands would be permanently filled at the Bradwood Landing LNG terminal, and NorthernStar will be required to mitigate for permanent impacts on wetland habitats through the implementation of its final Compensatory Mitigation Plan. See also the response to comment FA2-10.
CO11-78	The draft EIS fails to analyze adequately the impact on protected wildlife habitat in the Julia Butler Hansen Wildlife Refuge, Lewis and Clark Wildlife Refuge, and Fort Stevens State Park.	Additional information has been added to sections 4.5.1.1 and 4.5.2.1 regarding potential impacts on unique and sensitive wildlife habitats, including the JBHNWR, LCNWR, and Fort Stevens State Park.
CO11-79	The draft EIS fails to consider that noise impacts from construction activities may disturb various birds, including the Bald Eagle, and other animals, like the Columbia white-tailed deer, and cause them to avoid the areas impacted.	Sections 4.5.2.3 and 4.6.2 describe potential impacts on terrestrial wildlife due to construction and operation of the LNG terminal.
CO11-80	The pipeline construction will disrupt fish passage by damming the streams during the trenching and pipeline placement.	Potential impacts on aquatic resources due to pipeline construction are discussed in section 4.5.3.1.
CO11-81	If a frac-out should occur during pipeline boring or HDD, bentonite will be introduced into the waterway. Bentonite smothers fish habitat and fouls streams.	We believe that NorthernStar's HDD Contingency Plan adequately addresses potential modes of failure for each phase of the drilling process as well as mitigation measures for frac-outs to waterbodies.
CO11-82	The draft EIS fails to mention the behavioral modifications to salmonids and other organisms in the area due to noise impacts underwater.	Potential impacts on aquatic resources (including salmonids) due to increased noise levels during construction of the proposed LNG terminal are discussed in section 4.5.2.1.
CO11-83	The analysis for the Columbian White-tailed deer fails to account for fragmentation of habitats between population pockets in the estuary. The draft EIS fails to analyze the potential of fragmentation on terrestrial organisms that migrate through the region.	See our response to comment FA4-6.

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CO11-84	The draft EIS fails to consider the harm to multiple ESA-listed mammals and turtles including: green leatherback, loggerhead and olive ridley sea turtles; blue, fin, humpback, north pacific right, sei, killer, and sperm whales; and Steller sea lions.	Potential impacts on federally listed species are discussed in section 4.6.2. More specifically, potential impacts on federally listed sea turtles, whales, Steller sea lions, and other marine mammals (i.e., harbor seals and California sea lions) along the waterway for LNG marine traffic are discussed in section 4.6.2.1. Potential impacts on Steller sea lions and other marine mammals potentially occurring at the LNG terminal site are described in section 4.6.2.2.
CO11-85	The draft EIS has failed to consider the cumulative economic effect of Bradwood on the fishing industry and communities dependent upon the fishing economy. The direct harm to fish will harm the fishing industry, as will the lack of access to traditional fishing areas.	Section 4.12 of the EIS describes the potential cumulative impacts from the project in relation to other past, present, and future projects. As discussed in section 4.12.4, because recreational users of the Columbia River have always had to account for industrial and commercial ship traffic, no significant additional cumulative impacts on these activities are likely.
CO11-86	The draft EIS fails to analyze the economic impact, including the cumulative economic harm due to the delay on the importers and exporters of goods, producers, and consumers.	See our response to PM2-19.
CO11-87	The draft EIS fails to consider that dredging will adversely affect the commercial and recreational fishing industry, both vital components of the Clatsop County and State economy. The 24-hour per day dredging will completely block access to the traditional fishing grounds at the head of the Clifton Channel, and may block Clifton Channel, for several months. The LNG tankers will block access to traditional fishing areas along the entire length of the river as well.	Although dredging would occur 24 hours per day, 7 days per week for a period of approximately 48 to 72 days, it is important to note that the dredge would be operating throughout the 46-acre dredged footprint during that time. Potential impacts on commercial and recreational fishing could occur due to dredging activities; however, it is not anticipated that impacts would be isolated on any area for the entire 48- to 72-day period during which dredging would occur.
CO11-88	The draft EIS must consider the advantage of the 35 full-time jobs and the short-term construction jobs versus the detriment to the existing industry in Clatsop County and the State. The draft EIS fails to consider the risk to the multiple industries and municipalities.	We do not believe operation of the proposed project would adversely affect other industries in the project area. Our discussion of potential socioeconomic impacts associated with the proposed project is included in section 4.8.
CO11-89	The LNG tankers and terminal will disrupt the tourism and real estate industries, and burden local communities.	As discussed in section 4.8.1.8, we believe the proposed project would not have a significant impact on tourism in the project area.
CO11-90	The draft EIS fails to consider that construction activities at the proposed Bradwood LNG terminal will substantially increase traffic and decrease safety on Clifton Road.	Potential impacts on Clifton Road and NorthernStar's proposed mitigation measures to reduce impacts are discussed in section 4.8.2.7. Clifton Road is now planned to be widened to 24 feet with 2-foot shoulders on each side.
CO11-91	No consideration was taken for other disenfranchised communities, especially senior citizens and the physically disabled. What percentage of impoverished and/or minority groups would be relevant for a consideration to be made on the impact on those communities?	As discussed in sections 4.8.1.9, 4.8.2.9, and 4.8.3.9, low-income and minority populations would not be disproportionately affected by the proposed project. Executive Order 12898 does not establish a specific threshold (percentage) of minority or low income populations for assessing environmental justice impacts.
CO11-92	Was public notice and documentation of this project provided for the Hispanic, non-English speaking, population?	We did not identify a need to publish notices in Spanish, because the project area does not contain a large Hispanic population, as noted in section 4.8 of the EIS.
CO11-93	How many condemnation actions are expected on both the proposed northern pipeline and on the Palomar pipeline? What is the projected total loss in property value that the proposed pipeline right of way would	Our discussion of condemnation and potential impacts on property values is included in section 4.8.3.3. Even when eminent domain is authorized, in practice it is rarely used. For example, a large natural gas pipeline currently

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	cause as a result of loss of currently allowed uses along the pipeline?	under construction in the Midwest crossed the property of 1,746 landowners. Eminent domain was exercised to acquire land rights to only nine parcels. See also the response to CO11-12.
CO11-94	<p>The draft EIS fails to include discussion of the project's conflict with federal, state, and local plans, policies and controls. The following need to be addressed:</p> <ul style="list-style-type: none"> Conflicts with County land use plans. Conflicts between the Bradwood pipeline and Cowlitz County laws that protect natural resources, economics, and public safety. Conflicts between the Bradwood project and Oregon law and policies, such as: <ul style="list-style-type: none"> the Statewide Planning goal 16, the noncompliance with Oregon's implementation of the CWA's waste water permitting program under CWA section 402 the conflict with Oregon's obligation to certify a project as consistent with water quality standards under CWA section 401 the conflict with Oregon's duty to evaluate whether a water appropriation should be granted by the Water Resources Department the conflict with Oregon's duty to protect the public interest when leasing state land Conflict with federal laws: <ul style="list-style-type: none"> Conflict with the CWA section 404 dredge and fill permit. Conflict with the Endangered Species Act of 1973 	<p>Our discussion of the proposed project's consistency with local plans, policies, designations, and guidelines is included in sections 4.7.2.2 and 4.7.3.2. Because Clatsop County accepted NorthernStar's zoning changes, there is no longer a conflict with Oregon State Planning Goals at the LNG terminal. With regard to Cowlitz County, Washington, see our response to comment PM4-12. As discussed in section 1.3.11, the FERC encourages cooperation between applicants and state and local authorities, and we expect the project sponsors to submit applications for necessary permits. However, this does not mean that state and local agencies, through application of state and local laws, may prohibit or unreasonably delay the construction or operations of facilities approved by the Commission. Further, state and local permits must be consistent with the conditions of any authorization the Commission may issue. There are no identified conflicts with other federal laws, such as the CWA and the ESA. The COE has responsibility for reviewing the JPA and JARPA for consistency with section 404 of the CWA. As described in section 4.6.1.1, the FERC is responsible for complying with the ESA, and submitted a BA and EFH assessment to the FWS and NMFS that we are currently revising. We have recommended a condition in section 5.2 that NorthernStar may not start construction until the FERC has completed formal consultations with the NMFS and FWS.</p>
CO11-95	Further consideration of historic sites such as the LCNHT, Hunt Lumber Mill, historic shipwrecks and site 35CO16 should be made.	We and the Oregon SHPO agree the project would have no adverse effects on the LCNHT. As explained in section 4.9.1.1, it is highly unlikely that LNG marine traffic in the waterway would have any adverse impacts on shipwrecks that are listed or qualify for listing on the NHPA. As discussed in section 4.9.4, we have not yet completed compliance with the NHPA. We have recommended a condition that NorthernStar must provide the results of additional investigations, including data about the Hunt Lumber mill and site 35CO16, for our review and approval, before construction could begin,
CO11-96	Complete section 106 of the NHPA for the entire project prior to the final EIS being published.	It is not necessary that the FERC resolve issues related to the identification of historic properties and assessment of project effects prior to the issuance of our final EIS. It is standard FERC practice to complete compliance with the NHPA after an Order is issued, but before we allow construction to begin. This is because cultural resources inventories cannot be done on lands where access was previously denied until after an Order, when the company could use the power of eminent domain to acquire its pipeline right-of-way easement. Our recommended condition in section 4.9.4 ensures that the FERC will be able to

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		consult with the SHPO and review and approve additional cultural resources investigations and plans that would address potential project impacts on cultural resources.
CO11-97	The draft EIS fails to assess the impacts of imported natural gas with a Wobbe index higher than the domestic natural gas historically used in Oregon.	See our response to comment PM1-22.
CO11-98	The draft EIS fails to adequately assess the emissions of air pollutants, including greenhouse gases, from the project.	Section 4.10.1 includes information on the estimated emissions generated from the construction and operation of the project. Section 4.10.1 of the final EIS has been updated to clarify key assumptions used as the basis for the emissions estimates from the project and to include emissions of GHG.
CO11-99	The draft EIS fails to adequately assess air quality impacts resulting from the emissions associated with the proposed project.	See our response to comment SA4-11.
CO11-100	The draft EIS fails to adequately evaluate possible mitigation measures to be implemented to reduce air emissions generated from the project.	Section 4.10.1 includes a discussion of the project emission sources, regulatory requirements, and proposed mitigation measures to be implemented in order to reduce air emissions and minimize impacts.
		See our response to comment SA1-87 for additional information.
CO11-101	The draft EIS does not include adequate discussions of the health effects for the air pollutants that would be emitted from the proposed project.	General information related to the health and environmental impacts of the air pollutants that would be emitted by the project during construction and operation, which are regulated by the EPA, ODE, and ODEQ, are widely available to the public. Information specifically related to the proposed project impacts is included in Section 4.10.1.
CO11-102	The draft EIS fails to consider the direct, indirect, and cumulative safety impacts that the project would have related to the LNG tankers, LNG terminal facility, and pipelines that would be associated with the project.	We believe that the safety impacts of the project, including the marine waterway, LNG terminal, and pipeline, have been adequately addressed in the final EIS and the WSR (Appendix G). Reliability and safety is discussed in section 4.11. Section 4.11.5 discusses safety impacts associated with LNG tankers, section 4.11.4 discusses safety impacts of the LNG terminal, and section 4.11.9 discusses safety impacts of the associated pipeline.
CO11-103	Has it been acknowledged that LNG sources that could be used to supply the Bradwood terminal may contain contaminant gas concentrations that exceed 15 percent of the total LNG?	Natural gas is pretreated before liquefaction to remove contaminants at the export terminal before it is shipped. See our response to PM1-22 and PM6-79.
CO11-104	The draft EIS fails to describe what the potential effects of a leak caused by brittle fracture could be and what the resulting effects would be on sensitive resources including humans and onshore structures.	Section 4.11.4 includes a discussion on thermal exclusion and vapor dispersion zones for the onshore facility. Thermal exclusion zones for the onshore LNG tanks are calculated based on 49 CFR 193 and NFPA59A, 2001 edition. Section 4.11.5.3 discusses the hazards associated with a release of LNG from an LNG carrier for varying spill sizes and also includes a discussion on cascading damage due to brittle fracture. It also identifies the zones of concern, the communities located in the zones of concern, and what the potential effects associated with a spill would be in those zones of concern

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Due to the length of the Columbia Riverkeeper comment letter (comment letter CO11), we have summarized the issues raised and include them in the following table along with our responses. A copy of the complete letter follows the response table.

Comment Number	Comment (Summary)	Response
CO11-105	What would the vapor cloud dispersion distance be if wind speeds were 10 mph or other higher wind speeds that would result in a greater dispersion of a vapor cloud?	For the DEGADIS model, farther downwind vapor dispersion distances are produced at lower wind speeds. Increasing the wind speed also changes the stability class and will result in a shorter dispersion distance.
CO11-106	The draft EIS assumption that the outer tank wall would effectively contain LNG lacks a reasonable basis in fact.	As discussed in section 4.11.3, the LNG storage tanks would be full containment tanks. The inner tank would be constructed of 9 percent nickel steel and the outer tank would be constructed of pre-stressed concrete. Both of those materials are designed to withstand cryogenic temperatures and are not prone to brittle fractures.
CO11-107	If an LNG vapor fire ignited on a roofless LNG storage tank, as appears to be presumed in the draft EIS, how long would such a fire burn?	The fire duration would be dependent on a number of factors, including the amount of LNG inside the tank. A full LNG storage tank has enough fuel to potentially burn for up to 2 days, which is similar in total duration compared to oil tanks.
CO11-108	There is a failure to consider or disclose the flammable nature of insulating foam on LNG tankers.	As discussed in section 4.11.5.3, fire-induced damage to foam insulation which could lead to cascading damage was evaluated in the Sandia Report and, while possible under certain conditions, is not likely to involve more than two or three cargo tanks
CO11-109	What would the effects of a cascading fire event on a LNG tanker be from perspective of impacts to humans, private property, and infrastructure on shore? What would the effects of a cascading fire be on the type of 200,000 cubic meter tanker that would be used at Bradwood? How long would a cascading fire on such a tanker likely burn and what would the resulting on-shore effects be?	Section 4.11.5.3 discusses the hazards associated with a release of LNG from an LNG carrier for varying spill sizes and also includes a discussion on cascading damage due to brittle fracture. Cascading events are not expected to increase the overall fire hazard by more than 20 to 30 percent but would increase the expected fire duration by approximately 2 to 3 times according to Sandia. The Coast Guard has limited the size of arrivals until modeling is performed on the larger carriers.
CO11-110	Failure to evaluate an Emergency Response Plan and emergency response capabilities of local emergency responders. There are currently inadequate emergency response assets available to respond a serious event involving a LNG tanker.	See our responses to comments PM1-1 and PM1-15B. NorthernStar is currently in the process of developing its ERP and filed a draft ERP for the FERC's review on March 24, 2008.
CO11-111	The draft EIS fails to consider the cost to the local communities for emergency response and increasing the capabilities of emergency responders.	See our response to comment CO11-110. As discussed and recommended in section 4.11.6, the ERP must include a Cost Sharing Plan which must be approved by the FERC before any final approval to begin construction. If the needed resources are not available and properly funded, construction and operation of the project would not be approved by the FERC.
CO11-112	Failure to consider the effect of Astoria's extensive docks structure over the Columbia River in causing a potential explosion of gas vapors.	Section 4.11.1 discusses the hazards associated with LNG and section 4.11.5.3 discusses the hazards associated with a release of LNG from an LNG carrier for varying spill sizes. It also identifies the zones of concern, the communities located in the zones of concern, and what the potential effects associated with a spill would be in those zones of concern throughout the entire waterway.

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Due to the length of the Columbia Riverkeeper comment letter (comment letter CO11), we have summarized the issues raised and include them in the following table along with our responses. A copy of the complete letter follows the response table.

Comment Number	Comment (Summary)	Response
		including Astoria
CO11-113	Does the proposed site-specific location of the proposed facility make it any more vulnerable to intentional terrorist attacks that could be launched from a shoreline that in many locations is just a few hundred feet from the path of LNG tankers? As a part of this analysis, please discuss the justifications for security exclusion zones on either side of LNG tankers that are typically 1,500 feet.	Terrorist attacks were examined by the Coast Guard during their review. The Coast Guard has determined that the Columbia River would be safe for LNG marine traffic under the conditions described in its WSR. Based on their review, the Coast Guard's WSR establishes a 500-yard (1,500-foot) moving safety/security zone around the LNG carriers.
CO11-114	The draft EIS fails to address the risks of the Palomar pipeline.	See our response to comment CO11-11.
CO11-115	In the event of either an accidental or intentional breach of a LNG tanker, what would be the resulting damage with respect to loss of human life, injuries to humans, damage to private structures and infrastructures, along the tanker's path?	Section 4.11.5.3 discusses the hazards associated with a release of LNG from an LNG carrier for varying spill sizes. It also identifies the zones of concern, the communities located in the zones of concern, and what the potential effects associated with a spill would be in those zones of concern throughout the entire waterway.
CO11-116	The draft EIS significantly underestimates both the thermal radiation and vapor dispersion risks associated with the proposed terminal.	Section 4.11.4 includes thermal exclusion and vapor dispersion calculations which were done in accordance with 49 CFR 193 and NFPA 59A.
CO11-117	The draft EIS modeling of the LNG terminal risks also improperly assumes that should the integrity of the onshore LNG tanks, inlet, or outlet lines be compromised, that gaseous vapors from the spilled LNG would not mix with air thus reducing the vapor dispersion distance.	See our response to comment CO11-116.
CO11-118	It is a concern that due to the high pressure un-odorized gas pipelines, with a blast zone of over 1,400 feet, hundreds of homes, businesses, farms and other sensitive facilities would be at risk.	The safety of natural gas pipelines is addressed in section 4.11.9.
CO11-119	Why would the proposed gas line not be odorized? What would be the cost of adding odor to the line? How would the unodorized gas decrease detection of gas leaks along the Williams pipeline that the proposed northern pipeline would connect to?	See our response to comment PM5-81.
CO11-120	The draft EIS fails to analyze the potential risks of onshore leaks due to chemical composition of the natural gas from the proposed project.	See our response to comment PM1-22. Pipeline safety is addressed in section 4.11.9.
CO11-121	The draft EIS failed to analyze the cumulative effects of the Bradwood dredging, taking into account the channel deepening, increased ship traffic from both the channel deepening and the LNG tankers, the increase erosion from both projects, increased wave action, dredge disposal, and geomorphic and hydraulic changes.	Section 4.12 on cumulative effects does discuss the COE channel deepening project. Based on the COE's EIS, the channel deepening project is not expected to result in increased ship traffic. Dredging for the channel deepening project in the area of the LNG terminal would be completed before construction would begin on the Bradwood project. We are continuing to study the issue of shoreline erosion and will further discuss impacts in the BA and EFH Assessment.
CO11-122	What are the direct, indirect, and cumulative effects of increased industrialization that would be encouraged by the siting of one or more LNG terminals in the Lower Columbia River? Please include impacts to	Section 4.12 on cumulative effects discusses the potential for multiple LNG import terminals located along the lower Columbia River. However, it is purely speculation that several LNG terminals would lead to any more industrial development in the region than can be related to the mills at Longview and

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Due to the length of the Columbia Riverkeeper comment letter (comment letter CO11), we have summarized the issues raised and include them in the following table along with our responses. A copy of the complete letter follows the response table.

Comment Number	Comment (Summary)	Response
	air, water, fish, wildlife, humans, traffic, noise, lights and other impacts.	Wauna or the facilities at the Port Westward Industrial Area.
CO11-123	The draft EIS fails to assess the cumulative impact of destroying critical habitat on salmon, and on the economy and ecology of the estuary and the Columbia River Basin.	Section 4.12 on cumulative effects does discuss impacts on aquatic resources, including salmon. All federally regulated projects would need to obtain permits from the COE if they impact wetlands, and would have to comply with the ESA. The COE, NMFS, and FWS would require mitigation to compensate for wetland loss, and lessen impacts on federally-listed threatened and endangered species and their critical habitats. Those mitigation measures may result in habitat improvements for salmon and the estuary.
CO11-124	The draft EIS failed to analysis the increase in development pressures on the lower Columbia River.	See our response to CO11-122.
CO11-125	The draft EIS completely fails to consider the effects that massively increasing the gas supply in Oregon, California, and Washington and the west coast generally would have on incentives for conservation, efficiency, and renewable development.	Increased efficiency and conservation is discussed in section 3.1.1.2. Renewable energy resources are discussed in section 3.1.1.3. As explained in section 1.1, bringing in new sources of natural gas by importing LNG would diversity the energy portfolio of the Pacific Northwest, meet future demands, and may work to stabilize natural gas and electric prices. It would not necessarily reduce the incentive to conserve or develop additional renewable resources. The goals mandated by Oregon's Renewable Energy Standard would not be diminished. See our response to comment CO11-18.
CO11-126	The draft EIS failed to analyze the indirect effect of LNG creating additional gas-fueled power plants, which will decrease the demand for renewable energy, thereby hindering efforts to combat global warming and hindering the economic opportunities that renewable energy has brought to the Pacific Northwest, such as investments in wind, wave, and solar energy.	As mentioned in section 1.1, even without imported LNG on the West Coast, there has been a trend for increasing use of natural gas to fuel electric power plants. This trend would continue, with or without LNG, because natural gas has less air emissions than other fossil fuels, such as oil or coal. Therefore, providing more supplies of natural gas by importing LNG may result in environmental benefits, by helping to reduce GHG and global warming in the future if new or retrofitted power plants used natural gas instead of oil or coal. As discussed in section 3.1.1.3, it is not currently possible for renewable resources to produce the level of energy equivalent to the Bradwood Landing Project. As discussed in sections 1.1 and 3.1.1 of the EIS, the denial of the LNG project may hinder economic opportunities for the Pacific Northwest. However, it is beyond the scope of the EIS to address indirect effects the Bradwood Landing Project may have on creating additional gas-fired power plants, since details are unknown, including the number or location of such speculative plants.
CO11-127	Specific findings on the potential impacts of the project on: physical substrate; water circulation, fluctuation, and salinity; turbidity; contaminants; aquatic ecosystems and organisms; disposal sites' cumulative effects on the aquatic ecosystems; and secondary effects on the aquatic ecosystems need to be provided. The draft EIS fails to assess adequately the tremendous impacts on human environment.	Section 4.12 of the EIS describes the potential cumulative impacts from the project in relation to other past, present, and future projects. The known impacts that are described individually for these various topics in the EIS are not expected to result in significant cumulative impacts. Therefore, we believe that our analysis of cumulative impacts as it relates to these topics is adequate.
CO11-128	The analysis of projects in the Lower Columbia River by CRK's Brett VandenHeuvel should be reviewed and its contents considered and discussed in the context of cumulative impacts on air quality, energy use,	Mr. VandenHeuvel's analysis is available for viewing by the public on the FERC's Internet web page at www.ferc.gov , through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e.

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Comment Number	Comment (Summary)	Response
CO11-129	GHG emissions and their related impacts, including human health and environmental impacts.	CP06-365) and putting in the proper date range.
	The draft EIS fails to include a cumulative impacts analysis of the proposed Palomar Pipeline.	The Palomar Pipeline is included in our cumulative impacts analysis in section 4.12.

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December 21, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

RE: Comments on Draft Environmental Impact Statement, Bradwood Landing Project, FERC/EIS-0214D, Docket Nos. CP06-365-000, CP06-366-000

Ms. Bose,

We submit these comments on the Draft Environmental Impact Statement ("DEIS") Bradwood Landing Project ("Bradwood"), FERC/EIS-0214D, Docket Nos. CP06-365-000, CP06-366-000, on behalf of the following organizations: Columbia Riverkeeper, Columbia River Business Association, Rivervision, Waiilatpu Friends of the River, Landowners and Citizens for a Safe Community, Oregon Chapter Sierra Club, Willapa Hills Audubon Society, Oregon Citizens Against the Pipeline, Friends of Living Oregon Waters, Coalition, Northwest Environmental Defense Center, Willamette Riverkeeper, Rosemead Neighborhood Association, Audubon Society of Portland, Oregon Council Trout Unlimited, Native Fish Society, Citizens for a Clean Columbia Wenatchee, Columbia River Fishermen's Protective Union, Northwest Guides and Anglers, Oregon Wild, and Energy Options (collectively, "the Coalition"). The Coalition includes a broad, local and regional spectrum of business, environmental, safety, and property interests. Each organization has members who would be harmed by LNG terminal.

FERC must circulate a new DEIS

We request that FERC issue a supplemental DEIS for public comment because the current DEIS is wholly inadequate. The DEIS contains major factual errors, fails to address substantial changes to the project, fails to address reasonable alternatives, ignores the Palomar Pipeline as a connected action, and fails to evaluate significant economic, social, and environmental consequences. These errors cannot be correct in the final EIS. FERC's regulations require FERC to supplement the inadequate DEIS, and circulate the supplement draft for public comment. 40 C.F.R. § 1502.9(c).

NEPA requirements

NEPA "is our basic national charter for protection of the environment." *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1216 (9th Cir. 1998), quoting 40 C.F.R. § 1500.1(a). "NEPA was passed by Congress to protect the environment by requiring that federal agencies carefully weigh environmental considerations and consider potential alternatives to the proposed action before the government launches any major federal action." *Lands Council v.*

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Powell, 395 F.3d 1019, 1026 (9th Cir. 2005). The purpose of NEPA is to ensure "that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts; it also guarantees that the relevant information will be made available to the larger [public] audience that may also play a role in both the decisionmaking process and implementation of that decision." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

The Council on Environmental Quality ("CEQ") has promulgated regulations that bind federal agencies implementing NEPA. *Sierra Club v. U.S. Forest Serv.*, 843 F.2d 1190, 1193 (9th Cir. 1988). "The procedures prescribed both in NEPA and the implementing regulations are to be strictly interpreted 'to the fullest extent possible' in accord with the policies embodied in the Act." *Id.* (citing *California v. Block*, 690 F.2d 753, 769 (9th Cir. 1982)).

Two primary purposes of the DEIS are: 1) to ensure that the Federal agency implementing an action undergoes a thorough and objective investigation of the likely impacts of the action to the environment, and 2) to disclose to the public and encourage public scrutiny of any action likely to affect the environment before such action is executed. 40 C.F.R. § 1500.1(b) (2006). Adequate public disclosure by the EIS requires a full and accurate disclosure of all likely environmental impacts. *Baltimore Gas and Electric Company v. NRDC*, 462 U.S. 87 (1983). In satisfying the NEPA requirements for an EIS, a Federal agency must include the purpose and need for the action, analyze direct and indirect environmental and economic impacts of the action and any reasonable alternatives to the proposed action, and evaluate the effectiveness of anticipated mitigation measures. Additionally, a consideration of the cumulative impacts of all reasonably foreseeable actions must be included for a full analysis of direct and indirect environmental and economic impacts. 42 U.S.C. § 4332.

Full and Accurate Disclosure

FERC has continually failed to disclose a full and accurate description of the project to the public. Bradwood has submitted contradictory information in its applications to other local, state, and federal agencies, and the inability of FERC to address these concerns in the DEIS problematic. FERC can not make a full and accurate disclosure to the public until Bradwood clarifies the true scope and goals of the project and submits consistent application materials to all permitting agencies.

The inconsistent information submitted by Bradwood at various stages of the FERC process precludes adequate participation by the public. Today, the Bradwood LNG project ("project")¹ proposal dramatically differs from the project evaluated in the DEIS. In addition to precluding public review in contravention of the requirements of NEPA, the inconsistent information submitted by Bradwood prevents FERC from producing a valid final EIS. The everchanging proposal and the differing impact analyses also raises questions about the veracity of the information submitted by Bradwood. Bradwood should not be allowed to submit alternate plans for the Bradwood LNG project with various local, state, and federal agencies and FERC

¹ As used throughout these comments, "project" includes all aspects of the LNG importation, including but not limited to ocean transport, river transport, terminal construction and operation, pipeline and construction and operation.

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should abstain from further evaluation or decision making concerning the project until these uncertainties are resolved. To comply with NEPA, FERC must publish for public comments a supplemental EIS that describes the current project proposal prior to the final EIS. FERC cannot proceed to the final EIS because the project has substantially changed since the DEIS was published.

NEPA grants the public a right to review the current project, not a dramatically different project, which has changed after the publication of the DEIS. Without consistent information, the public cannot evaluate and effectively comment on the project proposed by Bradwood. Due process requires the ability to **effectively** participate, not just submit comments on a former project design. FERC also requires current information to fulfill the NEPA requirements of a thorough investigation of all the direct and indirect environmental and economic impacts likely to occur.

In addition to basing the DEIS on the inconsistent information submitted by Bradwood, FERC has failed to meet the full and accurate disclosure requirements of NEPA by not including the environmental and economic impacts of the whole project. In the DEIS, FERC must analyze the full scope of the project, including connected actions that are closely related to the project. 40 C.F.R. § 1502.4(a). In determining what actions to include in a single EIS, the CEQ regards actions as connected when they "[a]utomatically trigger other actions which may require environmental impact statements," "[c]annot or will not proceed unless other actions are taken previously or simultaneously," or "[a]re interdependent parts of a larger action and depend on the larger action for their justification." *Id.* § 1508.25(a). FERC has failed to assess the impacts of the proposed Palomar Pipeline Project ("Palomar"), which is discussed in detail below, in the Bradwood Landing DEIS, a portion of which will not proceed unless the Bradwood LNG Project is successfully completed. Because a portion of the Palomar Pipeline will not happen unless the Bradwood LNG Project is completed, FERC must include the environmental and economic impacts of that project in the DEIS.

Number of LNG Storage Tanks

Bradwood has presented inconsistent information in various regulatory contexts concerning the number of LNG storage tanks proposed. In applications submitted to Clatsop County, the State of Oregon, and the Army Corps of Engineers ("Corps"), Bradwood admits to pursuing a Bradwood LNG terminal designed for three storage tanks. Specifically, Bradwood states "[t]he terminal is designed for three tanks with a nominal storage capacity of 160,000 m³, for a total nominal LNG storage capacity of 480,000 m³" in application materials submitted to Clatsop County, OR.² Yet, the DEIS states that the project will have two LNG storage tanks. DEIS at ES-2; 2-20 ("LNG unloaded from the ships would be stored in two 160,000-m³ storage tanks).

Bradwood is designing the facility for three storage tanks. In fact, Figure 2.1.3-1 in the DEIS clearly shows the LNG terminal is designed for a third tank. Additionally, FERC acknowledges the terminal will have a potential to deliver 1.3 bcf/d, which would likely require a

² In Bradwood Landing LLC Narrative in Support of Applications for Local Approval of the Bradwood Landing LNG Terminal and Associated Facilities at 9.

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third tank. DEIS at 1-1. A third tank will substantially change the safety, environmental, and economic impacts of the project, and FERC should take this into account in evaluating the project. FERC's failure to address the third tanks is a major oversight.

A three tank design will increase the overall LNG storage capacity of the terminal from the 320,000 m³ contemplated in the DEIS to an actual 480,000 m³. The increase in storage of large volumes of LNG changes the safety considerations involved with the project. Not only is there an increased chance of an accident, natural disaster, or equipment failure leading to a breaching of a tank as a result of there being one additional tank, the larger amount of flammable gas may enhance catastrophic events, changing blast radius dynamics and endangering even more people, vegetation, and wildlife in the area.

Construction of an additional tank will also add to the noise, light, and water pollution of the Bradwood LNG project, both in the short-term and the long-term. Short-term construction activities for a third tank will require more noise producing activities, increased opportunities for polluted storm water runoff in to the Columbia River, and increased light pollution for security and construction activities. In the long-term, additional SCV units will be necessary with a third LNG tank, leading to more air pollution and water pollution through discharge of low pH, chlorinated, high temperature, and toxic water into the Columbia River, endangering aquatic animals and vegetation. Furthermore, the visual aesthetics will be fundamentally changed, with three large tanks blocking views and degrading the beauty of the location to an even further extent, in addition to increased lighting for security purposes.

Another long-term aspect of an increased storage capacity of the terminal caused by a three tank design not evaluated by FERC is an increase in ship traffic. The DEIS states that 125 ships will visit the site per year with varying LNG carrying capacities, but an increase of storage capacity due to the terminal design of three tanks instead of two will require more ships. Increasing the number of ships visiting the site will have substantial impacts upon the environment, economy, and safety of the region. Increasing ship traffic to more than 125 vessels per year will cause environmental harm through increasing shoreline erosion, decreasing water quality by re-suspending sediments due to wake turbulence, and harming aquatic life through vessel strikes, ballast intakes, and other harmful ship effects such as stranding. Economic harm will also result from an increase in ship traffic because other vessels must yield to the tankers to ensure the safety zone requirements are met. This will cause considerably more disruption to commercial fishing and recreation on the lower Columbia River, wasting valuable time of commercial fishermen or driving valuable business away from recreational areas. Finally, increased LNG ship traffic will amplify the safety concerns of the project. More ships will enhance the chances of a catastrophic accident or event by increasing the likelihood for vessel collisions, underwater obstacle strikes, terrorist attacks, equipment failure, and various other dangers.

FERC must assess these environmental, economic, and safety issues pertaining to a three tank design in the EIS. According to materials submitted with other applications, Bradwood is in fact actively seeking to build a facility designed for three tanks and an output of 1.5 billion cubic feet per day ("bcfd"). Although FERC acknowledges Bradwood may seek to expand the facilities in the future, and notes that any such expansion would require further applications and a

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supplemental EIS for approval, FERC should address a possible third tank now because Bradwood has made clear that it intends to construct the third tanks and has, in fact, submitted regulatory applications that contain the third tank.

At the least, FERC should require Bradwood to clarify its goal and objectives for the project and suspend further consideration until confusion over the discrepancies is dispelled. Even if Bradwood does not plan to install a third tank in the initial phase of construction, FERC should still address the third tank in its cumulative effects analysis in the EIS because it is reasonably foreseeable that Bradwood will install a third tank given the design and their actions of submitting application materials describing a third tank. Furthermore, the mitigation plan on file for the Bradwood LNG project is insufficient to support the current project as described by FERC, not to mention a three tank design and increased ship traffic. Bradwood should be required by FERC to submit an updated and detailed mitigation plan to account for the full scope of the project so that it may be evaluated properly in the EIS.

Size of the Ships

Not only are there discrepancies regarding the number of tanks to be used in the Bradwood LNG project, but application materials submitted by Bradwood and the information used in the DEIS also disagree about the size of the LNG ships that will transport LNG to the proposed Bradwood terminal. The DEIS at 2-3 states that ships ranging in size from 100,000 to 200,000 m³ will transport LNG to the terminal. Contrary to the DEIS, application materials submitted to Clatsop County, State of Oregon, and the Army Corp of Engineers suggest a ship size up to 220,000 m³. For instance, application materials submitted to Clatsop county state that "[i]n order to accommodate the full range of LNG carriers that will serve the terminal, the berth and a contiguous turning basin are designed for LNG carriers with a capacity ranging from 100,000 to 220,000 cubic meters (m³)."³ Therefore, contrary to the assumed ship sizes evaluated in the DEIS, Bradwood is seeking to design the facility for the use of ships up to 220,000 m³.

A number of impacts that the DEIS failed to address will occur as a result of the use of larger ships. Larger ships will increase wake and draft disturbance, erosion impacts, the likelihood of vessel strikes and collisions, likelihood of shoaling, and the amount of water withdrawn from the river to fill ballast tanks. Safety issues also arise because an extra 20,000 m³ of LNG would increase the blast radius if a catastrophic event occurred. Additionally, the Bradwood LNG terminal is being designed based on receiving these larger ships. Could the berth design and dredging activities be scaled back to help mitigate the impacts of the project on the environment if smaller ships only ranging up to 200,000 m³ are used? A berth design and larger turning basin for larger ships are unnecessary unless Bradwood does in fact intend to receive the larger ships at the terminal. If smaller ships than 220,000 m³ are used, will more ship traffic be necessary to meet the needs of the terminal? FERC must address these issues in the DEIS. The DEIS should evaluate the environmental and economic impacts of using ships up to 220,000 m³ in size because Bradwood is actively seeking a berth and turning basin design for these larger ships based on application materials submitted to other local, state, and federal agencies. Furthermore, FERC should evaluate the impacts of increased maintenance dredging in

³ In Bradwood Landing LLC Narrative in Support of Applications for Local Approval of the Bradwood Landing LNG Terminal and Associated Facilities at 6.

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the DEIS, because larger ships will require more maintenance dredging to avoid shoaling or striking underwater obstacles.

Pipeline Projects

The DEIS fails to take into account the Palomar Gas Transmission Project ("Palomar") pipeline, which is dependent upon the completion of Bradwood and, therefore, FERC fails to analyze and disclose the full scope of the Bradwood project. NEPA requires that actions "which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement." 40 C.F.R. 1502.4(a). An EIS is required to consider actions that are "interdependent parts of a larger action and depend on the larger action for their justification." *Id.* § 1508.25(a)(1). The test the Ninth Circuit has used to determine if an action is interdependent with a proposed agency action is the "but for" causation test. *Sierra Club v. Marsh*, 816 F.2d 1376, 1387 (9th Cir. 1987). Under this test, an action is interdependent upon the proposed agency action if but for the proposed action the other action would not occur. *Id.*

Palomar is a joint venture of NW Natural and TransCanada and is designed to diversify the natural gas market in the Western United States. The proposed Palomar Project is a project interdependent upon the Bradwood LNG Project. Although the Palomar claims that the eastern portion of the Palomar Project may proceed regardless of whether the Bradwood LNG Project is completed, the western half of the proposed Palomar Project would not occur but for the Bradwood LNG Project. In fact, Greg Kantor, president and chief operating officer for NW Natural, has stated that the Palomar "project is being designed so that, if an LNG terminal is constructed on the Columbia River, the Palomar pipeline can be extended to serve it." This illustrates that the Palomar project is dependent upon the building of an LNG terminal such as the proposed Bradwood terminal on the Columbia River. Furthermore, Bradwood and FERC have not demonstrated a market in Oregon and the Pacific Northwest for another 1.3-1.5 bcf of natural gas.

Bradwood will likely need the Palomar Project for the Bradwood to be economically viable since the Palomar Project will allow Bradwood to tap into other markets in the Western United States. Therefore, the Palomar Project is an interdependent action with the proposed Bradwood Project. The Palomar Project is also a reasonably foreseeable action, not an action that is purely speculative. In fact, as of October 29, 2007, the Palomar pipeline has been deemed sufficiently foreseeable that FERC has issued a notice of intent to produce an EIS for the project.

Given that NW Natural is Bradwood's agent for building the pipeline for the Bradwood LNG Project, it is likely that NW Natural and Bradwood had planned from the beginning of designing the Bradwood Project for a connection to the Palomar Project. The fact that FERC is allowing Bradwood and NW Natural to stagger the two projects as if they are not interdependent is unacceptable. It is true that there have been plans for years to build the Palomar pipeline segment leading from TransCanada's GTN pipeline system to somewhere south of Molalla in Clackamas County. However, it is also true that the second segment of the proposed Palomar Project was not designed until recently, specifically after Bradwood designed the Bradwood LNG Project. How could there have been plans for the western segment of the Palomar Project before the Bradwood Project when there was no Bradwood LNG terminal to which a connection

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could be made? Bradwood and NW Natural should not be allowed to separate a pipeline project clearly connected with the Bradwood Project into another project just to avoid the analysis of additional environmental impacts for the Bradwood Project in this EIS.

Because the Palomar Project is connected to and dependent upon the completion of the Bradwood LNG terminal, FERC should analyze the environmental and economic impacts of the segment of the Palomar Project leading to the proposed Bradwood LNG terminal in this DEIS. The pipeline segment at issue is proposed to be 102.5 miles long leading from the Molalla Lateral interconnect to the Bradwood Landing pipeline. This proposed 102.5 mile long 36-inch natural gas pipeline fundamentally changes the scope of the project. The pipeline will cross miles of wetlands and sensitive habitats, not to mention crossing private property and disrupting landowner's uses of their own properties. Many landowners will lose the right to use their lands for economic benefit because of the easements associated with the proposed Palomar Pipeline. Construction of the pipeline will lead to large amounts of timber harvesting through forested areas, destroying bird nesting areas and causing fragmentation of critical habitats for a variety of species. Many threatened or endangered plant species are also located in the area and construction activities will destroy many of these plants. Additionally, construction through wetlands will cause pollution to the streams through increased sedimentation, temperature increases, and introduction of pollutants such as gasoline and oil. Many of these streams are considered critical habitat for a variety of fish and construction activities would put these fish at greater jeopardy.

Noise, air, and light pollution will also result from construction activities, operation, and maintenance of the Palomar pipeline, further exacerbating the already substantial environmental impact of the Bradwood LNG Project. FERC should take all these factors associated with the Palomar Pipeline under consideration in the DEIS and not allow a project clearly associated with the Bradwood LNG Project to be staggered for analysis in a different EIS. The environmental impacts of the Bradwood LNG Project must be considered as a whole, which includes assessment of at least the western segment of the Palomar pipeline leading to the proposed Bradwood LNG terminal. Any omission of the impacts of the Palomar pipeline would be a failure on the part of FERC to fully and accurately disclose the full scope of the Bradwood LNG Project.

Due to the DEIS's failure to adequately explain the currently proposed project and failure to adequately assess obvious impacts and connected actions (e.g. Palomar Pipeline, tanker characteristics), FERC must prepare and circulate a revised draft. 40 C.F.R. § 1502.9(a). In addition, FERC "shall prepare supplements to either the draft or final [EIS] if: (i) the agency makes substantial changes in the proposed action that are relevant to environmental concerns; or (ii) there are significant new circumstances or information relevant to environmental concerns bearing on the proposed action or its impacts." 40 C.F.R. § 1502.9(c). These comments provide multiple examples of changes in the proposal and significant new information that requires FERC to supplement the DEIS.

FERC does not provide an adequate analysis of alternatives

Overview of Alternatives Analysis

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A critical component of the FERC's EIS process is its alternatives analysis. NEPA mandates that an agency "shall to the fullest extent possible: Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment." 40 C.F.R. §1500.2(c). The agency must also: "Study, develop, and describe appropriate alternatives to the recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses available resources as provided by section 102(2)(E) of ... 40 C.F.R. §1501.2(c)."

In order to issue the permit, the FERC has the burden of demonstrating that reasonable alternatives—including alternative sites—have been considered thoroughly. This section will demonstrate that FERC's alternative analysis does not even come close to evaluating a reasonable range of alternatives. In fact, there are multiple alternatives to satisfy the basic project purpose without disturbing special aquatic sites.

The purpose of Bradwood is to provide natural gas to the western markets. As such, there are a myriad of alternatives to accomplish this purpose. The primary flaw with FERC's alternatives arguments is that FERC claims the terminal must be in the Columbia River to serve customers in Oregon and Washington. The true destination of the vast majority of this gas is California. Therefore, the Columbia River location is not necessary. This opens up multiple reasonable alternatives, including siting an LNG terminal in California closer to the end users. In addition, energy conservation and efficiency is a preferable practicable alternative that FERC dismisses without justification. Offshore LNG terminals are also practicable alternatives. Furthermore, multiple design changes at the Bradwood site itself offers less harmful practicable alternatives.

The FERC does not provide sufficient reasoning or detail to justify its dismissal of many design and project alternatives that could have a less adverse impact on the aquatic ecosystem. In particular, there is little consideration of the relative costs, technologies, and logistics in the alternatives disregarded by the EIS. Many alternatives exist in the Western energy market that could provide cleaner, safer, more affordable energy without the enormous negative impact to the Lower Columbia River. Bradwood has not met its burden of overcoming the presumption that practicable alternatives exist.

The FERC also mischaracterizes the overall project purposes. The scale of the project alone clearly indicates that the proposed terminal will serve a West Coast-wide energy market. Bradwood's likely connection to the proposed Palomar pipeline, which connects Bradwood to the California market, indicates that the purpose of the project is to serve a region-wide demand, including California. Bradwood attempts to obfuscate this broader project purpose in order to avoid discussion of the most obvious alternative – siting the project in closer proximity to its target market in California.

There is no proven "need" for the project in the Pacific Northwest. The alternatives analysis rests, in part, on the assumption that LNG is a vital resource for the future of the Pacific NW. Yet, the analysis provides no impartial information showing need in the Pacific NW that matches the enormous scale of the Bradwood proposal. This overarching problem renders the

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alternatives analysis highly suspect, and any range of alternatives must be evaluated in a West Coast-wide context, and one that fully acknowledges the potential of the proposed Palomar pipeline to connect the Bradwood Project to regional markets.

The FERC has failed to undertake an adequate analysis of alternatives because of an unreasonably narrow definition of the purpose and need of the project which FERC then uses to dismiss reasonable alternatives. The DEIS states, "The purpose of the Bradwood Landing Project is to provide a new source of natural gas to the Pacific Northwest through importation of LNG" (DEIS, 1-3). The purpose of the project should be more broadly stated in terms of supplying the region with natural gas, an analysis for which FERC would include detailed consideration of non-LNG alternatives.

FERC further describes key objectives as supplying industrial and generation facilities in the Lower Columbia, supplying Mist directly with natural gas, and providing gas supply to the Pacific NW region via its interconnect with Williams NW pipeline (DEIS, 1-3). FERC presumes that failure to meet these objectives through importation of LNG will result in the objectives not being met, that no North American gas alternatives can fill these needs through existing infrastructure. However, these primary project objectives do not require a project of the size and scope of the Bradwood LNG terminal, and multiple pipelines already supply these gas users from existing infrastructure and supplies. The main proposed conduit of this gas to the Pacific NW market, the Williams NW pipeline system, cannot currently accommodate the huge quantities of gas that Bradwood seeks to import.

Industrial users and electricity generation in the Lower Columbia, by Bradwood's own estimates, are only likely to use 100 mmcf/d on an average day⁴. ODOE questions even this assumption, noting that operators of natural gas plants in the area are not planning to absorb LNG, currently.⁵ Williams pipeline company has indicated that it does not have capacity to absorb all of Bradwood's gas, and that Bradwood will likely have to rely on the Bradwood pipeline in the future.

FERC does not justify the enormous size and impact of its project, and thus does not demonstrate that more moderate developments (gas storage, conservation, efficiency measures) are not practicable alternatives to meet the modest growth in Pacific NW gas demand. Oregon Department of Energy ("ODOE") recently commented, in its draft comments on the FERC DEIS, "The DEIS provides no independent assessment of the demand for LNG to justify the need for the proposed project."⁶ ODOE's comment highlights widespread skepticism about FERC's characterization of the purpose and need for its project.

Furthermore, FERC relies heavily on data from the Northwest Gas Association ("NWGA"). The NWGA's members include NW Natural gas, a partner and likely future owner of the Bradwood pipeline and proponent of the connected Palomar project. The NWGA data cannot be considered unbiased, as preliminary comments on the DEIS of the Oregon Department of Energy have noted: "The [demand] analysis is based entirely on NWGA forecasts. No

⁴ Joint Aquatic Resources Permit Application, Attachment H, October 2006.

⁵ ODOE, Dec. 2007. Preliminary State Agency DEIS comments, at 64.

⁶ Id.

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independent assessment of demand. No consideration of demand side reductions."⁷ Other State agencies have raised similar concerns with the FERC DEIS – a document whose alternatives analysis is more extensive than the Alternatives analysis in the Army Corps application but is still deficient.

NOAA has also added its own reservations about the purpose and need of the project, raising the following questions regarding whether the alternatives analysis is artificially constrained in order to justify a high-impact project: "As the stated objective is providing the Pacific Northwest with another natural gas source, it would appear additional data from the region is warranted."⁸ Given broad skepticism about the need for the proposal, the no action alternative may result in the natural gas needs of the Pacific Northwest and California being met and should constitute a practicable alternative. FERC gives very little consideration to the potential for no action.

While the project configuration and pipeline routing are purportedly designed to match the needs of Lower Columbia industrial and electricity generation users, some of those users do not appear to be planning for LNG. For example, comments of ODOE indicate that Port Westward is not factoring LNG into its gas supply needs. PGE, which owns generating facilities there, is not necessarily going to buy large quantities of LNG.

Delivery of gas to the PGE power plants at Port Westward is not a compelling reason to select the preferred pipeline route over alternatives. In the Oregon EFSC review of the Port Westward power plant, PGE did not assume that LNG would be available. PGE also did not assume the availability of LNG in its integrated resource plan review before the Oregon Public Utility Commission.⁹

The Bradwood project is clearly designed to meet its expectation of West Coast-wide energy demands – not those of the Pacific Northwest. FERC's assertion that key project objectives involve delivery of gas to Mist and Columbia River industrial/generation users is severely undermined by the fact that less than 1/10 of the project would currently be likely to go to these users.¹⁰ The quantity of gas proposed for import by Bradwood (1.3 bcf/d) more than doubles Oregon's average daily natural gas use.¹¹

The enormous size of the project shows that a major economic driver for the project is California gas demand, rather than Oregon's or Washington's. California consumes as much gas as the rest of the West combined¹² (see below) and will likely receive most of Bradwood's gas, based on the recently proposed Palomar pipeline proposal (see attached maps). The Bradwood project not only seeks a connection to California's market via Palomar, but it also likely requires

⁷ ODOE, Dec. 2007. Preliminary State Agency DEIS comments, at 62.

⁸ NOAA comments on FERC DEIS, December 17, 2007.

⁹ ODOE, Dec. 2007. Preliminary State Agency DEIS comments, at 64.

¹⁰ Bradwood Landing 404 Application Attachment H, October 2006.

¹¹ Energy Information Administration. Natural Gas Summary Statistics. Oregon 2001-2006.

¹² EIA Natural Gas Use Summary Data, Dec. 2005. <http://eia.gov>. Quote from Loretta Lynch, former Chair of CA PUC under Gray Davis during Portland lecture on March 4 2007.

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additional pipeline capacity aside from the proposed Bradwood pipeline through Cowlitz County due to the capacity limitations on that pipeline (ICF International study for WA EFSEC).¹³



It is simply not credible for FERC to claim that its project will serve the Pacific NW alone. The Daily Astorian's interview with a Williams Pipeline representative demonstrates that the Williams Northwest Pipeline, which FERC claims will transport the majority of its gas, does not have room for Bradwood's gas. Williams recognized that the Palomar pipeline, which would take gas to California, is necessary for Bradwood.

Williams Northwest Pipeline spokeswoman Michele Swartz said her company doesn't have room for all the gas Bradwood plans to import to its Bradwood facility. 'It does make sense that they signed up on Palomar,' she said. 'Physically, we're capable of receiving it, but it would take the place ... of all the other gas supplies flowing in that system both north and south. We have long-term agreements in place. ... We're unlikely to disrupt the relationship we already have with our customers right now.' Even with the projected declines in supply from Canada and the Rocky Mountains, she said, there's not enough demand for gas in Oregon and Washington to absorb the full volume from Bradwood. But she said there is demand for that volume in California.¹⁴

¹³ ICF International. Nov. 2007.

¹⁴ "Who Knows Where the Gas Will Go?" Cassandra Proffitt. *The Daily Astorian*. Nov 27, 2007.

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Exhibit 2.1: Major Pipelines in the Pacific Northwest



Source: ICF International

Bradwood admits that it plans to use the proposed Palomar pipeline to deliver significant quantities of gas to potential customers in California, according to its S-1 filing submitted to the Securities and Exchange Commission.

In addition to the Bradwood Pipeline application, we have recently submitted a request for service to TransCanada and NW Natural for their open season under which they would construct, own and operate a pipeline that would connect the Bradwood terminal to Williams' Northwest pipeline at Molalla and TransCanada's GTN Pipeline near Madras. This will provide Bradwood and/or other shippers with gas transportation service from the LNG terminal to the pipeline systems of both the Northwest Pipeline Company and TransCanada's GTN Pipeline, which

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can deliver approximately 2.0 Bcf/d into Northern California at the Malin, Oregon interconnect point.¹⁵

Bradwood's SEC filing also touts Bradwood Landing's "convenient access" to the large "Northern and Southern California" gas markets in addition to referencing the smaller Northwest markets (SEC S-1 filing at 2). The SEC filing, submitted to investors, tells a completely different story than the 404 application or the DEIS, submitted to regulators. The SEC filing demonstrates that Bradwood's true intention is to serve California markets. Bradwood's attempt to hide this fact in its FERC application and the failure of the DEIS to consider Bradwood's California connection via Palomar severely undermines FERC's alternative analysis. Based on the true project purpose of serving gas to California, as admitted by Bradwood, the FERC should require Bradwood to submit a new alternative analysis to sufficiently assess the reasonable alternatives of this purpose. The FERC has the burden of assessing all reasonable alternatives. CEQ regulations state, at 40 CFR 1502.14: "(Alternatives shall) rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." Bradwood's likely use of the Palomar project – a pipeline that will likely send out the majority of Bradwood's gas on an average day in the West Coast energy market – should prompt FERC to assess West Coast-wide energy alternatives to LNG. The DEIS does not undertake a suitable analysis for this purpose.

Bradwood should be considered amidst a wide range of alternatives in the West Coast energy market – including conservation, efficiency, renewable energy, North American natural gas, and other LNG sites. All of these alternatives have potentially less severe impacts to the sensitive aquatic ecosystems in which they might occur. The unprecedented and severe impacts of the LNG proposal at Bradwood pose a huge risk to the aquatic environment, and the alternatives analysis is cursory and omits consideration of key alternatives. The FERC dismisses many of these alternatives based on the false assumption that they will not fulfill key project objectives that focus on Oregon and Washington.

The WA State Pipeline Capacity study, however, concludes that no LNG terminal will be viable in the Pacific NW without a pipeline connection to California:

Local load in the Pacific Northwest is too variable and not large enough to be economic for a LNG terminal. To site a terminal at a size that would be economic, at least 1 Bcf per day to start with, **access to Northern Californian markets would be necessary.**" (emphasis added).¹⁶

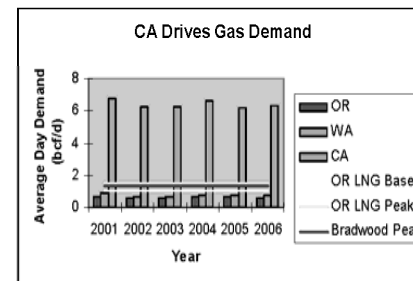
As noted in the pipeline capacity study (see figure above) and in the recent Daily Astorian article, the Williams pipeline is not capable of accommodating Bradwood's supply without vacating all of its current contracts for gas – a highly unlikely scenario. The pipeline currently operates near capacity, and long-term supply contracts render the current proposed

¹⁵ Bradwood 12/15/06 S-1 Registration filing with SEC, page 54 (emphasis added)

¹⁶ ICF International. Nov. 2007. Review of Pipeline Utility Corridor Capacity and Distribution for Petroleum Fuels, Natural Gas, and Biofuels in SW Washington. Submitted to WA State EFSEC. at 69.

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action potentially not viable. The alternatives analysis clearly should not have assumed that space will be available in the Williams system to absorb up to 1.3 bcf/d from Bradwood. Bradwood admits in its SEC filings that it seeks to use the Palomar pipeline to access California's gas market – and the use of the Palomar pipeline may be necessary for the project to even operate near capacity. Clearly, the Bradwood project must be considered in light of numerous alternatives throughout the West Coast due to Bradwood's stated intention of serving California and other West Coast markets in addition to the Pacific Northwest. The high unlikelihood of Bradwood's project operating as described (largely serving Williams NW pipeline) undermines the credibility of the current alternatives analysis, and certainly does not overcome the presumption that alternatives are available.



(Source: EIA. State Natural Gas Summary Data, 2006.)

Ultimately, the FERC must evaluate whether there are preferable alternatives to the Bradwood proposal in areas located closer to the largest target California market. The DEIS critiques potential LNG terminal locations south of the Columbia River for the length of their pipelines, saying that long pipelines render other LNG sites in the Pacific NW not practicable. FERC argues that Bradwood's proposed 36-mile pipeline is the least harmful. However, given the agreement between Palomar and Bradwood to deliver gas to the California energy market via a new 220-mile pipeline that cuts a swath across Oregon rivers, forests, and farms, FERC should acknowledge and evaluate potential alternatives that do not require extensive harm to resources in the Columbia River and all across Western Oregon. As FERC has repeatedly noted, the West Coast natural gas grid is interconnected, and FERC should evaluate whether alternatives to LNG, and whether other LNG sites, might accommodate future demands on the Western natural gas grid.

The Palomar Gas Transmission project (PGT) has also indicated in its own statements that the projects are intimately connected. Recent articles and statements in the FERC scoping hearings for the Palomar project indicate that the Western segment of the pipeline (or at least a significant portion of it) would only be constructed if the Bradwood project is approved. According to Chief Operating officer Gregg Kantor of NW Natural in a recent McMinville News-Register article, "This project is being designed so that, if an LNG terminal is constructed

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on the Columbia River, the Palomar pipeline can be extended to serve it.¹⁷ Mr. Sipes, representative of FERC, also indicated that the two projects were closely related during scoping hearings for the Palomar project. The FERC is asserting that the projects are “stand-alone”, yet Mr. Sipes and Palomar project representatives have plainly stated that all or a portion of the Western segment of the Palomar project depend on the approval of the Bradwood project.¹⁸

In addition, the FERC defines its project purpose too narrowly, and its alternatives evaluation incorrectly presumes that it is necessary to increase gas supply only through importing LNG, and ultimately only by importing gas into the Columbia River. If the purpose is properly defined as delivering clean, affordable energy into the West Coast market, many other alternatives are available – some of which, including continued or increased reliance on Rockies gas could fulfill all the project purposes. FERC persistently excludes many alternatives from detailed analysis because “of their distance to the target market to be served”, yet the primary target market for Bradwood’s gas is clearly California. Oregon PUC analyst, Ken Zimmerman, stated, “So far, the only people that have shown any interest in contracting with these LNG guys are in California.”¹⁹ Bradwood also acknowledged publicly in recent Clatsop County land use hearings that it already has an agreement to use the Palomar pipeline in the future – an agreement that has been described in Bradwood’s S-1 filing with the Securities and Exchange Commission in December 2006.

FERC does not adequately evaluate alternatives in conservation, efficiency, and renewable energy throughout the West Coast

The Bradwood analysis also fails to accurately assess non-LNG alternatives, such as conservation, efficiency, and renewable energy. In fact, the FERC alternatives analysis fails to acknowledge renewable energy and greenhouse gas emission laws that have recently been passed in Oregon, Washington, and California. These laws require a greater percentage of electricity generation to come from renewable sources, and the FERC alternatives analysis rests heavily on NWGA’s assumption that gas-fired generation will drastically increase. Because LNG is 25 percent more polluting than domestic natural gas in its lifecycle greenhouse gas emissions, FERC cannot assume that LNG has a place in an increasingly carbon-limited energy market.²⁰

Because avoiding the construction of the Bradwood LNG terminal, Bradwood pipeline, and Palomar pipeline would prevent severe damage to the aquatic ecosystem of the Lower Columbia, FERC should give more serious consideration to the impact of increasing reliance on renewable energy on the future of natural gas-fired electricity. The NW Power and Conservation

¹⁷ “Stage is Set For Big Pipeline Race.” David Bates. *McMinnville News-Register*. Aug. 7, 2007.

¹⁸ Transcripts of FERC scoping hearings for Palomar Gas Transmission Project. Statements made by Mr. Doug Sipes during meetings on Nov. 12 and 13 in Maupin and Molalla, Oregon, respectively.

¹⁹ “Pipeline Battle Hinges on Need, Livability.” Ted Sickinger. *The Oregonian*. August 21, 2007. Ken Zimmerman quoted as energy analyst for the Oregon Public Utilities Commission.

²⁰ Jaramillo et al. 2007. Comparative Life-Cycle Air Emissions of Coal, Domestic Natural Gas, LNG, and SNG for Electricity Generation. *Environ. Sci. Technol.*, 41 (17), 6290-6296.

see also Supporting Calculations document and application of Jaramillo study assumptions to a West Coast LNG facility in Powers 2007 study entitled *Smart Energy 2020*.

Also see Heede, Richard. May 2006. LNG Supply Chain Greenhouse Gas Emissions for Cabrillo Deepwater Port: Natural Gas From Australia to California. <http://www.edcnet.org/ProgramsPages/LNGrptplusMay06.pdf>

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Council concluded that wind power, conservation and efficiency are capable of meeting load growth and that existing natural gas supplies.²¹ Wind power, alone, has the potential to bring online and additional 5000 MW of generating capacity West of the Continental divide, according to NWPCC’s report.²² The FERC does not fully evaluate the severe environmental and economic costs of Bradwood’s project, and does not attempt to weigh the No Action alternative with readily available alternatives described in the Fifth Power Plan and elsewhere as required under NEPA. NEPA requires that reasonable alternatives be weighed in a logical manner with clear, reasoned criteria used to compare the different alternatives.

Oregon’s Department of Environmental Quality (DEQ) questions whether the impacts involved with Bradwood are necessary and without alternatives in renewable energy and conservation: “Decades of maintaining LNG facilities in Oregon to supply natural gas to California might not be justified, especially given Oregon’s policy to reduce reliance on non-renewable energy sources and the West Coast Governors’ goal to explore new renewable energy options on the coasts.”²³ Oregon’s Department of Land, Conservation and Development agrees: “There should be a rigorous analysis of alternatives and more consideration of conservation and renewable energy.”²⁴

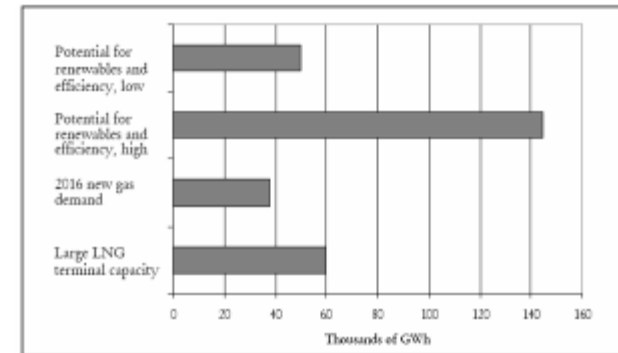


Figure 1. Energy Efficiency and Renewable Energy Potential vs. Natural Gas Demand

The Community Environmental Council in California has concluded that the need future LNG imports can be precluded economically by even a low estimate of energy efficiency

²¹ NW Power and Conservation Council. Fifth Power Plan. 2006. see Chapter 5, Generating Resources.

²² *Id.*, at 5-24.

²³ Preliminary Comments of DEQ, Oregon State Agencies on DEIS. Nov. 2007. at 9.

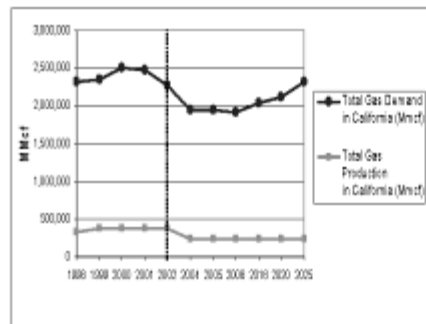
²⁴ Preliminary Comments of DLCD, Oregon State Agencies on DEIS. Nov. 2007. at 21.

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potential (see above)²⁵. Oregon Department of Energy has similarly expressed skepticism about the real need for the Bradwood LNG terminal, citing new renewable portfolio standards in the State of Oregon as a factor that could reduce demand for fossil fuel-powered electricity. Commenting on the DEIS, which was issued after the passage of the 2007 Renewable Portfolio Standard (25 percent by 2025), ODOE noted the following information gap in FERC's need analysis: "The Analysis does not consider the impact of Renewable Portfolio Standards (RPS) adopted by the 2007 legislature."²⁶

The Oregon Public Utilities Commission has identified energy efficiency and conservation as major goals for evaluating future energy policy. Additionally, the California Energy Commission has concluded that gas demand in California is not likely to reach 2000 demand levels for the foreseeable future (see graph below).²⁷ The NWGA presents, in its base case, that Oregon will not reach 2001 usage levels until 2011. Because the Bradwood project is intimately linked with California gas demand, and Oregon is actively moving towards more limited use of fossil fuels, conservation and efficiency are practicable alternatives that have less adverse impact and should be evaluated throughout the West Coast.

In the NW region, the Fifth Power plan concludes that supplies are available to meet gas-fired generation supplies for the foreseeable future. The remainder of future load growth can reasonably be addressed through conservation, efficiency, and renewable energy. Indeed, the passage of a law requiring 25 percent renewable generation by 2025 in Oregon may preclude utilities ability to greatly expand their proportional use of natural gas, limiting the growth in the fossil fuel electricity generation sector.



Source: California Energy Commission, Dave Maul

²⁵ Hunt et al. 2006. *Does California Need LNG?* Community Environmental Council.

²⁶ Preliminary Comments of ODOE, Oregon State Agencies on DEIS. Nov. 2007. at 62.

²⁷ Source: California Energy Commission, Dave Maul. Taken from "The Case Against LNG" presentation given by former CA PUC Chair Loretta Lynch in Portland, March 2007.

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FERC offers this cursory conclusion in its alternatives analysis, "It is also conceivable that increasing energy efficiency and use of renewable sources of energy could reduce the projected future demand for natural gas" (DEIS, at 3-7). As noted above, projected future natural gas demand is not necessarily as robust as NWGA indicates, and ODOE and others have identified a lack of independent analysis of the need for natural gas. The DEIS does not provide analysis to evaluate the likelihood of natural gas demand being limited by conservation, efficiency, and renewables. A report produced by the American Council for an Energy Efficient Economy indicates that, by 2010, Oregon can limit its natural gas use by 5 percent, compared to base case assumptions. Looking ahead, natural gas demand could be limited by 8 percent by 2015 and 12 percent by 2020.²⁸

These potential reductions in projected growth could severely undermine the projected 8 percent growth suggested by the NWGA by 2011. The FERC should evaluate independent estimates of future need rather than simply regurgitating information put forward by project proponents. Particularly when NWGA information appears to be contradicted by other projections, the FERC has a responsibility to look at a reasonable range of information. FERC even cites the NWGA's estimate that gas shortfalls might occur by the winter of 2006-2007 (DEIS, 1-4). This scenario did not occur, and the NWGA continues to paint a dire gas supply scenario to justify the Bradwood project.

The FERC does not offer supporting information to dismiss the potential for alternatives to limit growth in natural gas demand, yet the DEIS concludes, "neither conservation measures nor renewable energy sources are expected to replace the need for additional future natural gas supplies in the Pacific Northwest" (DEIS, at 3-7). FERC's confidence that increasing gas demand will necessitate LNG import in the Northwest is clearly not shared by Oregon Department of Energy. It also falsely concludes that independent regional energy forecasts conclude that increasing gas supply and gas-fired generation are necessary for meeting future demand. The NW Power and Conservation Council clearly indicate that wind power is a growing and viable alternative for meeting growth in generation capacity.²⁹ As alternatives to fossil fuels increase in renewable energy, energy efficiency, and conservation, natural gas prices may be relieved of some of the strain and vulnerability to speculation and manipulation that has driven recent high natural gas prices.³⁰ As Oregon State agencies have suggested, FERC must evaluate a reasonable range of alternatives including alternatives to LNG such as renewable energy, conservation, and efficiency.

ODOE addresses FERC's estimate of future wind energy directly in its comments on the FERC DEIS. The alternatives analysis aggrandizes the need for natural gas-fired generation by diminishing the current and future capacity of Washington and Oregon to generate wind-powered electricity. ODOE comments, "The DEIS understates wind capacity, operational and under construction, in Oregon and does not mention Washington at all. The DEIS cites the 2005 ODOE biennial energy plan and states that Oregon has a total capacity of 259 MW wind, with

²⁸ Elliot, R. Neil and Anna Shipley. April 2005. *Impacts of Energy Efficiency And Renewable Energy on Natural Gas Markets*.

²⁹ NW Power and Conservation Council. 2005. *Fifth Power Plan*.

³⁰ Elliot, R. Neil and Anna Shipley. April 2005. *Impacts of Energy Efficiency And Renewable Energy on Natural Gas Markets*. American Council for an Energy Efficient Economy.

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other projects planned for a total of 400 MW." ODOE concludes that the FERC's alternatives analysis "does not use current data for operating and planned wind generation. Information compiled by ODOE's Renewables division suggests over 500 MW of operating renewable generation, and over 3000 MW either under construction or in various stages of permitting. This does not even include Washington."²¹

Reference is made to the discussion of wind power as an alternative energy source found on page 3-5 and 3-6 of the DEIS.²² While it is acknowledged that wind power represents only a portion of the total Pacific Northwest energy portfolio, and requires load shaping from other sources of energy, the dismissive presentation of wind power in the DEIS is a) incorrect, b) is predicated on outdated information from seemingly a single source, and c) does not address the Pacific Northwest as a whole. A far more balanced picture is found in more contemporary information from the intergovernmental Northwest Power and Conservation Council [NWPPCC]. Noted in the Northwest Power and Conservation Council document "The Role of Renewable Sources in the Fifth Power Plan" dated 5 October 2006 at page 6 of the report under the heading: "CURRENT RENEWABLE RESOURCE DEVELOPMENT ACTIVITY":

Over 2600 megawatts of generating capacity of all resource types will have been placed in service in the Northwest between adoption of the 5th Plan in December 2004 and the end of 2008. About 800 megawatts is operating, 960 megawatts under construction and 880 megawatts currently scheduled for completion by the end of 2008 (Figure 2). *About 1720 megawatts (65 percent) of the total are renewable energy resources. Nearly all of this (over 99 percent) is wind capacity.*" (emphasis in italics added).²³

As shown above, the 400MW, wind power figure noted in the DEIS is incorrect. Additionally, while the assertion on page 3-4 of the DEIS that most new electrical generation is from natural gas fired sources was true in 2003, this assertion has been rendered moot by the recent accelerated development of wind powered generation. The following note appeared in the Introduction to latest NWPPCC Biennial Monitoring Report on the Fifth Power Plan dated January 5, 2007: "The Plan found that the region had a surplus of generating capability and that the need for new generation from coal or natural gas likely would not occur until after 2012, after the 5-year action plan period." And in the Summary:

High energy prices and concerns about potential climate-change policy have also led to aggressive development of wind power in the Pacific Northwest in the two years since the Council adopted the Fifth Power Plan. New generation capacity and slow demand growth have increased the electrical supply surplus in the region, which further delays the need for new generating capability.²⁴

²¹ ODOE Preliminary Comments on Bradwood DEIS, Nov. 2007, at 63-64.

²² See DEIS comments of R. Duncan Mackenzie, Dec. 17, 2007.

²³ NWPPCC, Fifth Power Plan Monitoring Report, January 2007, and NWPPCC Report entitled The Role of Renewable Resources in the Fifth Power Plan.

²⁴ Id.

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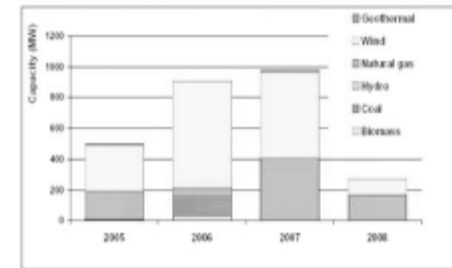


Figure 2: Northwest resource development 2005 - 2008

Therefore, the renewable numbers used by FERC are simply incorrect. The FERC must use the best available information to make its decisions, and should not dismiss non-LNG alternatives such as wind based on incorrect estimates of these resources.

With ODOE expressing skepticism that gas-fired generators in the Lower Columbia will use this gas, it is important to evaluate whether LNG is even economic compared with renewable alternatives. The price of LNG will be a key factor in determining how, and if, the fuel is used once it is imported. ODOE concludes that industrial use of natural gas is projected to decline by 4 percent, and that gas-fired generation may grow to meet demands – yet both of these factors depend at least somewhat on price. As noted above, natural gas prices may from North American sources depend on the success of conservation, efficiency, and renewable energy programs and development. The American Council for an Energy Efficient Economy concludes that "significant price reductions are possible by relieving demand" through a variety of efficiency, conservation, and renewable programs.²⁵ Their report specifically cites Oregon's Renewable Portfolio Standard as a potential method for relaxing future growth in demand for electricity from natural gas-fired generation. Hence, comparison of LNG and North American gas costs should take Oregon's RPS and other similar programs in Washington and California into account. The comparison may render LNG even more expensive when compared to LNG.

Furthermore, according to many published reports, current pricing is more reflective of speculation than market fundamentals.

Costs are way below current prices. For the most expensive domestic production, deep water Gulf of Mexico, the full-cycle replacement costs may be as high as \$3.25-3.50/MMBtu, the report says. Imported LNG falls near that range also at \$2.75-3.75. Other North American full-cycle production costs are: overall Gulf of Mexico \$2.75-3.00/MMBtu; onshore

²⁵ Elliot, R. Neal and Anna Shipley, April 2005, Impacts of Energy Efficiency and Renewable Energy on Natural Gas Markets

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Gulf Coast \$2.50-2.75; Canadian \$2.25-2.75; and Rockies \$2.00-2.25 . . .

³⁶

The above statement and EIA data show that LNG is not likely to depress prices below current levels. In fact, conservation, efficiency, and renewable alternatives are economically viable alternatives. The DEIS alternatives analysis does not compare costs or provide a reasonable projection of its own future gas supply costs. When combined with Bradwood's huge negative impact to the aquatic environment, it is evident that FERC has erroneously made the presumption that energy efficiency, conservation, and renewable energy are practicable alternatives to the project as a whole, making the no action alternative both viable and environmentally preferable.

FERC fails to adequately evaluate reasonable alternatives to the project in Rockies and Canadian gas supplies

The project configuration description in the DEIS is incomplete, and the project description should include consideration of the Palomar pipeline project, the Western half of which clearly depends on Bradwood's LNG terminal being approved. Under NEPA, the projects are connected actions – but for the Bradwood LNG terminal, the Western half of the Palomar pipeline (or some significant portion of it) would not be constructed.³⁷ The Palomar pipeline is not a surprising outgrowth of the Bradwood project. For several years members of the public have noted that the Williams pipeline system currently lacks available capacity to take on an additional 1.3 bcf/d. FERC's three-fold description of the project objectives (delivery to industrial/electricity users, Mist, and Williams) cumulatively do not come close to the capacity of the project as a whole. Again, the WA EFSEC study completed by ICF International shows that the region cannot economically absorb the huge amount of gas that Bradwood intends to import:

Each of the proposed terminals has an associated pipeline project. Local load in the Pacific Northwest is too variable and not large enough to be economic for a LNG terminal. To site a terminal at a size that would be economic, at least 1 Bcf per day to start with, access to Northern Californian markets would be necessary.³⁸

FERC's alternative analysis, then, should evaluate methods of meeting regional gas demand in the Pacific Northwest and California because project objectives may be readily achievable through North American sources of natural gas with existing pipeline infrastructure. The ICF International Study completed for WA EFSEC concludes that pipeline capacity is adequate to meet needs of gas users in SW Washington and Northern Oregon, areas of focus for

³⁶ Report by James R. Choukas-Bradley, a principal with the firm Miller, Balis & O'Neill, and Natural Gas Intelligence, February 18, 2005. *Analysts Assail Hyped Gas Market, See Prices Falling*. See attached RACE coalition comments to Clatsop County and regarding the Cabrillo offshore LNG facility.

³⁷ Gregg Kantor statement. Palomar Gas Transmission Press Release. Aug. 6, 2007. See also Transcripts of FERC hearings for Scoping on the Palomar Gas Transmission project held November 12-15, 2007.

³⁸ ICF International. Nov. 2007. Review of Pipeline Utility Corridor Capacity and Distribution for Petroleum Fuels, Natural Gas, and Biofuels in SW Washington. Submitted to WA State EFSEC. at 69.

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project objectives.³⁹ Secondly, FERC must evaluate alternative methods of meeting gas demand on a region-wide basis, including Rockies supplies, because the bulk of the gas is likely to go to California to meet that State's energy needs. There are multiple West Coast-wide alternatives that should be considered as reasonable, and for which the DEIS provides no or very cursory analysis.

Domestic Natural Gas Is a Viable Alternative

Northern Star, on its website, claims that "Despite record levels of drilling for natural gas in North America, production in the US and Canada is struggling to keep up with consumption."⁴⁰ The FERC DEIS characterizes U.S. and Canadian gas supplies as in decline, as well. However, this projection ignores that fact that the Department of Energy (DOE) estimates that there are decades of natural gas supply remaining in North America. To quote the DOE,

At current rates of consumption, the Nation has at least 60 years worth of natural gas supplies that are recoverable with current technology. Moreover, as our knowledge of resource characteristics and the potential of new technology increases, estimates of the size of the resource base grow.⁴¹

Natural gas demand has actually decreased nationwide since the DOE report was issued. A glaring omission in any of Bradwood's materials or the FERC DEIS is the lack of detailed analysis of increasing supplies from the Rocky Mountains as a viable alternative to the importation of LNG. Page 3-10 provides a very cursory consideration of other pipeline possibilities, citing the Palomar pipeline as a possible conduit for domestic gas into the Oregon market. Realistically, the Palomar project would be used for the opposite purpose – to import large quantities of LNG via the Columbia River into the Western market. The other project discussed, Kinder Morgan's Rockies express, is cited as a potential drain on Rockies gas supply to the Pacific region. The Rockies Express pipeline, according a presentation given by ICF International regarding the development of their pipeline capacity study, will have the opposite effect than that suggested in the DEIS. By relieving competition pressure from the Midwest for Canadian gas, the project would likely increase the availability of that gas supply while not effectively reducing the amount of Rockies gas also available to the Pacific NW.

FERC must more thoroughly evaluate Rockies gas as an alternative to LNG. No detailed rationale is given comparing the Rockies in price or environmental impact to LNG importation in Oregon. According to the DOE, there are almost 7,000 trillion cubic feet (Tcf) of natural gas in the Rocky Mountains. As their report details, more than 300 Tcf of gas-in-place is currently technically recoverable, though several different estimates done by organizations such as the National Petroleum Council and the EIA demonstrate that the recoverable rates are increasing, and the potential is great.⁴² By way of comparison, the states of Idaho, Oregon and Washington collectively consumed approximately 570 Billion cubic feet per year of natural gas in 2005.⁴³

³⁹ *Id.*

⁴⁰ http://www.bradwoodlending.com/affordable_energy.htm

⁴¹ U.S. DOE, "Natural Gas Fundamentals: From Resource to Market," DOE/FE-0457, June 2003, at 4.

⁴² U.S. DOE, *Rocky Mountain States Natural Gas - Resource Potential and Prerequisites to Expanded Production*, DOE/FE-0460, September 2003, at 5.

⁴³ From EIA database: http://onto.eia.doe.gov/dnav/ng/ng_cons_sum_000_gus_m.htm

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Annual production from Rocky Mountain States has risen from 2.3 Tcf in 1990 to over 3.5 Tcf in 2001. According to the DOE,

Assuming ongoing investment in expanding the geologic knowledge base and technology progress, upward trends in resource assessment and recovery are expected to continue...The National Petroleum Institute projects technically recoverable tight-gas sands resources in the Rocky Mountain States to grow from 105 Tcf in 1998, to 137 Tcf in 2010, and to 151 Tcf in 2015.⁴⁴

"Tight sands" is one of several classifications of natural gas deposits in the Rockies.

The DOE report goes on to describe one of the most serious barriers facing natural gas producers in the Rocky Mountain States: lack of access to markets. The report states, "*Severe pipeline constraints have contributed to two decades of depressed natural gas prices in the Rocky Mountain States. In recent years, price volatility, in large part due to limited pipeline infrastructure and market access, has discouraged investments in natural gas production in the region.*"⁴⁵

There is, however, a high-capacity gas pipeline currently under construction, called "Rockies Express Pipeline," being built by Sempra Energy, parent company of SoCalGas, and Kinder Morgan Pipeline Company. This pipeline, over 1,600 miles long, will run east to terminate in Clarington, Ohio. It will deliver up to 1,500 MMcf per day of domestic natural gas to customers throughout the Midwest. This pipeline goes in the opposite direction of utility customers in the Pacific Northwest. The distance between the major energy market of Portland, Oregon and the Wyoming gas fields is approximately 800 miles, about half the distance from these same Wyoming gas fields to Clarington, Ohio.⁴⁶ It would appear, then, that delivery of Rockies gas to the West Coast could also be an economic means of meeting regional energy needs.

Not surprisingly, new pipeline capacity from the Rockies to the West Coast are now proposed in the form of the recently announced Bronco and Ruby gas pipelines. These projects clearly provide an alternative to LNG on the West Coast that the FERC should evaluate. The price of gas traded at Henry Hub on July 6, 2007, which is the benchmark for domestic natural gas pricing, was \$6.14 per MMBTU. The price for natural gas traded at the Opal, Wyoming hub on the same day was \$3.54 per MMBTU.⁴⁷ The typical spread between the Henry Hub and Opal spot prices is more on the order of \$2 to \$3 per MMBTU. The price is low at Opal due to the current lack of pipeline access to markets.⁴⁸ Three new gas pipeline projects are now proposed to carry gas from the Rockies gas basin into the Western U.S. Two of them – the Ruby and

⁴⁴ U.S. DOE, *Rocky Mountain States Natural Gas - Resource Potential and Prerequisites to Expanded Production*, DOE/FE-0460, September 2003, at 5.

⁴⁵ *Id.* at 3.

⁴⁶ http://www.kindermorgan.com/business/gas_pipelines/rockies_express/

⁴⁷ http://intelligencepress.com/features/intex/gas/intex_gas_point.emb?pointcode=ICERMTOPAL

⁴⁸ Wyoming Pipeline Authority, fact sheet on need to expand natural gas pipeline export capacity from Wyoming: <http://www.wyopipeline.com/mission/GasOnGas.pdf>

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Bronco pipeline projects – exceed 1 bcf/d in capacity and would directly access the Malin, OR, interconnect with TransCanada's GTN system as well as California pipelines.

Statements from the Ruby and Bronco Gas Pipeline proponent indicate that their projects provide an alternative response to the FERC's characterization of West Coast market needs. Jim Cleary, spokesperson for the Ruby Pipeline, said, "Ruby will provide natural gas users in northern California, Nevada, and the Pacific Northwest with competitively priced natural gas from the nation's most important growth supply region." The Ruby project will have a capacity of 1.2 bcf/d and can be expanded to 2 bcf/d.⁴⁹ A representative of Spectra Energy, proposing the Bronco gas pipeline, characterized their project in similar terms: "With the continued demand for clean-burning natural gas to fuel growth in the Pacific Northwest and California markets, the Bronco Pipeline represents an important new outlet for Rockies production to reach these key markets and builds on our long-standing service to this region through our Western Canadian facilities."⁵⁰

The influx of a large quantity of Rockies gas into the West Coast must be considered as an alternative to LNG, and would likely result in less competition for Canadian natural gas. Because Rockies gas is the cheapest North American source and significantly cheaper than LNG, and because Bradwood's proposal requires the large, destructive Palomar pipeline to be viable, the alternatives analysis must evaluate these new proposals as reasonable and potentially environmentally preferable proposals.

Increasing natural gas supplies from the Rockies should clearly be evaluated as a cost-effective and reliable project alternative to importing LNG. The EIA regional natural gas production trends shown in the map below indicate robust supply growth in the Rockies, and steady production in other key major production regions around the country through 2025.

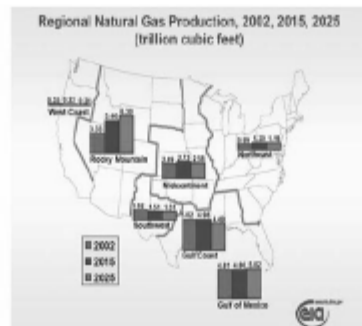
⁴⁹ El Paso Corporation Announces Rockies Pipeline Project." Press Release, Dec. 3, 2007.

⁵⁰ <http://online.wsj.com/public/article/PR-CO-20071203-904496.html?mod=cnews>

⁵¹ "Spectra Energy Proposes New Pipeline to Serve Western United States." News Release, Nov. 2007. <http://investors.spectraenergy.com/pressroom/2044494&q=NewsArticle&id=1071510>

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Regional U.S. Natural Gas Production Trends, 2002, 2015, 2025⁵¹



Canada Is Likely to Maintain or Increase Natural Gas Exports

According to the Bradwood website, "Canada's reserves are also dwindling and the Canadian Energy Research Institute predicts that production from the giant deposits in western Canada will stay at current levels only until 2010 and then begin an inevitable slow decline." The FERC alternatives analysis paints a similarly dire picture of the future of Canadian gas exports, arguing in Chapter 1 that Canadian gas supply forecasts show a decline in Canadian exports. Page 3-8 of the DEIS projects a steep decline in Canadian exports to the U.S., from 3.3 tcf in 2005 to 1.2 tcf in 2030. Yet, FERC's analysis does not evaluate a range of projections – several of which do not describe a decline in exports as severe as suggested in the DEIS.

Similar assertions also appear in California Energy Commission, California Public Utilities Commission and EIA data, which state that natural gas imports from Canada will decline 45 percent over the next 15 years.⁵² The agencies are basing this assertion on Figure 77, "Net U.S. imports of natural gas by source, 1990-2030," in the EIA's 2007 Annual Energy Outlook, which shows a 45% decline in Canadian exports to the U.S. by 2020. Figure 77 shows Canadian exports in slight decline in the 2005-2015 period, followed by a much steeper decline in the 2015-2020 period. The steeper decline in the 2015-2020 period accounts for most of the overall 45% decline in the 2005-2020 period.

It appears that the EIA is taking the "worst case" Canadian National Energy Board (NEB) supply-demand forecast scenario and adopting it as the only Canadian forecast. NEB forecasts include multiple supply-demand scenarios. The 2003 forecast looked at two scenarios, one ("Supply Push") where exports gradually decrease through 2015 and then go into a much steeper

⁵¹ Don Van Wageningen, EIA, *Domestic Natural Gas Supply: A Large Resource Base Does Not Guarantee Low Long-Term Prices*, presentation given at NEMS/AEO Conference, March 23, 2004, at 18.

⁵² R. Myers, H. Morris, *California's Need for LNG Supplies*, CPUC memo, December 12, 2006, at 3.

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export decline curve, and the second ("Techo-Vent") where natural gas exports increase through 2015 and return to 2005 levels in 2025.

The NEB is currently working on an update to the 2003 *Canadian Gas Supply, 1990-2025* document that will be published in 2007. The update will include three scenarios:

- 1) "Fortified Islands,"
- 2) Sustainable Economic, Environmental, and Energy – "EEE", and
- 3) "Continuing Trend."⁵³

The term "Fortified Islands" means Canada puts more emphasis on developing its own natural gas resources and reducing internal demand, and less emphasis on imports to satisfy energy needs. The EEE scenario assumes abundant cheap LNG is available and development of domestic resources is de-emphasized in favor of imports. The "Continuing Trend" is a business-as-usual scenario that assumes no national commitment to increasing domestic natural gas production and reducing domestic demand. The NEB "Fortified Islands" scenario matches well with the Techo-Vent scenario included in the 2003 report.⁵⁴

In this scenario Canadian exports increase from approximately 8,000 MMcf/d in 2005 to 10,000 MMcf/d in 2015 and then return to 8,000 MMcf/d in 2025. This scenario starkly contrasts with the DEIS assumptions, and FERC should evaluate this alternate projection of Canadian gas exports in evaluating the need and potential alternatives for the project. Continued reliance on Canadian gas apparently may be a reasonable alternative to satisfy at least a significant portion of the projected shortfall described by the DEIS.

It is reasonable to assume that the "Fortified Islands" scenario is more likely to occur than a scenario that presumes cheap and abundant LNG will cause Canada to put less emphasis on developing its own natural gas resources. LNG is neither cheap nor abundant.⁵⁵ Supply uncertainty and the willingness of major Far East LNG consumers such as Japan, Korea, and China to link the price they pay for LNG to the price of oil make it highly unlikely that "cheap" LNG will ever be available on the West Coast of Canada or the U.S. The likely high price and constrained supply of LNG in the Pacific Rim market will lead Canada to continue to develop its own reserves, potentially leading to an export scenario more like the one we describe—from 8000 mmcf/d to 10,000 mmcf/d and back to 8000 mmcf/d by 2025.

The Washington State Energy Facility Siting Council recently commissioned a study in which ICF International concluded that adequate supply and pipeline capacity exists in the Pacific NW for the reasonably foreseeable future, even in the absence of LNG. In fact, the study highlights increasing Rockies gas reserves as the cheapest source of gas to the West Coast region. Not surprisingly, three recent pipeline proposals now plan to increase the pipeline linkage between the West Coast and Rockies gas producers (Ruby, Bronco, and Kern River

⁵³ Telephone communication between Bill Powers of RACE and K. Martin Canadian NEB natural gas specialist, April 3, 2007.

⁵⁴ Id.

⁵⁵ J. Jensen, *Progress Report on Worldwide LNG Trade*, presented at CEC Staff Workshop on the Inputs, Assumptions, and Issues for the Natural Gas Assessment Report, March 26, 2007.

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expansion). The “System Alternatives” section unreasonably narrows its focus to LNG import possibilities – excluding already planned expansions of these new Rockies imports.

Increased supplies of Rockies gas to the West Coast (whether in California or Oregon) will relieve pressure on Canadian gas, allowing more gas into the Williams system which is largely dependent on Canadian gas. Because pipeline capacity between the Pacific NW and the Rockies is constrained, these new pipelines are not likely to increase starve the Pacific NW of Rockies gas. Essentially, there is enough for both markets, and increasing access from the Pacific to Rockies gas is very likely to relieve pressure on Canadian gas. Additionally, the Rockies Express Pipeline, which will deliver Rockies gas to the Midwest, may also relieve pressure on Canadian gas supplies according to the WA EFSEC pipeline capacity study.⁵⁶ Taken together, the FERC alternatives analysis currently fails to evaluate other potential, proposed influxes of natural gas into the West Coast pipeline system. Hence, the “System Alternatives” analysis is deficient, which only briefly evaluated alternatives and stated without substantial analysis that “modifications or additions (to existing pipelines) would result in environmental impacts that could be less than, similar to, or greater than those associated with construction of the proposed project” (DEIS, at 3-7). Ultimately, the DEIS does not offer a clear comparison of the potential alternatives, including the relative environmental impacts of the different projects and their potential, for instance, for negative impacts to threatened and endangered wildlife and fisheries species.

Due to the tremendous impact on the aquatic ecosystem for Bradwood, the FERC has not met its burden under NEPA in demonstrating that reasonable alternatives have been considered that would avoid many of the negative impacts on the aquatic ecosystem. There are numerous alternatives to the Bradwood Project, all of which have potentially less intensive aquatic ecosystem impacts. There are practicable alternatives in configurations of the terminal, pipeline developments, other LNG import sites, and overall methods of meeting regional energy demands.

Other reasonable alternatives are preferable to the Bradwood site

The FERC dismisses many practicable alternatives for LNG import sites on the grounds that they are too distant from the “target market”, which FERC apparently defines as the Lower Columbia River. Given the enormous size of the project and the statement from ICF International indicating that LNG projects in Oregon are not economically viable without connections to Northern California, FERC’s characterization of the target market is unreasonably narrow. The likely movement of the gas via the Palomar pipeline to California and the unproven need for a huge quantity of natural gas in the Lower Columbia River impugn FERC’s blanket assertion that other LNG sites are too distant. Indeed, even in Bradwood’s own alternatives analysis for its 404 application to the Army Corps, it indicates that only 100 mmcf/d would typically be used in the Lower Columbia area by electricity and industrial users.⁵⁷ The cursory

⁵⁶ ICF International. Nov. 2007. Review of Pipeline Utility Corridor Capacity and Distribution for Petroleum Fuels, Natural Gas, and Biofuels in SW Washington. Submitted to WA State EFSEC.

⁵⁷ Bradwood Landing 404 Alternatives Analysis submitted with Joint Aquatic Resources Permit Application. October 2006. Attachment H, at 3.

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analysis offered in regard to other sites fails to evaluate key differences and potential advantages between sites.

Other LNG sites exist on the West Coast that could potentially provide natural gas sources to California and other markets including the Lower Columbia industrial and electricity generation natural gas users. FERC dismisses many planned and developed facilities as unable to meet its project purposes because of their distance to the “target” Pacific NW market. The FERC rules out California alternatives, saying “the California LNG import terminal proposals... could not meet the objectives of the Bradwood Landing project to supply the states of Oregon and Washington with new sources of natural gas.” This statement from FERC is inaccurate, both because it implies that the central purpose of the Bradwood project is to supply the Pacific NW with gas (when ICF International has indicated that serving California is the primary driver for any LNG terminal), and because it fails to evaluate how a possible influx of natural gas elsewhere into the Western gas grid will allow Canadian and domestic sources of gas to be more available to the Pacific NW.

The West Coast energy grid is interconnected and so dismissing a California terminal is a poor basis for disqualifying other LNG sites. The FERC must evaluate the regional impact of each of these sites, including Semptra’s Costa Azul facility – which FERC only barely acknowledges although it will come online soon and have an enormous potential impact on gas supplies in the Pacific region. Because LNG facilities are so large, they will impact a large geographic range of any region they occupy. The West Coast, as a whole, uses approximately 9 bcf/d. Any LNG terminals that supply a significant percentage of that total could potentially relieve pressure on traditional gas sources, as well, leaving more traditional gas resources for the Pacific NW.

The DEIS states that other LNG import terminals are not considered further in this analysis because gas from this southern location cannot economically be transported to the Pacific Northwest, but it does not evaluate the regional import of LNG imports into California from Mexico. Furthermore, because Bradwood is planning to deliver a large proportion of its gas to California, the alternatives analysis should include potential LNG development sites in Northern California, in particular. There were multiple proposals for LNG terminals in Northern California, including Vallejo and Humboldt Bay. Indeed, FERC suggested to another LNG facility in Oregon (Jordan Cove) that it should defend why it is not locating its facility closer to its target market. The same criticism could be directed at Bradwood, who has an agreement to potentially use the Palomar pipeline in the future. FERC must evaluate alternatives that include siting the facility in the market capable of accommodating 1.3 bcf/d. In siting the facility closer to its true target market in California, Bradwood would likely avoid large pipeline construction and disturbance to the Columbia River. The FERC cites shorter pipeline routes as a reason to dismiss other projects in the Pacific Northwest, but it does not apply the same criteria to its own study and its use of the Palomar pipeline to connect to California.

FERC dismisses the offshore LNG terminal design alternatives based largely on cost considerations. FERC and Bradwood, in other documents, argue that some of these designs require specifically designed tankers, yet the analysis fails to mention that tankers for its own facility will have to be specifically retrofitted to accept filtered ballast water from a screened

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intake system.⁵⁸ Cost appears to be the dominant consideration in excluding offshore design alternatives, despite the fact that Bradwood has its own offshore proposal and that several others are proposed for the West Coast. Offshore facilities greatly diminish the public safety risk involved with LNG shipping – a factor that FERC does not weigh heavily in its alternatives analysis. NOAA has criticized FERC for disregarding offshore designs:

The DEIS indicates rough sea and weather conditions off the coast of the Pacific Northwest preclude the siting of offshore terminals. To those not readily familiar with the circumstances that differentiate proposed or existing terminals or other similar structures located in harsh environmental conditions elsewhere (e.g., Calypso LNG terminal off the eastern coast of Florida, Troll Natural Gas Fields in the North Sea with depths of 1,100 feet), FERC should explain further why the placement of terminals offshore of Washington and Oregon are not feasible.⁵⁹

FERC does not analyze the potential advantages that other sites may have over Bradwood – particularly offshore sites that do not require turning basin dredging. Because Bradwood's project involves severe disturbance of critical salmon habitat and a large-scale alteration of the Estuary, the alternatives analysis must weigh other potential LNG sites. Sites elsewhere in the Columbia River may not involve the same amount of dredging and disturbance in extremely sensitive habitats. The alternatives analysis paints all of the sites as similar in the extent of dredging. The analysis also states that Bradwood is preferable to Jordan Cove because that proposal's need for a lengthy pipeline – an advantage that obviously evaporates once we consider the Palomar project as part of Bradwood's proposal.

The DEIS alternatives analysis falsely asserts that key project objectives cannot be met through other means, particularly referring to the delivery of natural gas to Mist, to Williams Pipeline, and to Lower Columbia River industrial and electricity gas consumers. Not only can these demands potentially be satisfied through domestic sources of gas, but, as we have already noted, FERC has mischaracterized the project purposes to aggrandize the importance of these smaller goals that are achievable through other practicable alternatives. Because the site has regional significance if it is approved and built, FERC cannot screen out alternatives on the basis of the Bradwood facility being in closer proximity to facilities that may not even use LNG in the future according to ODOE.

Delivery of gas to the PGE power plants at Port Westward is not a compelling reason to select the preferred pipeline route over alternatives. In the Oregon EFSC review of the Port Westward power plant, PGE did not assume that LNG would be available. PGE also did not assume the availability of LNG in its integrated resource plan review before the Oregon Public Utility Commission.⁶⁰

FERC cites other pipeline projects as being more damaging than Bradwood, but several of these pipeline and other system alternatives might require less dredge/fill activity than

⁵⁸ 404 Application from Bradwood Landing, October 2006, Attachment H.

⁵⁹ NOAA DEIS comments, at 2, Submitted Dec. 17, 2007.

⁶⁰ ODOE preliminary State Agency Comments on Bradwood DEIS, Nov. 2007, at 62.

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Bradwood. FERC is also misleading in its description of the extent of its pipeline development, giving no acknowledgement of the added dredge/fill impact of the Palomar pipeline, which is clearly a connected action under NEPA guidelines. While other sites on the Columbia River may have longer pipelines, the Bradwood proposal is likely to result in the Palomar pipeline being extended to the Columbia River – adding 100 additional miles or more to the overall pipeline mileage that should be attributed to the Bradwood project.

FERC also characterizes this project as more distant than other alternative sites in Oregon from population centers. This description apparently only considers the terminal site itself – which incidentally is close to both Puget Island and the Washington community of Cathlamet. The Bradwood project also brings Warrenton and Astoria well within 1 mile of the LNG tankers in the shipping channel. Bradwood has significant disadvantages over other sites throughout the West Coast due to its selection of a site in the midst of the busy Columbia River shipping channel. The area between Puget Island and Bradwood is narrow, and the shipping channel is currently unable to accommodate an LNG vessel. Bradwood's 700,000 cubic yards of dredging and construction for its pipeline(s) constitute a massive alteration of the aquatic environment of the Lower Columbia.

FERC also fails to evaluate whether other sites are superior in avoiding sensitive habitats in construction and operation centers. The Bradwood proposal is extraordinary in its selection of a site in the midst of habitats of extreme importance to the Columbian White-tailed deer, habitat for threatened and endangered salmon, and numerous sensitive streams and wetlands for its project area. No other terminal poses the same degree of threats to migration and rearing habitat for juvenile salmonids and Columbia white-tailed deer, in particular. FERC points out that there are trade-offs with each site, but clearly the selection of the Bradwood site in the midst of critical habitat for ESA-listed fish and wildlife species represents potentially the worst alternative for compliance with the ESA on the West Coast.

NOAA has strongly criticized FERC's assessment of alternatives in LNG sites and project design. The criticism leveled at Bradwood and FERC in these statements also apply to the Corps alternatives analysis, which is even more cursory and inaccurate than the Alternatives analysis in the DEIS. NOAA concludes,

The duration and magnitude of impacts do not appear to have been fully considered in the alternatives analysis. Impacts that are permanent or chronic should be given significantly greater weight than temporary or short-term impacts. For example, in most instances when appropriate conservation measures are successfully implemented (e.g., HDD stream crossings), the impact of pipeline construction on aquatic systems can be avoided or be limited to temporary or short-term duration. In such instances the transitory nature of the impact likely limits the magnitude of the environmental effect. Conversely, impacts that are permanent (e.g., aquatic and wetland filling, sequestration of dredged sediment) or chronic (e.g., maintenance dredging, wake stranding of juvenile salmonids) are of considerable environmental concern and are more likely to have significant impacts on sensitive species. FERC needs to consider the

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duration and magnitude of likely impacts when determining whether environmental advantages exist between alternatives.⁶¹

The Columbia River Estuary, as a whole, is a critical area for the survival of listed salmon and Columbia white-tailed deer populations; hence, it is crucial that FERC evaluate sites, not only in the Lower Columbia, but also throughout the West. It is also important that FERC not dismiss as not practicable alternatives which will serve the true project purpose of delivering LNG into the Western U.S. – including Oregon LNG, Tansy Point, Jordan Cove, and numerous potential sites in Northern California.

FERC fails to provide accurate information on why other sites are not practicable alternatives, in violation of its burden under NEPA. The alternatives are not evaluated in terms of their relative impacts on shipping, habitat, and public safety in a manner that clearly indicates advantages and disadvantages between them. FERC has not provided an analysis adequate to evaluate whether other alternatives might environmentally preferable. NOAA's recent comments on the Bradwood project indicate that practicable alternatives may exist that have significantly less negative impacts on sensitive species, and that FERC failed to weigh the sensitivity of affected species in its alternatives analysis:

The sensitivity of a species or their habitat to change does not appear to have been factored into the alternatives analysis. An alternative that impacts only viable fish populations is preferable to one that impacts at-risk species. Similarly, an alternative that impacts few or no ESA-listed species is preferable to an alternative that impacts many ESA-listed species. FERC should analyze how, for example, endangered, threatened or sensitive species and their associated habitat could be impacted by each of the proposed alternatives. Moreover, NMFS believes that all of the alternatives should include measures to minimize and/or avoid impacts to threatened and endangered species and their critical habitat. This is consistent with the implementing regulations for NEPA, which state that both context and intensity must be considered when determining significance, and that the ESA-status of a species and their critical habitat are one consideration (40 CFR 1508.27). FERC needs to consider environmental impacts in terms of species and habitat sensitivity when evaluating project alternatives.⁶²

FERC does not adequately evaluate alternatives that would reduce impacts on the environment

FERC Fails to Analyze Reasonable Alternatives to Size and Design of the LNG Terminal

FERC should have considered designing the terminal for a smaller footprint and smaller LNG vessels in greater detail. The FERC analysis makes the assumption that a smaller LNG terminal is not economically viable but does not provide data to justify ruling out smaller design alternatives. There is no justification anywhere in the DEIS for the size of the project: at 1.3 bcf/d, the Bradwood proposal will overwhelm the Pacific NW market and is not viable without access to regional markets. If Bradwood seeks to serve primarily Pacific NW markets, it should

⁶¹ NOAA comment letter to FERC regarding Bradwood DEIS. Dec. 17, 2007, at 4

⁶² *Id.*, at 4.

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have evaluated smaller design alternatives with more limited sendout capacity, smaller pipelines, and fewer and smaller tankers.

Due to the lack of consideration of smaller terminal alternatives, FERC does not demonstrate that there are no practicable alternatives to its terminal site design. Reducing the size of the terminal footprint as well as the area that requires dredging are methods of diminishing the impact on the aquatic ecosystem. The size of the terminal itself is a key factor that remains unresolved. FERC should have evaluated the project as a whole for a 3-tank design; clearly, a third tank is reasonably foreseeable. According to page 3-41 of the DEIS, "designing a project to allow for future expansion is a typical model for energy projects of this size and is necessary to make the project viable." Despite this indication that a third tank will be necessary, the DEIS only acknowledges two tanks as the proposed action, with the possibility of future expansion. As discussed elsewhere, and in the comments of Frans Eykel, Marjorie Castle and others, the number of tankers will increase with a three-tank design. Indeed, the Joint Aquatic Resources Permit Application and the Alternatives analysis for the 404 application submitted by Bradwood still describe a three-tank design. The FERC DEIS does not evaluate alternatives that preclude future expansion. Limiting the facility to two tanks is a condition of local proposed land use approval, and it may limit the amount of permanent and temporary negative impacts during construction and operation of the terminal.

The FERC narrowly considers methods of reducing the footprint of a terminal of the proposed size, but does not consider reducing or limiting the actual proposed size of the terminal. There is no factual evidence to support the conclusion that a smaller terminal would not be viable. The Pacific Northwest does not require an LNG terminal of even two tanks, yet FERC does not evaluate the possibility of reducing or limiting the capacity of its terminal in order to reduce its impact on the environment. A third storage tank, 260 feet in diameter and over 160 feet in height, increases the footprint of the area. FERC should evaluate site designs that do not involve the extensive wetland fill that will occur on the site. FERC claims that Bradwood has reduced the amount of wetland fill within its 1.3 bcf/d design, but it must consider whether a facility of smaller size and sendout capacity would require fewer impacts to the environment. Less gas storage would also decrease the number of tankers necessary each year, which would decrease adverse impacts. The FERC has failed to analyze how future expansion plans are increasing the footprint of the currently proposed facility (which will be constructed with a foundation for a third tank), and whether abandoning future expansion or reducing the number and size of tanks is a reasonable alternative. NOAA raises this question in its comments on the DEIS, as well:

The applicant submitted differing proposed actions to the local, state, and federal permitting agencies with regards to whether two or three tanks would be built. The DEIS states that the applicant has not committed to expanding the terminal, however if they wish to expand by way of a third tank, the terminal layout accounts for this. It remains unclear how storage capacity factors into the project's purpose and need, in addition to FERC's alternatives analysis as previously discussed. The applicant's own statements have indicated that storage capacity does not determine throughput (sendout) capacity.⁴ Therefore, the need to accommodate and reserve space for a future third tank appears questionable

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since the terminal is already designed to accommodate a peak sendout capacity of 1.3 billion cubic feet per day (bcfd). As such, the subject of whether the project footprint has been minimized to the greatest degree practicable remains in question. The FEIS should clarify this topic and provide supporting rationale on how the project footprint has been minimized, perhaps through modeling various operating scenarios.⁶³

FERC discounts the possibility of developing a smaller terminal and/or limiting the facility to two tanks by stating that the project would not be economically viable if it were a smaller size. Yet, Bradwood now proposes a two-tank design in its application to FERC, leaving the potential for a third tank in the future. If FERC insists that a three-tank design is necessary for project viability, then certainly this a reasonably foreseeable future action and the entire DEIS should have reflected the ultimate, 3-tank design. The alternatives analysis does not provide adequate data to justify why a smaller site design is not practicable, particularly considering the relatively modest overall gas demand of Oregon and Washington (less than 1.5 bcfd, combined, on an average 2006 day).

FERC asserts that the forecasted demand and life cycle costs make it potentially necessary to expand the facilities to meet future demand, but it does not evaluate the potential benefits to the environment of substantially reducing the scale of the project. FERC has not provided adequate information to support its claim that the Pacific Northwest needs a facility on the scale of 1.3 bcfd, and Oregon Department of Energy and others have raised the problem of no proven need in comments on the FERC Draft EIS. Given the potentially huge range of future demand (FERC relies on the NWGA – a non-objective proponent of the natural gas industry), FERC must consider smaller site designs. The analysis should clearly indicate what environmental and economic benefits to the community might occur in a smaller design alternative as well as the costs to the applicant. NOAA has noted the inadequate nature of FERC's cost analysis in the Alternatives section of the DEIS:

It remains unclear what weight FERC gives to financial costs. In multiple instances FERC appears to dismiss alternatives due to financial considerations without fully evaluating environmental or public safety impacts. FERC should develop and implement a more transparent cost/benefit decision matrix in the alternatives analysis. Furthermore, any financial costs analysis should be comprehensive and include costs associated with each alternative in its entirety (e.g., increased shipping costs to river commerce due to traffic restrictions, impacts to fisheries, increased emergency response capacity).⁶⁴

Oregon Department of State Lands has expressed similar concern with the lack of alternatives analyzed for the design layout of the facility based on the Draft EIS for Bradwood. DSL argues, "Alternative site designs and layouts with a smaller footprint are not discussed in adequate detail as to why the chosen alternative layout is the most practicable with least adverse effects."⁶⁵

⁶³ NOAA DEIS comments, Dec. 17, 2007, at 4.

⁶⁴ NOAA DEIS comments, at 2.

⁶⁵ Oregon DSL Preliminary State Agency comments on DEIS, Nov. 2007, at 31.

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In general, FERC does not demonstrate that its site design is necessary to meet the objectives of the project. Specifically, FERC must evaluate what size of facility it could practicably build without extensive wetland/fill on the site. There are similar considerations for the sendout pipeline(s) as well. Additionally, the Bradwood project will impact areas of the aquatic environment that are not appropriately zoned for industrial development of this type. It is inappropriate for this application to proceed without a land use compatibility statement, in any case, but it is also crucial for a thorough alternatives analysis that Bradwood develop a site design that is consistent with current zoning regulations. Even if Bradwood achieves zoning consistency, these changes are likely to be contingent on only two tanks. FERC does not investigate a true minimal impact site design in its Alternatives analysis, but instead asserts without proper analysis that the project cannot be reduced in size. Most importantly, FERC should evaluate a site design that involves fewer (and potentially smaller) storage tanks and with reduced overall sendout capacity. We agree with the following NOAA comment on this issue, raised in its comments on a similar alternatives analysis for the project in the FERC DEIS:

It remains unclear what role site or capacity expansion plays in consideration of suitable alternatives to the proposed project. Section 3.1.6.2 discusses terminal expansion in terms of the proposed Bradwood Landing LNG terminal, but appears not to do the same for the alternatives. If expansion potential is a decision element, FERC should modify its selection criteria to clarify the weight given to expansion in the alternatives analysis. Furthermore, if expansion potential is not a siting consideration, there appears no reason that reserving space for a third tank at Bradwood Landing should be considered necessary to the proposed project and the facility footprint should be reduced accordingly.⁶⁶

FERC Fails to Address Alternatives for Gasification and Gas Quality Mitigation

FERC's DEIS largely ignores two key issues that will greatly impact the quantity and nature of air emissions for the project. The method of gasification and the quality of gas imported to the site are two crucial factors that are poorly evaluated, and for which FERC does not consider reasonable alternatives. The FERC must consider alternatives that limit air emissions, and the current analysis fails to provide adequate analysis of impacts or the alternatives to the proposed project's emissions.

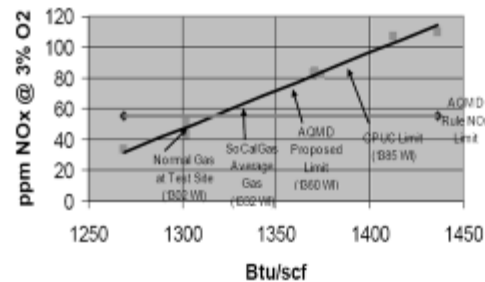
FERC essentially dismisses alternative gasification strategies. Most importantly, the DEIS concludes the ambient air vaporization is not a reasonable alternative for the Bradwood site due to frequent, cool weather. Yet, Oregon LNG in Warrenton has a similar climatic regime and now proposes to use ambient air vaporization technology. The DEIS must evaluate the relative environmental and economic costs of each technology – including energy usage, effluent (condensate), and air emissions. The DEIS' rationale for dismissal of ambient air vaporization is inadequate, and the DEIS should be amended to include more thorough discussion of this vaporization technique. Ambient air vaporization is less polluting, potentially, than submerged combustion vaporization. The DEIS does not provide an analysis of reasonable alternatives to the method of vaporization.

⁶⁶ NOAA comments on FERC DEIS, December 17, 2007, at 4.

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Additionally, FERC does not evaluate the issue of whether imported gas will comply with gas quality specifications in the Pacific Northwest. LNG often contains a higher proportion of non-methane constituents such as propane, ethane, and butane – all of which increase the heating value of the gas (see below). The FERC DEIS must evaluate an alternative that limits the impurities of imported gas by stripping non-methane constituents out of the LNG imports. This process is proposed for Jordan Cove LNG – a proposal which is likely to be seeking LNG supplies from the same Pacific Rim market as Bradwood. The FERC's failure to evaluate terminal design alternatives that limit non-methane impurities in the LNG supply may result in significant increases in NOx and other emissions.

Because FERC has not identified the gas source, the public cannot ensure that gas quality specifications will be met by proposed incoming LNG supplies, and FERC must evaluate this issue in its alternatives analysis. The terminal design can be amended to remove impurities, and FERC provides no basis for excluding this alternative which has potentially significant environmental benefits for the air quality of the Lower Columbia River airshed and all of the markets targeted for LNG use. Currently, there is inadequate gas supply available for "mixing" gas to the Lower Columbia gas users that Bradwood seeks to supply. The DEIS should also evaluate alternatives to ensure that gas can be mixed with North American natural gas to bring LNG within an acceptable range of heating values (known as the Wobbe index).⁶¹



FERC Inadequately Evaluates All Alternatives For Dredge Disposal:

First, dredge disposal plans remain unclear, as Wahkiakum County has not agreed to have its sand pit used for the large quantity of dredge material involved in the project. The application must clarify the proposal before clearly evaluating alternatives to the proposal. There are discrepancies in dredging and dredge disposal plans between the FERC DEIS and the application to the Army Corps. The DEIS provides more discussion of potential dredge disposal alternatives, but this analysis does not appear to be included in the application to the Army Corps. It is difficult for the public, in general, to provide comment on this proposal when major discrepancies in the character and quality of information exist between federal applications.

⁶¹ South Coast AQMD presentation, May 31, 2007, Slide 25 of 31.

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Additionally, the piping system described to cross the Columbia River shipping channel raises questions of safety and added disturbance if the dredge material pipe is disrupted by passing vessels. The Alternatives analysis should evaluate alternative methods of transporting dredged material and alternative disposal sites within the Columbia River.

Most importantly, the DEIS alternatives analysis does not evaluate a reasonable range of alternatives for either upland or in-water disposal. The analysis focuses on the proportion of disposal that should occur on land versus water, yet it does not include extensive site-by-site analysis of alternative dredge sites that have been evaluated and why the Wahkiakum County Sand Pit site and the Bradwood site will have the least impact on the aquatic environment. The analysis also does not appear to account for other dredge/fill activities in the area that could limit the availability of the Wahkiakum County Sand Pit site.

FERC indicates that disposal at these sites will have impacts on fish. FERC characterizes these impacts as "minimized" for beach nourishment alternatives without a clear, transparent discussion of avoidance and minimization for different possible disposal sites. NEPA requires that reasonable alternatives be considered and compared for their relative environmental impacts. The analysis that leads to this conclusion is cursory and does not involve in-depth consideration of dredge disposal sites in areas with less valuable fish habitat. FERC does not appear to consider sites further from the Bradwood site, but gives no detailed rationale as to why more distant dredge disposal in the Columbia or the ocean are too expensive.

There are practicable alternative disposal sites throughout the Estuary, ones that may also provide benefits to a "sediment-starved" Columbia River. FERC has failed to meet its burden in considering and thoroughly evaluating all of these practicable alternatives for dredge disposal. Oregon Department of DSL has also characterized FERC's evaluation of dredge disposal alternatives as limited, and lacking evaluation of other practicable in-water disposal alternatives.⁶²

FERC Should Evaluate Alternative Limiting Ship Sizes and Turning Basin

The FERC DEIS does not provide a significant or adequate analysis of turning basin design alternatives. In Section 3.1.9 of the EIS, on page 3-52, FERC simply dismisses the idea of limiting the terminal's turning basin size: "... alternatives requiring less dredging would not be able to safely accommodate LNG ships. As such, we did not consider it feasible to reduce the volume or extent of dredging and still satisfy the objectives of the project at the proposed size."⁶³ Bradwood considers configuration of the dredge area in Section 5.1.4.2 of its alternatives analysis for its 404 application to the Corps, as well, a document that is referenced in the DEIS, and this section fails to demonstrate that the proposed dredging activity is the least damaging practicable alternative.

FERC's blanket assumption that the facility must be constructed at the proposed size has resulted in the DEIS incorrectly dismissing alternatives that involve smaller tankers, a smaller turning basin, and less sendout capacity for the project as a whole. NEPA requires that all reasonable alternatives be considered, and FERC's failure to evaluate alternatives that may

⁶² Oregon DSL Preliminary State Agency comments on DEIS, Nov. 2007, at 31.

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require a reduction in the project size and sendout clearly violates its obligation to provide the public with a thorough assessment of alternatives. The highly restricted range of alternatives evaluated and considered violates the very purpose of NEPA's alternative analysis requirement, to foster informed decision-making and full public involvement.

FERC does not thoroughly evaluate the potential for using smaller vessels to access the LNG site, potentially reducing the size of the terminal overall, and limiting the amount of area to be dredged. As we have discussed above, there are alternative LNG sites throughout the West Coast that do not require 700,000 cubic yards of dredging in critical salmon habitat, and FERC has failed to consider other sites in sufficient detail to show that its own site is the least damaging practicable alternative for delivering LNG into the West Coast market. NOAA also raises this concern, and notes that the alternatives are not balanced or compared with regard to impacts to threatened and endangered species and other important environmental and economic factors. FERC must evaluate alternatives that involve less dredging by using smaller LNG tankers, or it must provide clear reasoning why this is not a reasonable alternative.

There are a range of sizes of LNG vessels (from under 70,000 cubic meters to greater than 200,000 cubic meters). According to Bradwood's analysis for its 404 application, "A depth of ~42 feet was determined necessary based on the need to provide clearance of the *largest size LNG carrier* draft with adequate connections to and from the carrier channel" (emphasis added).⁶⁹ The analysis should evaluate alternatives that accommodate smaller tankers; no rationale is offered in the DEIS or elsewhere as to why the turning basin must be designed to accommodate the largest tankers. Currently, the USCG is recommending a size limitation on incoming LNG tankers, and smaller vessels could result in a significant reduction in the area that needs to be dredged.⁷⁰ This would reduce the overall impacts of the project on the aquatic environment of the Columbia River. FERC should consider a similar condition and limitation on turning basin size and the amount to be dredged.

FERC characterizes the size of the turning basin as a conflict between safety and aquatic habitat impacts. Yet, the safety risks could be reduced by limiting LNG tankers size to the smallest LNG tankers available. FERC does not evaluate in any way the significant advantages to fish species that might occur from reducing the amount of dredging and the size of the turning basin. NEPA requires that alternatives be considered in detail, and FERC has failed to evaluate whether material benefits to fish and aquatic habitat exist from reducing the size of the Bradwood project. The DEIS does not provide an adequate basis for the US Army Corps of Engineers to evaluate the project's least environmentally damaging practicable alternative. Without detailed consideration of a proper range of project size and turning basin alternatives, the analysis is flawed and unreasonably narrow, in violation of NEPA.

The impact to multiple listed species of salmon has been characterized as significant and negative, both by FERC and NMFS. The disruption of benthic habitats, which generate migrating and rearing fish food supply, is also a potential serious impact. We address these impacts in greater detail elsewhere, but FERC should not assume that reducing dredge area will provide no benefits. In fact, differences in site design, according to NOAA and Oregon DEQ,

⁶⁹ Bradwood Landing Joint Aquatic Resources Application, Attachment H, October 2006.

⁷⁰ USCG Waterway Suitability Report for Bradwood LNG Terminal, March 2007.

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may result in significant reduction of negative impacts to the environment (see those agencies comments). The safety of LNG tankers is a high priority, but the FERC incorrectly presumes that the only method of keeping LNG tankers safe is by having a large turning basin, when alternatives in tanker and project size are readily available.

FERC Must Consider Key Alternatives to Pipeline and Its Route.

The need for the project and the pipeline has been questioned by multiple agencies. Alternatives to the construction of the pipeline as a whole appear to have been ruled out by artificially narrowing the project purpose to serving Lower Columbia River industries. The DEIS provides no analysis of alternative methods of meeting those Lower Columbia River needs or consideration of the relative proportion of the project and its impacts that are justified based on the small likelihood of those industries using a large portion of the project's capacity. NOAA questions the overall approach that FERC has taken to its complete its analysis:

"Is the purpose to provide a new source of LNG to the Pacific Northwest? Is the purpose to provide a new source of LNG for Wauna Mill, NW Natural, PGE, and Williams Pipeline? The pipeline alternatives analysis would appear to indicate the latter is true, which greatly constrains the alternatives that meet the project purpose and appears to increase the environmental impacts of other alternatives as they try to service the same potential customers."⁷¹

Because the Bradwood project is clearly linked to the Palomar pipeline, it is difficult to assess alternatives to routes on the Bradwood pipeline through Cowlitz County without asking whether this route is altogether redundant. According to maps submitted by the Palomar Gas Transmission project to FERC, the Palomar pipeline plans to intersect with the Bradwood pipeline near Wauna. FERC should evaluate whether its proposed pipeline across the Columbia River and through Cowlitz County is necessary given Bradwood's stated intention of using the Palomar project in the future. The alternatives analysis does not provide any consideration of the relationship between the Palomar and Bradwood pipelines.

The Palomar pipeline would fulfill the true purpose of the project more effectively than the proposed Bradwood pipeline, which intends to supply 1.3 bcf/d of gas to a pipeline system that cannot accommodate that enormous volume of gas. Williams Northwest Pipeline has indicated that it would have to cancel all current contracts for gas supply to its existing customers – a highly unlikely scenario – in order to accept the huge volume of gas Bradwood proposes to send out each day. Clearly, the Palomar pipeline represents the true conduit for Bradwood's gas to regional markets that can absorb it. Without the Palomar pipeline, the project is constrained to delivering gas to markets that are unable to economically accept it, according to the pipeline capacity study recently completed by ICF International on behalf of WA EFSEC. NOAA addresses the relationship between Palomar and the Bradwood project, and states that the two are clearly interdependent:

FERC's Notice of Intent for the Palomar Pipeline project (PF07-13) indicates the proposed pipeline would terminate at NorthernStar Energy LLC's Bradwood Landing pipeline near Wauna, Oregon. But for the construction of the Bradwood

⁷¹ NOAA comment on FERC DEIS, at 4, Dec. 17, 2007.

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Landing LNG import terminal, the Palomar project apparently would not be constructed as proposed (see DEIS 2.1.6). At a minimum, segment 2 of the Palomar project would appear interdependent on the Bradwood Landing LNG project. The 50 CFR 402.02, regulations which implement the ESA, define interrelated and interdependent effects. Interrelated actions are those that are "part of a larger action and depend on the larger action for their justification."⁷² Interdependent actions are those that "have no independent utility apart from the action under consideration." Segment 1 would achieve connection to NW Natural's regional distribution system and provide another natural gas source to the Portland Metro area. Extension of the pipeline to Bradwood Landing would have no utility independent of the proposed action. Extension of a bidirectional pipeline to the Mist Storage Facility would provide indirect access to Bradwood Landing LNG via a proposed lateral pipeline from NorthernStar's pipeline to Mist. Implementation of segment 2 fundamentally alters the Palomar Pipeline's operations from a LNG source for the Portland Metro area to a West Coast distribution network for Bradwood Landing LNG. FERC should include anticipated impacts of segment 2 of the Palomar Pipeline project in the EIS.⁷³

Because the Palomar project will likely be necessary, in any case, for the Bradwood project to viably deliver its gas to market, the alternatives analysis must evaluate whether Bradwood can forego its pipeline through Cowlitz County. This alternative is reasonable and would entirely avoid major negative impacts to aquatic habitats throughout Cowlitz County.⁷⁴ These impacts include the crossing many sensitive wetland areas and open trench pipeline construction across salmon-bearing streams.

FERC does not provide an adequate analysis of route alternatives on its proposed 35-mile pipeline route, either. FERC's description of route alternatives is cursory and does not provide adequate detail and evaluation of potential impacts to rivers, streams, and wetlands from construction and operation of the pipeline. FERC has also failed to evaluate constructing a smaller diameter pipeline, which might allow for more nuance in routing the pipeline around sensitive areas. The alternatives analysis does not include adequate discussion of so-called "minor" route variations within the proposed route. The "minor" variations have enormous potential to enhance or diminish the level of aquatic impacts along the pipeline route. The FERC's project description, in general, is vague and does not account for changes that have occurred – including a potential change in the HDD drill site on the Washington side of the Columbia River.⁷⁵

As an example of FERC's failure to adequately address pipeline route alternatives, there are two areas which stand out among many deficiencies in the DEIS and highlight the inadequate range of alternatives considered. The project proposes to use an HDD in NS-1 to reduce "impacts on environmental resources" but completely fails to integrate consideration of the area immediately East of Bradwood as geologically unstable. Multiple state agencies have indicated

⁷² NOAA DEIS Comments, at 5. Submitted 12-17-07.

⁷³ See Comments of Cowlitz County, prepared by Parametrix, regarding the DEIS. Also see comments of Sandra Davis, Marjorie Castle, and Gayle Kiser.

⁷⁴ See comments of Marjorie Castle on DEIS.

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that the area is seismically active with multiple active landslides nearby, and the very first mile of the pipeline proposes to cross an active landslide area. Residents of Puget Island have repeatedly raised concerns about this portion of the pipeline, which crosses an area that only last winter slid, causing debris to fall on and block the railroad below. Additionally, in the 1960s a landslide caused a tsunami to move across the Columbia River, flooding part of Puget Island and causing one death. Richard Beck has submitted information corroborating this event, which FERC has dismissed saying that they can find "no evidence" of a landslide there.⁷⁶

A second area of serious concern involves a crucial segment of the pipeline as it crosses the Columbia River. The routing for this part of the pipeline is highly sensitive and any adjustment cannot truthfully be characterized as "minor." Shifts by a few hundred yards in either direction will involve very different impacts, resources, and landowners than the proposed route. Unfortunately, the proposed routing of the directional drill is unclear, according to conversations held during the Clatsop County land use process.⁷⁷ Specifically, the alternatives analysis does not weigh the best available information when evaluating HDD routes across the Columbia River. In particular, geotechnical reports indicate that unstable geology and active landslides in this area should warrant a rerouting of this segment of the pipeline. The DEIS states, "impacts on natural resources are generally consistent between the two route segments" – a statement that contradicts the extremely sensitive geology of the area and information in Bradwood's resource reports. The Geohazard Report indicates that rerouting in this area may be necessary, and information in the Geological Hazards section of the DEIS (Page 4-19 Section 4.1.4.3, also see Geologic Hazards Table 4.1.4-3) shows significant hazards in this area. The alternatives analysis seems to indicate no difference in reasonable alternatives regarding environmental impacts, yet information submitted by URS Corporation and issues raised by both Cowlitz County and Oregon Department of Geology raise questions about the validity of these conclusions.

FERC should evaluate alternatives that minimize the use of open-trench construction methods in salmon-bearing streams. The alternatives analysis does not include adequate or specific information describing why HDD or other methods are not practicable in avoiding serious disturbance to habitat for ESA-listed salmon species. FERC does not demonstrate that it has routed its pipeline to avoid sensitive wetland areas. The alternatives analysis must include a detailed description of why the route was chosen and why no practicable alternatives exist to the construction methods and locations for the pipeline. The description of the route and waterbody and wetland crossings and why specific methods were chosen for each crossing, are almost entirely lacking in the Alternatives analysis. FERC does not justify why open-trench methods are necessary for certain areas, and an alternative involving no open trench cuts across streams with essential fish habitat and active runs for threatened and endangered species must be considered.

It is also important to note that information provided by the applicant to multiple federal agencies on this issue is inconsistent. Attachment H, Bradwood's alternatives analysis for its 404/401 applications, appears to provide inaccurate and contradictory information based on revised pipeline routing and crossings reflected in the Draft EIS. For example, dozens of sensitive wetland areas are impacted by the pipeline, and the project description in the

⁷⁵ See comments of Rick Beck on DEIS.

⁷⁶ See comments of Marjorie Castle on DEIS.

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Alternatives analysis appears to be grossly inaccurate in its characterization of wetland impacts: "After all of the minor route adjustments and other avoidance and minimization measures are applied, the remaining unavoidable impacts to wetlands and other waters of the U.S. from the proposed route are small and scattered along the route" (BL Attachment H, at 44). This assertion is directly contradicted by the DEIS, which on pages 4-99 and 4-100 provides a table of wetland crossings. Areas to be permanently and temporarily altered by the pipeline amount to 97.9 total acres. The alternatives analysis provided to the Corps, and the current application to the Corps, does not reflect the current status of the project, and clearly the discrepancies between the project described in this application and the EIS are serious and make evaluation of the alternatives very difficult. The Corps cannot reasonably evaluate how to determine if the project proposed is the least environmentally damaging practicable alternative if applications include obviously contradictory information. The DEIS should clarify the role of the Army Corps in evaluating these impacts and how the public should understand a proposal with multiple, contradictory configurations depending on agency and application.

Regardless, dozens of salmon-bearing streams and sensitive wetlands will be crossed by the pipeline. FERC provides insufficient detail in describing how and why the proposed route was selected, and why there are no practicable alternatives exist to avoiding the dozens of acres of sensitive stream and wetland habitats that will be impacted by dredge/fill activities. The Alternatives analysis is both inaccurate and vague, and FERC has failed to evaluate practicable alternatives in the routing of the pipeline.

Specifically, there are numerous fish-bearing streams that Bradwood proposes to cross through open-trench methods, including Larson Slough, McLean Slough, Hammony Creek, Brock Creek, Coal Creek, and Clark Creek. The EIS finds that pipeline construction and operation will result in "substantial adverse effect on Pacific Coast salmon essential fish habitat" (DEIS, at 4-171). Again, FERC, the Army Corps and the public lack specific information to justify the conclusion that there are no practicable alternatives to its proposed routing. FERC must consider reasonable alternatives to the project as a whole, and to routing that damages fish-bearing streams.

FERC fails to offer a thorough description of either its chosen route or major route variations and the relative wetland/stream impacts of each. The alternatives analysis for the alternate routes (Southern Route, Railroad route) do not specifically describe possible reductions in impacts to threatened and endangered species and their habitats. Ultimately, the criteria for determining practicable alternatives are poorly developed in this alternatives analysis. NOAA has noted that the alternatives analysis for the DEIS "appears to dismiss alternatives due to financial considerations without fully evaluating environmental or public safety impacts." The NOAA comment letter continues by arguing that FERC and the applicant "should develop and implement a more transparent cost/benefit decision matrix in the alternatives analysis. Furthermore, any financial costs analysis should be comprehensive and include costs associated with each alternative in its entirety (e.g., increased shipping costs to river commerce due to traffic restrictions, impacts to fisheries, increased emergency response capacity)."⁷⁷ We strongly agree with these conclusions, and the cursory analysis provided by FERC clearly violates

⁷⁷ NOAA comment letter on FERC DEIS. December 17, 2007.

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standards requiring that all reasonable alternatives be evaluated in a logical, transparent fashion with regards to their costs, impacts, and technological feasibility.

FERC fails to adequately address alternatives with respect to tanker traffic for the Coast Guard's analysis

In its analysis of alternatives, FERC does not properly weigh a reasonable range of alternatives for the USCG to consider in whether it permits the facility. FERC and the USCG should consider conditions that include limiting the number and size of tankers that visit the proposed LNG terminal at Bradwood. The alternatives analysis concludes that the no action alternative for the USCG – finding the waterway not suitable for LNG traffic – would fail to meet project objectives. However, as we argue above, there are readily available alternatives to the proposed LNG terminal to serve regional energy needs. FERC should not assume in the DEIS that project objectives cannot be met through continued or increased reliance on Rockies and Canadian supplies of natural gas as well as energy conservation, renewable resources, and energy efficiency.

The FERC should also evaluate project alternatives in light of SIGTTO regulations.⁷⁸ The LNG industry has a good safety track record in shipping LNG cargoes partially because it typically has high standards for site selection for LNG import terminals. The Bradwood LNG terminal fails to meet high international standards for an LNG import terminal in several respects – the channel width is excessively narrow, the berth is proposed to be parallel to the shipping channel on the outside bend of the shipping channel, and there exist significant natural navigational hazards (the Columbia River bar) to safe transit.⁷⁹ FERC and the USCG should evaluate all potential LNG sites with respect to their potential to disrupt shipping traffic and their potential for an accident. The comparison of site alternatives does not include a detailed analysis of this type as required by NEPA, and the USCG cannot rely on the cursory analysis provided in the DEIS to make its recommendation regarding the environmentally preferable alternative for the project.

By narrowing the DEIS consideration of river safety and traffic issues to a few conditions being considered by the USCG, FERC fails to consider the full range of alternatives to the project and falsely creates a dichotomy between the USCG issuing a LOR and project objectives not being approved. The "all or nothing" approach FERC uses to characterize project alternatives does a severe disservice to the public and to cooperating agencies in the Bradwood permitting process; alternatives to the project and to the project design – in ship size, ship frequency, project sendout capacity, and alternatives to LNG altogether – are readily available and have received cursory or no analysis from FERC.

Conclusion for Alternatives Analysis

FERC has failed to consider key practicable alternatives to its project, to the design of the terminal and the turning basin, and to its proposed pipeline. There are numerous practicable

⁷⁸ SIGTTO, Society International of Gas Tanker and Terminal Operators. Site Selection and Design for LNG Ports and Jetties. August 2000.

⁷⁹ Id.

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alternatives available for meeting West Coast energy needs. FERC dismisses non-LNG alternatives, while assuming that electricity generation from LNG-sourced gas will be a major driver for the project. There are many alternative methods of generating electricity that do not involve LNG importation. Energy conservation, renewable energy, and energy efficiency all present practicable alternatives to LNG throughout the West Coast. There are also practicable alternatives available for maintaining gas supplies to the Pacific Northwest and the West Coast, including increasing access to domestic supplies of natural gas. Alternative LNG sites – particularly sites closer to the target market in Northern California – must also be considered and are almost entirely omitted in the alternatives analysis. Finally, FERC has failed to assess reasonable and practicable site alternatives in the Pacific Northwest and to the design of its project that would significantly reduce the negative impacts of its project on the aquatic environment.

The Columbia River Estuary has been considered the “lynchpin” for recovery of ESA-listed salmon species. FERC provides cursory and inaccurate analysis of the impacts of its dredge/fill activities, and the Army Corps must find that practicable alternatives exist to severely undermining the health of the Estuary, both in the Columbia River and in wetlands and rivers impacted by the terminal and pipeline. “An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.” 40 C.F.R. § 320.10(a)(2). The alternatives analysis fails to address many alternatives, and some alternatives are given such cursory consideration that it is impossible to realistically conclude that they are not practicable. This includes changes to terminal design, turning basin size and design, alternative LNG sites, and both major and minor route variations on the pipeline route.

Reasonable and practicable alternatives to the proposed action do exist and have been identified in earlier comments. The alternatives considered, however, were unreasonably narrow and not meaningful in regards to the purposes of NEPA. The highly restricted range of alternatives evaluated and considered violates the very purpose of NEPA’s alternative analysis requirement, to foster informed decision-making and full public involvement. 42 U.S.C. §101; 42 U.S.C. §102(2)(E); 40 C.F.R. §1508.9(b); *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

Indeed, NEPA’s regulations and Ninth Circuit caselaw require the agency to “[r]igorously explore and objectively evaluate all reasonable alternatives.” 40 C.F.R. § 1502.14(a); *Citizens for a Better Henderson v. Hodel*, 768 F.2d 1051, 1057 (9th Cir. 1985). The Ninth Circuit has consistently held that an agency’s failure to consider a reasonable alternative is fatal to an agency’s NEPA analysis. See e.g., *Idaho Conserv. League v. Mumma*, 956 F.2d 1508, 1519-20 (9th Cir. 1992) (“The existence of a viable, but unexamined alternative renders an environmental impact statement inadequate.”)

The minimal difference among the action alternatives is not consistent with NEPA’s requirement that a range of alternatives be considered especially when given the repeated public requests that alternative sites, alternative natural gas sources to LNG, and alternative energy options (renewables, conservation, efficiency) be fully considered. *State of California v. Block*, 690 F.2d 753 (9th Cir. 1982).

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FERC misrepresents purpose and need for the project.

Purpose and Need Overview

FERC has vastly overstated the need for a LNG terminal in the Pacific Northwest, particularly Oregon, and misconstrues the real purpose of the Bradwood LNG Project. The purpose and need statement in an EIS is required by NEPA to justify why an agency action is necessary. 40 C.F.R. § 1502.13. The agency action at question here is the approval or disapproval of the Bradwood Landing Project by FERC. In its DEIS statement concerning the need of the Bradwood Landing Project, FERC fails to fully analyze the demand for natural gas in the future and fails to give adequate weight to non-conventional domestic supplies, conservation measures, and current storage capacities. Furthermore, the stated purpose for the project in the DEIS is imprecise because of a faulty assumption by FERC that natural gas imported as LNG to the proposed Bradwood Landing terminal, and distributed there from, will be used to supplement regional supplies, when in fact Bradwood’s purpose for the project is, at least in part, to tap into the California market and supplement California natural gas supplies.

In the purpose and need statement of the DEIS, FERC justifies the need for an approval of the project by citing energy use forecasts predicting increased future demands for natural gas, exacerbated by shrinking domestic and Canadian supplies to the region because of increasing demand elsewhere in the nation. DEIS at 1-4. Therefore, according to the DEIS, international imports in the form of LNG are needed to meet demand and stabilize the market. *Id.* However, a variety of factors indicate that importation of LNG from foreign nations is unnecessary and is likely to destabilize both the supplies and prices for the region.

The demand for natural gas will likely not be as great as the DEIS purports. According to the Northwest Gas Association (NWGA), and acknowledged by FERC in the DEIS, the existing gas supplies and infrastructure will be sufficient to meet demand in the next few years.³⁰ Moreover, although NWGA predicts a shortfall for meeting peak demand conditions in 2010 using a high growth or base growth scenario, the predictions relied upon in the DEIS are based on suspect NWGA assumptions of an 8.1% growth rate for natural gas consumption in the Pacific Northwest through 2011 using its base growth scenario.³¹ On the other hand, longer range forecasts based on reasonable assumptions reported by the Energy Information Administration (EIA) in its Annual Energy Outlook (AEO) predict less than an 8% increase for natural gas consumption in the region from 2005 to 2030.³² FERC should evaluate the need for LNG imports based on the lower projected natural gas consumption estimated by the EIA since those numbers are objective governmental projections less likely to be biased, whereas the NWGA projections are from a group consisting of natural gas and pipeline companies seeking a profitable outlook. Additionally, FERC must evaluate the need for LNG based on an increased focus in the Pacific region on renewable energy, conservation, and energy efficiency – all energy options that are likely to reduce natural gas demand.

³⁰ Northwest Gas Association. 2006. 2006 Northwest Gas Outlook Update. Available online at: <http://www.nwga.org/>. Accessed October 2007.

³¹ *Id.*

³² Energy Information Administration. 2007. Annual Energy Outlook 2007 with Projections to 2030. Report #: DOE/EIA-0383(2006). February.

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There are also serious uncertainties in the projected growth of natural gas consumption regionally and nationally. In fact, the EIA AEO 2007 notes that forecasts for actual national natural gas consumption from 2005 to 2030 have consistently been scaled back over the past couple years due to a variety of factors including greater conservation measures and less predicted reliance on natural gas for electric energy generation. For example, EIA projections in 2006 estimated national natural gas consumption in 2030 to reach 26.8 trillion cubic feet (Tcf), while the 2007 projections are only for 26.1 Tcf of natural gas consumption in 2030.⁶⁵ The DEIS falsely asserts that "much of the demand growth in the NWGA forecast is driven by power generation." DEIS at 1-4. However, the NWGA also acknowledges a lower reliance on natural gas for electric energy generation, given the volatile gas prices and sufficiency of hydropower sources, leading them to lower their projected base growth consumption from over 9.3% to 8.1% through 2011.⁶⁶

The Northwest Power and Conservation Council's Fifth Power plan indicates that gas prices will continue to limit gas-fired production.⁶⁷ These uncertainties regarding the projected consumption of natural gas, both in the short-term and long-term, indicate the growing effects alternative energy sources and conservation measures are having on the regional and national energy market. FERC should reanalyze the growth projections if used to analyze the need for LNG based on demand in the DEIS given its false information about natural gas powered electric production and the current and past trend for lowering natural gas consumption projections.

Yet another factor that FERC failed to properly analyze when determining the need for imported LNG is the forecasted increased production of domestic conventional and non-conventional natural gas. The NWGA admits that production from U.S. Rocky mountain sources is projected to increase by 2011.⁶⁸ Furthermore, the Alaskan North Slope, along with the Mackenzie River Delta in Canada, has enough proven resources to satisfy the whole U.S. natural gas demand for more than a decade.⁶⁹ Natural gas sources from Alaska are predicted to be up and running by 2017, and along with advances in technology for exploration and production, should be sufficient to meet North American demand for a substantial period. FERC properly states that domestic production of natural gas supplies are predicted by the EIA to increase substantially in the coming years as non-conventional sources of gas are tapped into. DEIS at 1-4. However, FERC essentially dismisses these non-conventional sources by implying it is possible that these resources will not be able to be successfully and economically explored and produced.⁷⁰ FERC should include a more thorough analysis of both these conventional and non-conventional sources of natural gas when determining the need for imports through the Bradwood LNG terminal into the region. We discuss alternative sources for natural gas in more detail in our discussion of alternatives to the Bradwood project, including gas supply sources in the Rockies and in Canada.

⁶⁵ *Id.*

⁶⁶ Northwest Gas Association. 2006. 2006 Northwest Gas Outlook Update. Available online at <http://www.nwga.org/>. Accessed October 2007.

⁶⁷ NW Power and Conservation Council. Fifth Power Plan. 2006. see Chapter 5, Generating Resources.

⁶⁸ Northwest Gas Association. 2006. 2006 Northwest Gas Outlook Update. Available online at <http://www.nwga.org/>. Accessed October 2007.

⁶⁹ *Id.*

⁷⁰ *Id.*

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Increased competition for the resources that the Pacific Northwest relies upon for its natural gas demands is another justification relied upon by FERC for the need of a LNG import terminal at Bradwood Landing. FERC notes that Oregon relies 100% on imports of natural gas for consumption. DEIS at 1-4. However, as noted above, the domestic production is likely to increase over the next few years as new technology for exploration and production comes into play. These additional resources, along with conservation measures and alternative energy, should help alleviate, if not completely offset, the increased demand of the nation and, therefore, competition for Pacific Northwest resources.

FERC claims that the relatively low prices the Pacific Northwest has historically enjoyed will be threatened by competition for the resources the region relies upon, and implies that LNG imports will help stabilize the supply and price for the region. This is a blatantly false statement. Imports of LNG are notoriously unreliable because of uncertainties in the supply and demand of the global market. Indeed, there are currently not enough liquefaction facilities and the current liquefaction facilities are having supply shortages, leading to shortages of LNG in the face of increasing global demand.⁷¹ Additionally, because of increasing oil prices, the global demand for natural gas is predicted to increase substantially leading to a global increase in LNG prices and a predicted lowering of the capacity utilization rates at domestic LNG terminals.⁷² Clearly, LNG is currently not a reliable source of natural gas, nor will it be in the near future. If the region does in fact need a supplemental stable source of natural gas at steady prices, LNG is not the answer. Approval of the Bradwood LNG Project would have the opposite effect on natural gas supplies and prices in the region, leading to possible shortages and increased costs if LNG supplies are relied upon for future needs. FERC should reevaluate the purpose and need in light of these observations and better relate to the public the effects importing LNG will have on the regional supplies and prices, especially given the likely purpose of the project as discussed below.

The claims by Bradwood that the proposed Bradwood LNG Project is being designed to serve the needs of Oregon and the Pacific Northwest is obviously an exaggeration given the information above relating to the already saturated market in the Pacific Northwest. The Pacific Northwest market does not require more inputs of natural gas, especially from unstable foreign sources that will likely cause instability of supply and prices in the Pacific Northwest if relied upon for any supposed future need. The true market in the West is California, which consumes more natural gas than all other West Coast states combined.⁷³ Not only does California use more natural gas than any other state in the region, California is a rapidly growing market.⁷⁴ Regardless of how fast the market for natural gas is growing in California, proposals for LNG terminals in California have been met with very strong resistance due to environmental and safety concerns. To date, no proposed LNG terminal has been approved for California. It goes without saying that the closest alternative sites for LNG terminals are Mexico and Oregon. Proposals for new LNG terminals in Mexico have also been met with resistance because of

⁷¹ Energy Information Administration. 2007. Annual Energy Outlook 2007 with Projections to 2030. Report #: DOE/EIA-0383(2006). February.

⁷² *Id.*

⁷³ *Id.*

⁷⁴ *Id.*

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environmental and safety concerns, as well as economic considerations. Therefore, a slew of proposed projects have been initiated for Oregon, the next best alternative for an LNG source for California markets. Obviously Oregon and the Pacific Northwest do not require additional natural gas inputs in the form of LNG to meet current or near future demands from one LNG terminal, not to mention the three to five terminals that are under consideration. FERC should seriously reconsider the purpose behind the proposed Bradwood LNG Project and accurately relay the true purpose to the public.

Bradwood and FERC claim that the designated market for the Bradwood LNG Project is Oregon and the Pacific Northwest. However, the justification for this stated purpose is not sufficiently strong to indicate that there is in fact a need and demand in the Pacific Northwest for LNG. The Oregon market can not absorb another 1.3 bcf/d of natural gas from the proposed Bradwood LNG terminal. The only economically viable market for the natural gas is California. The Palomar Project provides a clear conduit to California. Therefore, it goes without saying that the proposed Bradwood LNG terminal will have a viable California market to ship its natural gas to, a market with much higher demand and profit expectations than any other in the region. How can Bradwood honestly claim they are not seeking to serve the California market when that is the market most economically feasible for allocation of incoming natural gas from foreign LNG markets and when there are already plans to build a pipeline connecting the proposed terminal to interstate pipelines leading to California? FERC should undertake further analysis regarding the likely future market to be served by the project, taking the Palomar pipeline into account.

Alternatively, if current sources of natural gas to the Pacific Northwest are rerouted to serve the large and growing California market because of the additional inputs into Oregon via the proposed LNG terminals, Oregon and the Pacific Northwest will be substantially harmed. As mentioned above, foreign LNG markets are notoriously unreliable, and if Oregon and the Pacific Northwest are forced to rely on imports of LNG the supply and prices in the region are very likely to be adversely affected. Oregon should not have to bear the brunt of supply and price fluctuations, in addition to environmental, economic, and safety impacts, so that California may enjoy a steady and price stable supply of domestic gas. There are sufficient domestic and other gas sources other than foreign LNG to serve the whole West coast including California. It is unnecessary to subject Oregon to all the impacts of the proposed Bradwood LNG terminal. At the least, FERC should further evaluate the purpose behind the proposed Bradwood LNG Project and accurately relate to the public the potential impacts of the project.

FERC defines purpose and need too narrowly

The FERC has failed to undertake an adequate analysis of alternatives because of an unreasonably narrow definition of the purpose and need of the project which FERC then uses to dismiss reasonable alternatives. The DEIS states, "The purpose of the Bradwood Landing Project is to provide a new source of natural gas to the Pacific Northwest through importation of LNG" (DEIS, 1-3). The project objectives list key delivery points, and taken with the overall purpose of the project, this section of the DEIS reads more like a description of the project than an accurate characterization of the purpose and need. The purpose of the project should be more broadly stated in terms of supplying the region with energy. An analysis for a broader, more

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accurate statement of the purpose for the project would lead FERC to include detailed consideration of non-LNG alternatives, other LNG sites, and alternatives to the proposed design of the project.

By narrowing the purpose statement to focus on LNG importation and, specifically, LNG importation on the Columbia River with the potential to deliver gas to Mist, Williams Pipeline, and Lower Columbia industrial and electricity generation users, the FERC has excessively narrowed the scope of its entire analysis. We have described in our comments on the Alternatives analysis how the narrow focus of the DEIS has resulted in reasonable alternatives not being given adequate consideration. FERC similarly errs in narrowing its consideration of the need to be served by the project, failing to justify assumptions regarding the future of natural gas demand and supply in the Pacific Northwest. Indeed, multiple state and federal agencies have questioned the need for the project as it is described, and ICF International concluded that supplies for natural gas were "abundant" for the foreseeable future from either the Rockies or Canadian supply basin: "Gas supply is expected to remain abundant well beyond the forecast period of 2025."⁵³

FERC describes key objectives and included Lower Columbia River industries that cannot absorb a huge quantity of LNG as possible consumers. The primary project objectives do not require a project of the size and scope of the Bradwood LNG terminal, and multiple pipelines already supply these gas users from existing infrastructure and supplies.⁵⁴ The DEIS does not justify the need for the size of the project. At 1.3 bcf/d with the potential for expansion, the project will dwarf any future needed gas supplies. Yet, FERC excludes alternatives because they cannot be built to the size of the project desired by Bradwood. The purpose of the project should not be to build an LNG terminal of the enormous scale proposed, but rather it should be to deliver energy to the Western energy market.

FERC has routinely dismissed alternatives that involve reduction of the project size. Essentially, FERC has defined the project purpose and need so closely to the project description (even requiring sendout capacity of 1 bcf/d or greater with the possibility of expansion), the overall analysis suffers from a lack of regional perspective and even readily available alternatives in adjustments to project site, design, and size. The recently completed ICF International pipeline capacity study (submitted to Washington's EFSEC) indicates that the purpose and need description in the EIS is disingenuous, and that the purpose and need for the project would more accurately be defined as supplying natural gas to the Western energy market.⁵⁵

FERC falsely claims that project's primary purpose is to serve Oregon and Washington gas needs

⁵³ ICF International. Nov. 2007. Review of Pipeline Utility Corridor Capacity and Distribution for Petroleum Fuels, Natural Gas, and Biofuels in SW Washington. Submitted to WA State EFSEC.

⁵⁴ ODOE, Dec. 2007. Preliminary State Agency DEIS comments.

⁵⁵ ICF International. Nov. 2007. Review of Pipeline Utility Corridor Capacity and Distribution for Petroleum Fuels, Natural Gas, and Biofuels in SW Washington. Submitted to WA State EFSEC. at 69

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FERC makes broad assumptions regarding the need for LNG in the Pacific Northwest that are unsupported by unbiased evidence. FERC uses outdated data to argue that LNG is needed in the Pacific Northwest while ignoring growing renewable energy, conservation, and efficiency programs in the region. ODOE and other state agencies have asked that FERC consider the impact of renewable portfolio standards. With FERC projecting average growth of 2 percent a year in regional gas use, the impact of conservation and efficiency programs must be considered as a limiting factor. We discuss alternatives to LNG in greater detail in our comments on FERC's alternatives analysis, and FERC has failed to show that a need exists that cannot be satisfied through the no-action alternative.

FERC's need analysis aggrandizes future Pacific NW gas demand based on data from the Northwest Gas Association (NWGA), an industry group whose members include utilities that will be involved in the Bradwood project (NW Natural gas, for instance). ODOE concurs that the NWGA does not constitute an independent perspective on future natural gas demand.⁹⁶ The NWGA data cannot be considered unbiased, as preliminary comments on the DEIS of the Oregon Department of Energy have noted: "The [demand] analysis is based entirely on NWGA forecasts. No independent assessment of demand. No consideration of demand side reductions."⁹⁷ Other State agencies have raised similar concerns with the FERC, as well.

The markets and key industries to be served by the project, as described by the DEIS, are not adequate to support an LNG facility of Bradwood's size. Industrial users and electricity generation in the Lower Columbia, by Bradwood's own estimates, are only likely to use 100 mmcf/d on an average day.⁹⁸ ODOE questions even this assumption, noting that operators of natural gas plants in the area are not planning to absorb LNG, currently.⁹⁹ Williams pipeline company has indicated that it does not have capacity to absorb all of Bradwood's gas, and that Bradwood will likely have to rely on the Bradwood pipeline in the future. These and other pitfalls in the needs analysis are illustrated by the comments of Oregon Department of Energy. Oregon Department of Energy recently commented, in its draft comments on the FERC DEIS, "The DEIS provides no independent assessment of the demand for LNG to justify the need for the proposed project."¹⁰⁰ ODOE's comment highlights widespread skepticism about Bradwood's characterization of the purpose and need for its project.

NOAA has also added its own reservations about the purpose and need of the project, raising the following questions regarding whether the alternatives analysis is artificially constrained in order to justify a high-impact project: "As the stated objective is providing the Pacific Northwest with another natural gas source, it would appear additional data from the region is warranted."¹⁰¹ Given broad skepticism about the need for the proposal, the no action alternative may result in the natural gas needs of the Pacific Northwest and California being met and should constitute a practicable alternative. Bradwood gives very little consideration to the potential for no action.

⁹⁶ ODOE, Dec. 2007. Preliminary State Agency DEIS comments.

⁹⁷ ODOE, Dec. 2007. Preliminary State Agency DEIS comments, at 62.

⁹⁸ Joint Aquatic Resources Permit Application, Attachment H. October 2006.

⁹⁹ ODOE, Dec. 2007. Preliminary State Agency DEIS comments, page 64.

¹⁰⁰ *Id.*

¹⁰¹ NOAA comments on FERC DEIS. December 17, 2007.

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While the project configuration and pipeline routing are purportedly designed to match the needs of Lower Columbia industrial and electricity generation users, some of those users do not appear to be planning for LNG. For example, comments of ODOE indicate that Port Westward is not factoring LNG into its gas supply needs. PGE, which owns generating facilities there, is not necessarily going to buy large quantities of LNG:

Delivery of gas to the PGE power plants at Port Westward is not a compelling reason to select the preferred pipeline route over alternatives. In the Oregon EFSC review of the Port Westward power plant, PGE did not assume that LNG would be available. PGE also did not assume the availability of LNG in its integrated resource plan review before the Oregon Public Utility Commission.¹⁰²

The Bradwood project is clearly designed to meet its expectation of West Coast-wide energy demands – not those of the Pacific Northwest. FERC's assertion that key project objectives involve delivery of gas to Mist and Columbia River industrial/generation users is severely undermined by the fact that less than 1/10 of the project would currently be likely to go to these users.¹⁰³ The quantity of gas proposed for import by Bradwood (1.3 bcf/d) more than doubles Oregon's average daily natural gas use.¹⁰⁴ This also renders it highly unlikely that a large proportion of the gas will be delivered into Oregon and Washington. The unlikelihood of the Pacific NW absorbing a majority of the gas is further illustrated by both the ICF International study and by Williams current long-term contracts for supplies on its Northwest pipeline system.

The enormous size of the project shows that a major economic driver for the project is California gas demand, rather than Oregon's or Washington's. California consumes as much gas as the rest of the West combined¹⁰⁵ and will likely receive most of Bradwood's gas, based on the recently proposed Palomar pipeline proposal (see attached maps). The Bradwood project not only seeks a connection to California's market via Palomar, but it also likely requires additional pipeline capacity aside from the proposed Bradwood pipeline through Cowlitz County due to the capacity limitations on that pipeline (ICF International study for WA EFSEC).¹⁰⁶ NOAA concurs that the Bradwood project and the Palomar project are interconnected, or at least the Western portion of the Palomar project appears to depend on the Bradwood project.

The Daily Astorian has reported the Williams Pipeline, by their own estimates, cannot absorb a significant quantity of Bradwood's proposed LNG supply. Furthermore, Bradwood admits that it plans to use the proposed Palomar pipeline to deliver significant quantities of gas to potential customers in California, according to its S-1 filing submitted to the Securities and Exchange Commission. Based on the true project purpose of serving gas to California, as admitted by Bradwood, the FERC should evaluate West Coast regional needs and alternatives for

¹⁰² ODOE, Dec. 2007. Preliminary State Agency DEIS comments, at 64.

¹⁰³ Joint Aquatic Resources Permit Application, Attachment H. October 2006.

¹⁰⁴ Energy Information Administration. Natural Gas Summary Statistics. Oregon 2001-2006.

¹⁰⁵ EIA Natural Gas Use Summary Data. Dec. 2005. <http://eia.gov>. Quote from Loretta Lynch, former Chair of CA PUC under Gray Davis during Portland lecture on March 4 2007.

¹⁰⁶ ICF International. Nov. 2007.

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meeting these needs. The WA State Pipeline Capacity study, however, concludes that no LNG terminal will be viable in the Pacific NW without a pipeline connection to California:

Local load in the Pacific Northwest is too variable and not large enough to be economic for a LNG terminal. To site a terminal at a size that would be economic, at least 1 Bcf per day to start with, *access to Northern Californian markets would be necessary.*" (emphasis added).¹⁰⁷

The pipeline capacity study and the recent Daily Astorian article show that the Williams pipeline is not capable of accommodating Bradwood's supply without vacating all of its current contracts for gas. The pipeline currently operates near capacity, and long-term supply contracts render the current proposed action potentially not viable.

FERC statements from staff evaluating the proposed Palomar project indicate that the Palomar and Bradwood projects are connected actions, and that the Palomar project may be the true recipient of the large proportion of Bradwood's gas that cannot be absorbed in the Williams system and Lower Columbia River industrial and electricity generation users.. Mr. Doug Sipes, who conducted scoping hearings for Palomar in mid-November, 2007, stated,

The Bradwood LNG terminal and its proposed sendout pipelines are being analyzed in a separate environmental impact statement. The Bradwood meetings were being held out here last week that Paul Friedman from our office held. They were the draft environmental impact -- they were the comment meetings on the draft environmental impact statement. Although gas coming into the Bradwood LNG terminal may ultimately be shipped by Palomar, the terminal developers have stated that the Bradwood LNG terminal and its associated pipeline would be built regardless of whether Palomar is built or not. Also, Palomar would be built to serve Northwest Natural's supply reliability regardless of whether Bradwood LNG is built, *although it would probably not need to be built all the way up to Wauna.*¹⁰⁸ (emphasis added)

The above statements, particularly the statement regarding whether or not Palomar would be built to Wauna, indicate that the two projects are connected actions under NEPA. While Mr. Sipes indicates that he does not believe the projects to be connected, the configuration of the Palomar project will clearly depend on whether Bradwood is approved or not, with the entire Western portion of the Palomar project likely being dependent on the Bradwood proposal. NOAA also indicates its skepticism regarding the separateness of the two actions, "FERC should include anticipated impacts of segment 2 of the Palomar Pipeline project in the FEIS."¹⁰⁹

¹⁰⁷ ICF International. Nov. 2007. Review of Pipeline Utility Corridor Capacity and Distribution for Petroleum Fuels, Natural Gas, and Biofuels in SW Washington. Submitted to WA State EFSEC. at 69.

¹⁰⁸ Doug Sipes. FERC staff for Palomar Gas Transmission project. 12 November 2007. Official FERC transcript, at 14 -15.

¹⁰⁹ NOAA DEIS Comments, at 5. Submitted 12-17-07.

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FERC must acknowledge that the true project purpose of the Bradwood proposal is significantly altered due to its relationship to the Palomar project. California, which uses vastly more gas than Oregon and Washington combined (see below), will receive significant quantities of gas from Bradwood via the Palomar project if both are built.¹¹⁰ FERC must re-evaluate the purpose and need for the project in this regional, California-driven context. As noted above in our comments on the Alternatives analysis, both Palomar Gas Transmission project representatives (such as Gregg Kantor) and FERC representatives (Mr. Sipes, FERC transcripts for Palomar project) have made statements that support our conclusion that the need analysis for the project must include Californian demand, as it will likely be served from Bradwood via the Palomar pipeline.

The FERC defines its project purpose too narrowly. If the purpose is properly defined as delivering clean, affordable energy into the West Coast market, many other alternatives are available -- some of which, including continued or increased reliance on Rockies gas could fulfill all the project purposes. California gas needs are also a key factor to be considered in the needs analysis, as the project apparently intends to connect to California markets via the Palomar pipeline. Oregon PUC analyst, Ken Zimmerman, stated, "So far, the only people that have shown any interest in contracting with these LNG guys are in California."¹¹¹ Bradwood also acknowledged publicly in recent Clatsop County land use hearings that it already has an agreement to use the Palomar pipeline in the future -- an agreement that has been described in Bradwood's S-1 filing with the Securities and Exchange Commission in December 2006.

California gas needs should be evaluated as part of the DEIS needs analysis. More regional data is required to evaluate whether the project will serve a legitimate regional need (including California), and obviously alternatives must be considered on a regional scale if there is need for increased energy supply -- alternatives including energy efficiency, conservation, renewable energy, alternative natural gas supplies, and alternative LNG sites.

FERC fails to accurately evaluate the need for LNG

FERC must evaluate the need for LNG on a national, state, and regional scale. The DEIS rests its need analysis largely on a national presumption of need for LNG imports, and is inadequate in its evaluation of the regional need for LNG imports. In our Alternatives section we discuss why natural gas supplies from the Rockies as well as renewable energy, conservation, and efficiency initiatives in the Pacific Northwest can provide alternatives to the proposed project. The DEIS does not discuss gas demand adequately for the major market driving the potential need for the project -- California. Because the project will likely serve California if built, the DEIS must evaluate whether the Bradwood project is justifiably serving a need in the Pacific market as a whole -- including California.

Yet, there is ample evidence to demonstrate that California, which drives the regional market for natural gas by using as much gas as the rest of the Western states combined, does not need LNG to meet its future energy requirements. As discussed in our alternatives section, there

¹¹⁰ EIA Gas Summary data for OR, WA, CA. Annual Energy Outlook. 2006.

¹¹¹ "Pipeline Battle Hinges on Need, Livability." Ted Sickinger. *The Oregonian*. August 21, 2007. Ken Zimmerman quoted as energy analyst for the Oregon Public Utilities Commission.

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are many regional alternatives to LNG. Just as importantly, however, the projected demand for natural gas in the West Coast must be considered in light of growing conservation, renewable, and energy efficiency programs. There is enormous potential to limit the use of fossil fuels, and the State of Oregon recently passed legislation that may reduce growth in natural gas consumption to an almost negligible level from the baseline described by NWGA, according to a 2005 report completed by the American Council for an Energy Efficient Economy.¹¹² The report indicates that, by 2010, Oregon can limit its natural gas use by 5 percent, compared to base case assumptions. Looking ahead, natural gas demand could be limited by 8 percent by 2015 and 12 percent by 2020.¹¹³ These gains in natural gas conservation and efficiency would offset most, if not all, of the growth projected by the NWGA. They offset all of the projected 8-9 percent of growth projected by the EIA for 2025. FERC must re-evaluate the need for the project, taking the impact of renewable energy, efficiency, and conservation of energy into account.

California demand reduction should also be considered in evaluating the need for LNG. The ICF International study recently completed for Washington EPSEC shows that no project in the Pacific Northwest is viable without also serving the California market, and FERC should have evaluated the need on a more regional basis, including California. Information from California indicates that there is enormous potential for renewable energy, energy efficiency, and conservation that precludes the need for LNG altogether. In 2006, the Santa Barbara Community Environmental Council (Council) prepared a report analyzing whether California needs LNG to meet its current and future projected energy demands.¹¹⁴ According to the report, California can achieve its energy needs without importing LNG. In fact, the Council concluded that California can satisfy 133-381% of the State's additional natural gas demand through energy efficiency and renewable supplies.

The DEIS concludes, "neither conservation measures nor renewable energy sources are expected to replace the need for additional future natural gas supplies in the Pacific Northwest" (DEIS, at 3-7). FERC's confidence that increasing gas demand will necessitate LNG import in the Northwest is clearly not shared by Oregon Department of Energy. It also falsely concludes that independent regional energy forecasts conclude that increasing gas supply and gas-fired generation are necessary for meeting future demand. The NW Power and Conservation Council clearly indicate that wind power is a growing and viable alternative for meeting growth in generation capacity.¹¹⁵ As alternatives to fossil fuels increase in renewable energy, energy efficiency, and conservation, natural gas prices may be relieved of some of the strain and vulnerability to speculation and manipulation that has driven recent high natural gas prices.¹¹⁶

On a national scale, the DEIS exaggerates the need for LNG tremendously while failing to evaluate a realistic projection of regional needs. According to the U.S. Department of Energy,

¹¹² Elliot, R Neal and Anna Shipley. April 2005. *Impacts of Energy Efficiency And Renewable Energy on Natural Gas Markets*. American Council for an Energy Efficient Economy. at 6.

¹¹³ Elliot, R Neal and Anna Shipley. April 2005. *Impacts of Energy Efficiency And Renewable Energy on Natural Gas Markets*.

¹¹⁴ Tam Hunt. 2006. *Does California Need LNG? Report for the Community Environmental Council*.

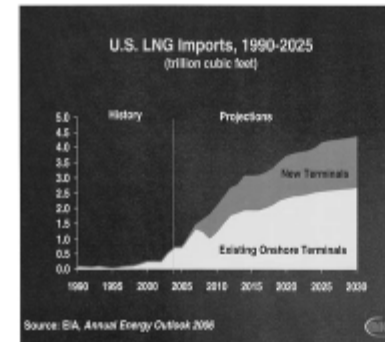
¹¹⁵ NW Power and Conservation Council. 2005. *Fifth Power Plan: Summary of Generation*.

¹¹⁶ Elliot, R Neal and Anna Shipley. April 2005. *Impacts of Energy Efficiency And Renewable Energy on Natural Gas Markets*.

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the country has 60 years of natural gas supplies available to meet our needs.¹¹⁷ Given that the alleged need for natural gas is the driving force for this Project and the reason that the range of alternatives has been so narrowly prescribed, this is a critical, threshold issue for the lead agencies to consider. If we don't need LNG, we don't need to accept the tremendous risks and impacts that would result from the proposed Project.

Future expansion of LNG terminals, according to US Department of Energy, may provide a substantial increase in LNG. Terminals under construction and expansion are already expected to greatly increase LNG import capacity in the case that the U.S. opted to use more of this foreign fossil fuel. There are over a dozen approved LNG terminals, and several under construction. Existing facilities will expand, and the EIA estimates that current onshore facilities will provide more LNG than those under construction. Hence, the need for LNG is extremely limited beyond those facilities currently existing or already being built. If, as the EIA indicates, the existing four onshore terminals will expand to import large quantities of LNG, then the remainder of future projected LNG demand can likely be met with as many or fewer terminals. FERC both overstates the need for LNG in the DEIS, and it fails to account for this basic fact – that currently producing LNG terminals and those under construction are likely to fulfill any future LNG needs for natural gas demands on a national scale. The gaps in FERC's analysis for the Pacific Northwest and the West Coast region, as a whole, exacerbate FERC's problems in demonstrating that the Bradwood project is needed.¹¹⁸



FERC falsely concludes that LNG will be competitive in price

The FERC DEIS presumes that LNG will offer a new gas supply at a "competitive price." FERC does not provide evidence to support the conclusion that LNG is an economically reasonable source of gas supply for the region. Indeed, FERC has questioned

¹¹⁷ U.S. Department of Energy, *Natural Gas Fundamentals: From Resource to Market* (2003).

¹¹⁸ EIA. *Annual Energy Outlook*, 2006.

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Bradwood's estimates of its supply in previous documents, but the DEIS does not provide adequate analysis to evaluate the potential negative economic impact of reliance on LNG in the future.

The price of LNG will be a key factor in determining how, and if, the fuel is used once it is imported. ODOE concludes that industrial use of natural gas is projected to decline by 4 percent, and that gas-fired generation may grow to meet demands – yet both of these factors depend at least somewhat on price. As noted above, natural gas prices may from North American sources depend on the success of conservation, efficiency, and renewable energy programs and development. The American Council for an Energy Efficient Economy concludes that “significant price reductions are possible by relieving demand” through a variety of efficiency, conservation, and renewable programs.¹¹⁹ Their report specifically cites Oregon's Renewable Portfolio Standard as a potential method for relaxing future growth in demand for electricity from natural gas-fired generation. Hence, comparison of LNG and North American gas costs should take Oregon's RPS and other similar programs in Washington and California into account. The comparison may render LNG even more expensive when compared to LNG.

Furthermore, according to many published reports, current pricing is more reflective of speculation than market fundamentals. North American supply basins are capable of producing natural gas more cost-effectively than LNG:

Costs are way below current prices. For the most expensive domestic production, deep water Gulf of Mexico, the full-cycle replacement costs may be as high as \$3.25-3.50/MMBtu, the report says. Imported LNG falls near that range also at \$2.75-3.75. Other North American full-cycle production costs are: overall Gulf of Mexico \$2.75-3.00/MMBtu; onshore Gulf Coast \$2.50-2.75; Canadian \$2.25-2.75; and Rockies \$2.00-2.25 . . .

¹¹⁹

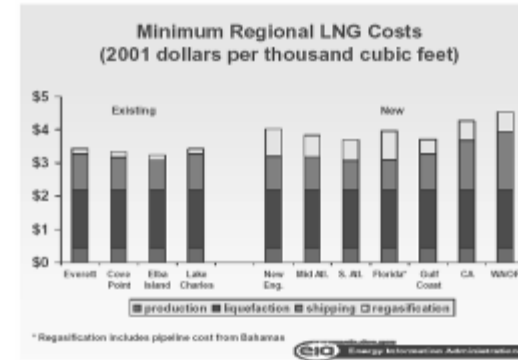
In contrast, EIA data show that LNG delivery to the Pacific NW is a relatively high-priced alternative for meeting natural gas demands¹²⁰.

¹¹⁹ Elliot, R. Neal and Anna Shipley. April 2005. *Impacts of Energy Efficiency And Renewable Energy on Natural Gas Markets*

¹²⁰ Report by James R. Choukas-Bradley, a principal with the firm Miller, Bulis & O'Neill, and Natural Gas Intelligence, February 18, 2005. *Analysis Assail Hyped Gas Market, See Prices Falling*. See attached RACE coalition comments to Clatsop County and regarding the Cabrillo offshore LNG facility.

¹²¹ Annual Energy Outlook, 2004. Taken from Loretta Lynch March 2007 presentation, “The Case Against LNG.”

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North American natural gas production costs and EIA data show that LNG is not likely to depress prices below current levels. In fact, conservation, efficiency, and renewable alternatives are economically viable alternatives to both, particularly LNG. The DEIS alternatives analysis does not compare costs or provide a reasonable projection of its own future gas supply costs. In contrast with supplies in North American, LNG is neither cheap nor abundant.¹²² James Jensen presented his analysis of the global LNG trade, and concluded that the Pacific Rim LNG market will remain tight into the foreseeable future, and that LNG supplies are susceptible to the same geopolitical factors that create instability and volatility in oil pricing. Supply uncertainty and the willingness of major Far East LNG consumers such as Japan, Korea, and China to link the price they pay for LNG to the price of oil make it highly unlikely that “cheap” LNG will ever be available on the West Coast of Canada or the U.S.¹²³

In addition, the track record for other LNG ports around the country provides evidence that such facilities do not operate full-time due to fluctuations in demand and price, as well as competition with foreign demand and market availability. According to a recent interview of Joseph Kelliher, former chairman of the Federal Energy Regulatory Commission,

“The most recent data I’ve seen suggests that [LNG facilities] were operating at less than 40 percent capacity.” When asked why, Mr. Kelliher replied, “It’s because we have to compete with foreign demand. LNG comes to this country either by long-term contract or in spot shipments. We’ve been losing out on a lot of spot shipments to Europe. If prices are higher elsewhere, that’s where the spot shipments are going to go. . . . LNG import facilities are operating at about 50 percent capacity worldwide. The world has twice the capacity to import LNG as it has to make LNG. That gives

¹²² J. Jensen, *Progress Report on Worldwide LNG Trade*, presented at CEC Staff Workshop on the Inputs, Assumptions, and Issues for the Natural Gas Assessment Report, March 26, 2007.

¹²³ Id.

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developers of the liquefaction facilities more choices when it comes to what markets they prefer to use."¹²⁴

An Associated Press news article, entitled "Natural gas imports leave U.S. vulnerable," explains that "as America becomes a bigger player in the global natural gas trade, its vulnerability to faraway production snags and price gyrations will rise, as will its dependence on energy from the Middle East and other volatile regions."¹²⁵ This article, which reports on the fact that U.S. natural gas supplies "tightened in January because LNG originally scheduled for delivery at a terminal in Cove Point, Md., was redirected to Europe," points out that even long-term supply contracts can be affected by the global market. Matthew Simmons and other energy analysts continue to suggest that LNG is trading globally at the lower end of its potential price range.¹²⁶ EIA data also conclude that LNG prices may fail to compete in the future, with tightening global supplies in the Pacific Rim and other basins resulting from competition with Asian and other markets.¹²⁷

To summarize, FERC cannot assume that LNG is providing a competitively priced source of natural gas. There are trends at the regional, national and global scale that may increase the gap between lower-priced North American supplies and likely high-priced LNG. In evaluating the purpose and need for the project, FERC must disclose the basis for its price assumptions, and FERC should evaluate the overall impact of potential gas price increases on the Western energy market.

The DEIS fails to consider connected actions

"The CEQ regulations require 'connected actions' 'to be considered together in a single EIS.'" *Save the Yaak Committee v. Block*, 840 F.2d 714, 719 (9th Cir. 1988), quoting *Thomas v. Peterson*, 753 F.2d 754, 758 (9th Cir. 1985). Connected actions (i) automatically trigger other actions which may require an EIS, (ii) cannot or will not proceed unless other actions are taken previously or simultaneously, or (iii) are independent parts of a larger action and depend on the larger actions for their justification. *Id.* 40 C.F.R. § 1508.25(a)(1).

The Ninth Circuit applies an "independent utility" test to determine whether actions are "connected" within the meaning of these CEQ regulations. *Native Ecosystems Council v. Dombeck*, at 894, citing *Wetlands Action Network*, 222 F.3d at 1118. "Where each of two projects would have taken place with or without the other, each has 'independent utility' and the two are not considered connected actions." *Id.*; see also *Morongo Band of Mission Indians v. FAA*, 161 F.3d 569, 580 (9th Cir. 1998). Where, however, a "close nexus" exists between two actions, such that one would not take place but for the other, the actions qualify as "connected" and must be analyzed in a single NEPA document. *Save the Yaak Committee*, 840 F.2d at 720. For example, the Ninth Circuit has repeatedly required the Forest Service to analyze timber sales and road reconstruction in a single NEPA document where the purpose of the road reconstruction "was to make the log hauling more efficient, productive, and safe," and nothing suggested that

¹²⁴ "Building up Gas," Martin Rosenberg, *EnergyBiz Magazine*, 2006.

¹²⁵ Natural gas imports leave U.S. vulnerable," *Burl Post, Associated Press*, Feb. 12, 2006.

¹²⁶ Simmons Oil Monthly, *Macro Energy Outlook* 2006, at 19.

¹²⁷ EIA LNG Overview, 2004, LNG price projections.

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"the road was reconstructed for any other reason." *Id.* Similarly, where a timber sale would not proceed without construction of a logging road, and the road would not be built but for the contemplated timber sales, the Ninth Circuit has determined that these actions are "inextricably intertwined" and must be analyzed in a single NEPA document as connected actions. *Thomas v. Peterson*, 753 F.2d at 759. Here, neither the Bradwood Terminal nor the 102.5 mile western section of the Palomar Pipeline have any "independent utility." Rather, the two projects are "inextricably intertwined" and failure to analyze them in a single EIS violates NEPA.

As discussed in great detail in the alternatives analysis above, the Bradwood Terminal would not be built without access to the California market provided by the proposed Palomar Pipeline. The natural gas market in Oregon and Washington simply cannot absorb such an increase in supply. Trying to skirt this issue, Bradwood redefines the "Northwest" to include much of the West coast and then analyzes the increased demand for natural gas in the region. However, this increased demand comes primarily, if not exclusively, from California; without access to that market, no reason would exist for building the Bradwood Terminal. The proposed Palomar Pipeline provides that necessary access and, therefore, the two proposed projects must be analyzed together in a single EIS.

Yet, the DEIS asserts that the Bradwood Landing Project is in no "way dependent upon Palomar" because:

Bradwood has proposed its own natural gas sendout pipeline, analyzed in this document, which would connect the Bradwood Landing LNG terminal with the interstate pipeline grid through an interconnection with Williams Northwest pipeline near Kelso, Washington.

DEIS 2-28. However, without access to the California market through the proposed Palomar pipeline, construction of the Bradwood Terminal would make little if any economic sense. Rather, the terminal depends on access to the California markets that the Palomar pipeline will provide and, therefore, the projects must be analyzed together in a single EIS.

The proposed Palomar Pipeline extension would not be built but for the Bradwood Terminal. In fact, the President and Chief Operating Officer of NW Natural, has stated that the Palomar "project is being designed so that, if an LNG terminal is constructed on the Columbia River, the Palomar Pipeline can be extended to serve it." Bradwood has requested such an extension:

[W]e have recently submitted a request for service to TransCanada and NW Natural . . . [to] construct, own and operate a pipeline that would connect the Bradwood terminal to Williams' Northwest pipeline at Molalla and TransCanada's GTN Pipeline near Madras. This will provide Bradwood and/or other shippers with gas transportation service from the LNG terminal to the pipeline systems of both the Northwest Pipeline Company and TransCanada's GTN Pipeline, which can deliver approximately 2.0 Bcf/d into Northern California at the Malin, Oregon interconnect point.

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Bradwood 12/15/06 Registration filing with SEC, page 54. While the DEIS notes that the Palomar Project in its entirety "is not dependent upon the authorization or construction of the Bradwood Landing Project," DEIS, at 2-28, it is clear that the extension of the Palomar Pipeline to Bradwood will not be built if the Bradwood Terminal is not constructed.

The potential environmental impact of an extension of the Palomar Project would likely be significant. The pipeline would extend 220 miles from Bradwood to near Madras, Oregon, crossing wetlands and other sensitive habitats as well as the property of numerous landowners. DEIS, at 2-28. Construction through wetlands would likely cause pollution in streams from increased sedimentation and temperature, and deposition of gasoline and oil. Many of these streams are designated critical habitat for numerous species; these construction activities could lead to "take" of these species in violation of the ESA. The construction would also necessitate extensive timber cutting through habitat of a variety of plants and animals listed as threatened or endangered under the ESA, including the northern spotted owl and marbled murrelet. DEIS, at 3-10. Both construction and maintenance of the pipeline extension would result in noise, air, and light pollution. These extensive environmental impacts must be considered together with the environmental impacts of the Bradwood Terminal because neither the terminal nor the pipeline extension would be built but for the other.

As in *Thomas v. Peterson*, the Bradwood Terminal would not proceed without access to California markets and the Palomar pipeline would clearly not be constructed "but for" the Bradwood terminal. 753 F.2d at 758-59. Similarly, as in *Save the Yaak*, the purpose of the Palomar pipeline extension is to connect the Bradwood Terminal to the California market. No indication exists that NW Natural and TransCanada would build the pipeline for any other reason. 840 F.2d at 720. These "inextricably intertwined" projects must be analyzed together in a single EIS. *Thomas v. Peterson*, 753 at 758-59. Failure to do so violates NEPA. 40 C.F.R. § 1508.25(a)(1).

The DEIS dismisses the need to discuss the cumulative impacts of the Palomar Pipeline Project with the proposed terminal by merely asserting:

the current route proposed by Palomar travels south away from areas impacted by the Bradwood Landing Project [and] cumulative impacts associated with the Palomar Pipeline Project would be primarily limited to the area near that Bradwood Landing LNG terminal location.

DEIS, at 4-446; see also DEIS, at 4-454 ("The Palomar Pipeline project would contribute to visual impacts as a result of tree clearing along the right-of-way. The cumulative impacts would be limited to the LNG terminal area since the proposed Palomar Pipeline would progress south and away from the other Bradwood facilities"); DEIS, at 4-456 ("The Palomar Pipeline . . . would be located within the immediate vicinity of the proposed LNG terminal; however, only a small portion of the project would be in the vicinity of the Bradwood Landing LNG terminal. Therefore, potential cumulative impacts on traffic from construction would likely be temporary and short term"). This analysis overlooks the fact that the two projects lack "independent utility" and must be analyzed in a single NEPA document. *Native Ecosystems Council*, at 894, citing *Wetlands Action Network*, 222 F.3d at 1118. Therefore, the proper inquiry is not limited, as the

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DEIS assumes, to potential cumulative impacts within the geographic vicinity of the terminal; rather, FERC must consider the potential impact of both the Bradwood Terminal and the Palomar Pipeline Extension as one project. *Id.*

FERC Fails to Adequately Address the Environmental Impacts of the Project in the DEIS

One of the primary goals of NEPA is to recognize "the profound impact of man's activity on the interrelations of all components of the natural environment." 42 U.S.C. § 4331(a). The reason behind this goal is to ensure each person "enjoy a healthful environment . . . and to contribute to the preservation and enhancement of the environment." *Id.* § 4331(c). In this DEIS, FERC fails to meet the requirements of a thorough and accurate assessment of all the environmental impacts of the project.

It is difficult to conceive of a project with greater unacceptable impacts to an area of such high ecologic value. The Oregon Department of Environmental Quality stated that it "has not been asked to review a project with in-water and wetland impacts of this magnitude **in the history of the 401 Certification Program**."¹²⁸

DEQ recognized the enormous impact on protected resources, stating that even if mitigation is successful:

the project will still result in a permanent loss of 33 acres of wetland and 58 acres of in-stream areas, as well as temporal losses from an additional 98 acres of temporary wetland impacts. Not only is this **contrary** to both the intent and requirements for mitigation to fulfill permit requirements under the Clean Water Act, but it is of additional significance under the recent EPA elevation of the Columbia River to a national priority.¹²⁹

FERC must make specific findings on the potential impacts of the project on the impact to: physical substrate; water circulation, fluctuation, and salinity; turbidity; contaminants; aquatic ecosystems and organisms; disposal sites; cumulative effects on the aquatic ecosystems; and secondary effects on the aquatic ecosystems. The DEIS fails to assess adequately the tremendous impacts on human environment.

Terminal Dredging

Physical and chemical impacts

Dredging will degrade flow and create a sediment trap

The DEIS failed to consider the impacts of the dredging on the Columbia River. The proposed 58-acre hole dredged to 43 feet will permanently modify the geomorphology of the river bed, which will affect flow and erosion. The large hole will be located at the head of Clifton channel. The hole will decrease the river's velocity both within Clifton Channel and the

¹²⁸ Oregon Draft State Agency Comments. Oregon DEQ, at 10

¹²⁹ Oregon Draft State Agency Comments. Oregon DEQ, at 8

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mainstem of the Columbia. The decreased velocity will harm salmon by increasing the travel time for smolts traveling to the ocean.¹³⁰ Increased travel time for smolts is already a severe problem for the affected salmon populations.¹³¹

The decreased velocity will also impact the geomorphology and aquatic life both upstream and downstream of the 58-acre hole. DEQ noted that these upstream and downstream impacts of the geomorphic changes "have not been fully analyzed by the applicant." The potential upstream and downstream impacts of the 58-acre hole include "unacceptable levels of erosion (banks on either side and around multiple in-stream islands), introduction of toxics to the waterway, habitat loss, and wetland loss – all of which reduce water quality."¹³²

While the hole will decrease velocity, it will increase flow into Clifton Channel. Increasing flow into a channel will decrease channel stability, thereby decreasing substrate stability and increasing erosion.¹³³ Not only will there be increased flow into the Clifton Channel, but this increased flow will likely cause erosion at the mouth of the channel leading to further deepening. Removing sediment and leaving a hole in a river can cause downstream erosion of the channel bed.¹³⁴ This further deepening of the channel will in turn result in greater flows into the Clifton Channel.

Downstream of the dredge hole, the velocity will increase, which will cause scouring and erosion of the channel bed and shorelines. The erosion will be further exacerbated because there will be a lack of sediments to replace the channel bed sediments removed because of erosion. The dredged hole will act as a huge sediment sink, permanently starving the downstream area of Clifton Channel of sediments. This increases erosion and harms aquatic life that depends on sediment for habitat and the associated nutrients. This lack of replacement sediments is permanent because the maintenance dredging will continually remove the captured sediment from the system. When extraction of sediments outpaces the amount of sediments being transported from upstream, there will be a net loss of sediments for the system.¹³⁵

FERC has failed to independently assess the veracity of the models used by Bradwood to predict the impact of the dredging on hydrology. Therefore, the DEIS fails to assess or fully disclose the environmental impacts. DEQ raised concerns about the Bradwood's modeling, stating, "initial review of the modeling presented raises questions about the appropriateness of the models used (e.g. why a 2-D model was used rather than a 3-D model which is available),

¹³⁰ Rhodes, Summary of Review of FERC Biological Assessment and Essential Fish Habitat Assessment for Bradwood Landing LNG Terminal. Report to Columbia River Intertribal Fish Commission, at 5.

¹³¹ *Id.*

¹³² Oregon Draft State Agency Comments. Oregon DEQ, at 4.

¹³³ Mitchell, B., Lind, P. and Robson, B. 1999 Hypothesis of the ecological genetics of environmental flows in lowland rivers. In Rutherford, I. and Burley R. (Eds) Proceedings, Second Australian Stream Management Conference, Vol 1, Adelaide, pp addendum

¹³⁴ Rutherford, I. and Budalov, M. 1996. A Sand Management Strategy for the Glenelg River and its Tributaries, Western Victoria. A Report to the Department of Natural Resources and Environment, Victoria and Southern Rural Water. Cooperative research Centre for Catchment Hydrology.

¹³⁵ Erskine, W.D., Geary, P.M., Oullet, D.N. 1985. Potential impacts of sand and gravel extraction on the Hunter River, New South Wales. Australian Geographical Studies 23, at 71-86.

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lack of a physical basis for models used, and their predictive abilities given average results and highly complex relationships between erosion, sediment transport and deposition."¹³⁶

The DEIS stated that modeling activities conducted by Bradwood indicate "hydraulic characteristics of the Columbia River and its channels caused by the proposed project would generally be minor." DEIS at 4-40. FERC should not have relied completely on modeling to assess changes in sediment and stream flow characteristics because models have a tendency to produce inaccurate data when trying to characterize highly complex systems. Models are useful to predict possibilities and for learning how different factors interact in a system. However, models do not predict the truth, only possibilities, and FERC should have taken into account other studies and observations pertaining to changes in stream flow and sediment transport resulting from changes in stream morphology due to dredging.

The Columbia River system is highly complex system, and it is unlikely that a model could account for all the factors in the system. For instance, factors that affect stream flow in the Columbia River include river flows, tides, flooding, river slopes, channel cross-sectional geometry, sediment characteristics, bedforms, shoreline stability, and many more factors too numerous to list. Failure to include even one factor in a model could produce results that are completely wrong, although past trials have produced results that closely resemble the river system under specific conditions. Despite these problems, FERC failed to assess the veracity of the models used by Bradwood for modeling the Columbia River.

FERC must further analyze stream flow characteristics and sediment transport through research of the literature or require Bradwood to conduct further studies. FERC improperly bases its conclusion on the models used by Bradwood and fails to conduct the thorough and accurate analysis required by the CWA.

Changes in current pattern and flow can degrade environmental values. The DEIS failed to analyze the adverse impacts to the: location, structure, and dynamics of aquatic communities; shoreline and substrate erosion and deposition rates; the deposition of suspended particulates; the rate and extent of mixing of dissolved and suspended components of the water body; and water stratification." 40 C.F.R. § 230.23. Because of the very large scale of the Bradwood dredging in a vital area of the estuary, FERC must thoroughly analyze each of these adverse impacts.

In addition, the geomorphic modification due to dredging affects the normal water fluctuations. The DEIS failed to consider the impacts to the changes in salinity gradient, nutrient balance, and dissolved oxygen balance. The DEIS failed to consider how these changes will adversely affect communities of aquatic life, induce populations of nuisance organisms, modify habitat, reduce food supply, restrict movement of aquatic fauna, and change the adjacent upstream and downstream areas.

FERC must also address concerns raised by NMFS that are not adequately addressed by the DEIS. NMFS noted that dredging has the potential to cause: changes in the morphology and hydraulics of the Clifton Channel; alteration of sediment transport in the main navigation channel and impacts to downstream Tenasille Island and the Lewis and Clark National

¹³⁶ Draft State Agency Comments. Oregon DEQ, at 4.

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Wildlife Refuge; change in water circulation in the dock area to adversely affect shallow water habitat; scour at the shoreline from altered depth contours and from vessel berthing and unberthing at the terminal' and turbidity from the dredge activity, including suspended solids concentrations, size and duration of the plume. The DEIS's analysis of these issues, if it occurred at all, is wholly inadequate, and does not satisfy NEPA's duty to consider the environmental impacts of the project.

The DEIS acknowledges that the dredging will have "an influence on flow and sediment transport within the main navigation channel." DEIS at 4-40. Yet, it fails to discuss the extent of the change and the affect on aquatic life. In addition, Bradwood's models of sediment transport relied on in the DEIS are based on the incorrect assumption of uniform deposition within the turning basin. FERC must analyze the impacts under physically realistic conditions in which deposition will be greatest adjacent to the navigation channel.

Bradwood's assumptions regarding maintenance dredging are also problematic. Bradwood predicts it will need to dredge every 2 to 4 years. However, maintenance dredging is required if the turning basin or channel fills in with 1 foot of sediment. This may happen much quicker than 2 to 4 years. For example, the models indicate that in just 10 days of high flood water, a half foot of deposition would occur. The DEIS fails to analyze whether the maintenance dredging is realistic, especially in light of the predicted increased flooding due to global warming.

Further, the DEIS fails to consider the stability of the dredge walls. Bradwood proposes that the sides of the dredged area would be cut to a 3 (horizontal) to 1 (vertical) slope. This slope is too steep for the instable Columbia River sediments. Slope failure will occur, which will cause additional turbidity, toxic sediment problems, and require more frequent maintenance dredging. FERC must investigate the appropriateness of the 3 to 1 slope specific to this location.

Dredging will increase turbidity, temperature, and decrease dissolved oxygen

The DEIS fails to consider adequately the impact of pollutants caused by dredging. Dredging associated with the proposed Bradwood LNG Project will increase the turbidity of the river and lead to higher water temperatures. Turbidity has a number of adverse effects on water quality, including reducing light for photosynthesis by algae and plants, increasing temperature, and decreasing dissolved oxygen levels. Increases in temperature as a result of turbidity are caused by the suspended particles absorbing more heat from sunlight and, therefore, increasing the temperature of the water around the particles. The DEIS fails to analyze how water temperature will be changed due to increases in turbidity, and how any changes in water temperature resulting from increased turbidity due to dredging activities will exacerbate the ODEQ 303(d) water quality-limited status of these waters. Also, as a result of turbidity and increased water temperatures, dissolved oxygen levels and light will be decreased harming aquatic biota including federally protected fish species. The DEIS also fails to disclose and consider that the dredging will violate water quality standards ("WQS") in Oregon and Washington.

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The potential turbidity increases and the impact to aquatic life are great due of the large size and long duration of the dredging. DEQ stated:

Dredging is proposed to occur **non-stop** (24 hours per day, 7 days per week) for 2-3 months. No other proposal for dredging in the Columbia has operated 24-hours per day, 7 days per week for multiple months. Impacts to **13 listed salmonid species/ESUs, sturgeon** . . . , resident aquatic organisms (mammals, fish, amphibians and reptiles, invertebrates, sediment dwellers), and terrestrial species are not fully identified or known based on non-stop action over this duration, as it is unprecedented. **Potentially debilitating impacts to these species include noise, continuous light, suspension of sediment, turbidity, loss of salmonid habitat** and ability to rest or avoid predation, and potential attractant for sturgeon to a dangerous construction zone.

Oregon Preliminary Comments at 11. The DEIS fails to consider adequately any of this impacts described by DEQ.

Consultant Jonathan Rhodes noted that dredging will significantly increase turbidity, which will have negative effects on salmonids by impairing their ability to feed and by causing gill damage.¹³⁷ Elevated turbidity can also adversely affect benthic macroinvertebrates, upon which salmon and other organisms rely for food.¹³⁸ The long-term and constant nature of this dredging are particularly troubling and distinguish this project from smaller dredging operations that occur in the Columbia River. This controversial project requires close scrutiny. FERC must analyze and make findings on the size, scope, duration, and intensity of the dredging, and how each affects aquatic life.

The DEIS also suffers from factual errors, faulty analysis, and a simply lack of depth of understanding. The DEIS states that dredging will "result in a temporary increase in suspended solids in the water around the dredged area and the subsequent settling of the suspended particles, or sedimentation." DEIS at 4-69. In addition, the DEIS states that "[t]he maximum additional suspended solids concentration in the water column resulting from dredging activities would range from a high of 1 milligram per liter (mg/L) at the dredge site to less than 0.1 mg/L before reaching Tenasillahe Island." DEIS at 4-41. FERC provides no justification for these assumptions. Are they from modeling and, if so, what assumptions were used? FERC gives no basis to evaluate these numbers. Model predictions for turbidity "are often highly inaccurate."¹³⁹ The DEIS does not provide any information on the accuracy of models, despite the widely known belief of the inaccuracies of turbidity modeling.

In addition, the DEIS asserts that there will only be 0.5 percent spillage of sediments during dredging, but again fails to qualify how it reached that number. DEIS at 4-69. In fact, research has revealed that problems leading to increased turbidity can arise using cutterhead

¹³⁷ Rhodes, Summary of Review of FERC Biological Assessment and Essential Fish Habitat Assessment for Bradwood Landing LNG Terminal. Report to Columbia River Intertribal Fish Commission

¹³⁸ Id.

¹³⁹ Id at 6.

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dredges when dredging hard-packed sand.¹⁴⁰ The DEIS notes that “[t]he results of grain size analyses indicated that the sediments in the proposed dredging area generally consist of sands.” DEIS at 4-33. But, the DEIS also states that sampling zones in the proposed dredging areas include “dense gravel layers, wood, and densely packed sands.” DEIS at 4-32. The DEIS concluded that dredging activities will lead to minor turbidity impacts, but it failed to properly analyze the impact of diverse substrates. The hydraulic cutterhead dredging equipment may encounter difficulties that may lead to further turbidity and pollution due to gravel, wood, and densely packed sand. The DEIS fails to evaluate how the cutterhead dredging equipment will operate under these conditions. FERC should require Bradwood to propose a plan to deal with difficulties encountered during dredging.

Although some specially designed hydraulic cutterhead dredges may reach 0.5 percent spillage, the DEIS fails to disclose what kind of cutterhead dredge will be used by Bradwood for dredging. This is vitally important information for the public to assess the veracity of these statements because without knowing what type of cutterhead dredge will be used, the public can not begin to evaluate what kind of sedimentation will be caused by Bradwood’s dredging activities. Furthermore, any modeling conducted on behalf of Bradwood is suspect until justification is given for using a 0.5 percent spillage rate. All cutterhead dredges are not the same. Studies indicate that conventional cutterhead dredging “can liberate considerable amounts of turbidity and associated contaminants to overlying water.”¹⁴¹ Additionally, selection of the proper cutterhead for the type of sediment, in addition to correct rotational speed and hydraulic suction, to obtain reduced suspension rates of sediments is rarely achieved. (Herbich 2000). Therefore, knowing not just the type of cutterhead dredge used but the anticipated methods of using the dredging equipment are important factors that must be disclosed for the public to properly analyze the effects of dredging at the proposed Bradwood LNG Project. FERC must make specific findings on the types of dredging equipment in order to fully analyze the impacts dredging will have on turbidity and overall pollution.

DEQ recognized that Bradwood’s proposed dredge equipment may be inadequate:

All dredging is proposed to be accomplished via hydraulic suction. However, 12 of 31 cores planned for sediment sampling to depth (-43 ft) hit refusal before reaching proposed depth. The contractor’s assumption was that obstructions were caused by dense gravel layers, wood and densely packed sand comprising an identified layer of consolidated sediments. No information is offered as to the ability of the proposed hydraulic equipment to penetrate the consolidated materials. Procedures proposed by FERC for removing obstructions in channel deepening include using a clam shell bucket and blasting. Both of these methods may result in significantly deeper disturbance and greater impact to remove erratic materials. Further analysis and justification is required for such contingency measures.

¹⁴⁰ Kato, H., Y. Segi, Y. Takei and T. Harada. 2000. Development of Dredging Method for Hard-Packed Sand. Underwater Technology. In Proceedings of the 2000 International Symposium on Underwater Technology, pages 508-512, Tokyo, Japan.

¹⁴¹ Cooke, G.D., E.B. Welch, S.A. Peterson and P.R. Newirth. 2005. Restoration and Management of Lakes and Reservoirs, 3 ed. CRC Press, New York, NY, 616 pages.

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Oregon Preliminary Comments at 5.

FERC, therefore, must analyze the turbidity caused by the various types of dredges that may be utilized, including clam shell dredge and blasting. These dredge methods will produce significantly more turbidity.

In addition, the DEIS failed to consider adequately the impacts of maintenance dredging. Maintenance dredging will result in further degradation of water quality through repeated resuspension of sediments. The DEIS asserts that maintenance dredging will occur about every 2 to 4 years and Bradwood estimates they will dredge approximately 80,000 cubic yards of sediment during each maintenance cycle. DEIS 4-76. However, the DEIS fails to inform the public how Bradwood calculated the maintenance dredging frequencies and amounts. Furthermore, the large variation in frequency shows a substantial uncertainty in the calculations. If dredging must be conducted every 2 years as opposed to 4, there will be twice as much disturbance and twice as much dredged material removed, leading to higher turbidity impacts upon the river. A great number of complex factors are associated with how often dredging will be needed, including whether over-dredging will be allowed initially and sediment transport processes of the dynamic Columbia River. FERC must reanalyze maintenance dredging and provide a more thorough analysis on how often dredging activities will be conducted and how much dredging material will be removed. Without this information the public and FERC can not possibly evaluate the impact maintenance dredging will have on water quality and the effects on organisms in the river.

The DEIS also fails to analyze what will be done with any possibly contaminated water from dredging activities. Hydraulic cutterhead dredging techniques require a lot of water to be sucked up with the solid sediments. If Bradwood encounters a contaminated area when dredging, how will they dispose of the contaminated sediment and water associated with the contaminated sediments? Worse, how will they know that the sediment is contaminated?

Release of such contaminated water back into the river after mixing with contaminated sediments can be highly toxic to aquatic life. Additionally, release of the contaminated water onto land can contaminate ground water resources or run back into the river. Bradwood proposes that “all or most of the dredge water will percolate into the sandy soil at the site.” DEIS at 2-40. First, there is no analysis of the volume of water discharged by the hydraulic dredge and the permeability of the soil to absorb this volume. Second, there is no analysis of the run-off of water into the Columbia River if only “most” of the water is absorbed. Third, there is no analysis on the effect of toxic or other contamination percolating into the soils, and potentially reaching the groundwater or being discharged back into the river via surface or subsurface flows. Last, there is no analysis of the contamination of the soil on site and the associated effects on plants and animals. The DEIS fails to analyze each of these issues and FERC has failed to require Bradwood to produce a plan to deal with contaminated sediments and water from dredging activities before approving the project. FERC cannot produce a final EIS without such a plan.

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The DEIS also failed to analyze how Bradwood's long-term dredging will increase water temperature in the Columbia River near the dredging. Dredging increases temperature because the suspended particles absorb more heat from sunlight. In response to channel deepening dredging on the Columbia River, DEQ stated, "this project is expected to result in an increase in surface water temperatures during the low flow time of year both during dredging and flowlane disposal as a result of increased turbidity. . . . Temperature contributions are particularly problematic given the water quality limited listing for temperature in the lower Columbia River."¹⁴²

The DEIS also failed to analyze adequately how dredging will decrease dissolved oxygen near the site because dredging increases the oxygen demand by disturbing sediments. In response to the proposed channel deepening dredging on the Columbia River, DEQ stated, "this project is expected to exert an oxygen demand both during dredging and flowlane disposal."¹⁴³ Similarly, Bradwood will exert an oxygen demand during and after initial dredging and maintenance dredging. The oxygen demand will increase when Bradwood dredges through organic matter, uses alternative dredging methods, such as blasting and clam shell dredges. The oxygen demand will also increase due to shoreline erosion caused by the hydraulic and geomorphic changes in the river. Like temperature, the Columbia River is water quality limited for dissolved oxygen so no increase in oxygen demand is acceptable.

All of the physical and chemical changes discussed above are exacerbated by the large-scale channel deepening in the lower Columbia River, which the DEIS fails to consider at all. The channel deepening alone will have detrimental impacts on the physical and chemical characteristics of the lower Columbia River. The DEIS failed to analyze the cumulative effects of the Bradwood dredging, taking into account the channel deepening, increased ship traffic from both the channel deepening and LNG tankers, the increase erosion from both projects, increased wave action, and geomorphic and hydraulic changes.

Dredging will introduce toxic pollutants from bed and shoreline sediments

The DEIS fails to assess how aquatic life in the estuary will be harmed by the resuspension of contaminated sediments into the water column. This harm will be especially acute adjacent to or in the dredging area. Sediments in rivers are often implicated for their tendency to store large amount of contaminants, which may turn into a significant source of contamination to aquatic and terrestrial organisms if disturbed.¹⁴⁴ This is a particularly serious problem in the Columbia River estuary. FERC must examine all available data, including data generated from the channel deepening, to determine potential contaminants. FERC must also conduct a site-specific analysis at Bradwood, as well as all of the upstream and downstream areas where hydraulic and geomorphic modifications may mobilize sediments. The DEIS fails

¹⁴² Letter from DEQ to Colonel Butler, ACOE, September 29, 2000 at 2.

¹⁴³ Letter from DEQ to Colonel Butler, ACOE, September 29, 2000 at 2.

¹⁴⁴ Landrum, P. F. and J. A. Robbins. 1990. Bioavailability of sediment associated contaminants: A review and simulation model. Sediments: Chemistry and Toxicity of In-Place Pollutants. R. Baudo, J. P. Giesy and H. Muntau, Eds. Lewis Publishers, Chelsea, MI. Chapter 8, pp. 237-263.

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entirely to assess the complete impact of contaminants on salmon, macroinvertebrates, and other aquatic life.

The DEIS claims that no contamination in the proposed dredging area would adversely affect water quality based on studies conducted by Bradwood. DEIS at 4-39. However, based on the information given in the DEIS, the sampling methods were flawed and were not representative of the potential contamination in the area. Furthermore, FERC was unable to address the negative impacts to aquatic organisms that are associated with the presence of phytosterols in the DEIS. FERC must reevaluate the sampling procedures and require Bradwood to conduct a more accurate and thorough sampling process. The DEIS also failed to obtain information on the effects phytosterols may have on aquatic organisms in order to more accurately assess the danger of dredging activities to the ecosystem.

The study conducted by Bradwood and used by FERC for analysis of contamination in the sediments in the DEIS has a flawed design and was not able to accurately represent whether sediments in the area are contaminated. According to Bradwood's own Sampling and Analysis Plan ("SAP"), the sampling approach used to test sediments in the dredge area for contamination was a "biased sampling approach." Bradwood, and the company they hired to conduct the sampling, claimed that such an approach has the benefit of concentrating on areas where greater volumes of sediment are to be dredged. This is a fundamentally flawed approach, as bias is a prejudice that all truly scientific methods seek to avoid. Picking and choosing where to sample is not an acceptable method to obtain reliable data on whether sediments in the dredge area are contaminated. A truly random sampling approach would have yielded much more reliable results. Granted, transects may be used to concentrate on specific areas of interest. However, the SAP and the DEIS make no mention of any random sampling techniques to be used along the transects to choose sampling locations. The use of the biased sampling approached fails to analyze the toxic contaminants and fails to inform the public of the environmental risks.

Not only are the results flawed because they depend on some biased sampling location selection method, but the DEIS does not present any statistical analyses to justify how such a sampling scheme could possibly represent whether the sediments in the dredge area are uncontaminated. FERC cannot rely on such questionable scientific methods.

How did Bradwood reach the conclusion that five core locations within seven horizontally delineated areas were sufficient to represent contamination of the whole dredging area? Furthermore, why did Bradwood think that areas with the thickest deposits of proposed dredge material would be inherently more reliable in testing for contamination in the dredge material than other areas? Even a random sampling technique has problems associated with missing "hot spots," as discussed below, but the sampling technique used by Bradwood does not even approach the statistical and methodological reliability of a random sampling technique and is, therefore, practically meaningless. These blatant oversights indicate the lack of depth of analysis that FERC and Bradwood have conducted in evaluating possible contamination in the dredge area. Based on these sampling techniques, the public can not make any meaningful evaluation of whether contaminated sediments are present in the dredging area. FERC must review the sampling location techniques used by Bradwood and require a more thorough and reliable examination of contamination in the dredge area sediments.

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Not only were there problems associated with a biased sampling approach, but there were also problems associated with the methods of actual collection and analyzing of the samples collected. FERC states that there were a number of partial refusals at various locations throughout the sampling area. DEIS at 4-32. The company hired by Bradwood to conduct the sampling then omitted those samples with partial refusals from compositing and analysis in the laboratory. *Id.* However, NMFS required Bradwood to go back and sample at least 7 of the 12 sites where partial refusals occurred. *Id.* Why didn't FERC require Bradwood to collect samples at all 12 sites where partial refusals occurred? Not only does the lack of these samples further degrade the reliability of an already flawed sampling regime, but it completely ignores the possibility of contamination in those locations. Just because there were partial core refusals in those locations does not mean Bradwood will not dredge those locations to their full depth as required by the plans. The DEIS failed to analyze contamination at the partial core refusals. Contamination may be concentrated in these areas due to accumulation in organic matter or different types of sediments. If FERC will not require a more reliable sampling and analysis scheme as discussed above, at the very least these sampling locations must be included to analyze for possible contamination.

After NMFS requested additional laboratory analyses on some of the previously taken samples, FERC found that these samples had been "inadvertently discarded by laboratory staff." DEIS at 4-32. In order to rectify the situation, Bradwood collected "replacement samples" from the "same seven core locations" in February 2007. *Id.* The DEIS fails to give enough information regarding these replacement samples. It goes without saying that a laboratory that discards unanalyzed samples after such a short period of time shows an alarming lack of competency. The DEIS fails to support with evidence its contention that the dredging contamination will not significantly affect aquatic resources.

The problem of missing samples is further compounded by Bradwood retrieving samples from the "same seven core locations." Either FERC has not adequately explained the retrieval of replacement samples, or Bradwood actually did carelessly sample from the same exact locations. Sampling from the same locations to where the original samples were taken would not represent contamination in the surrounding areas because the sampling location would likely have been filled back in with new sediments that filled the hole where the last core was taken. Even if Bradwood did not use the same exact core location, care should have been taken to ensure a retrieval of replacement samples from undisturbed sites, especially if very near to the original coring sites. The original core could have moved sediments around and destroyed the integrity of the surrounding sediments. Therefore, FERC should require Bradwood to collect new samples that are more likely to represent the sediments in the dredged area.

Compositing multiple core samples can also cause a serious problem with measurements of contamination in sediments. FERC states in the DEIS that material from specific strata were composited together by same area to yield a total of 18 sediment samples. DEIS at 4-30. Although this method helps save time by reducing the amount of samples to be analyzed, in addition to arguably representing an average of the area, more reliable data on the contamination of sediments can be achieved by analyzing each sample separately. Compositing samples together by strata may cause dilution of any contaminants found in one sampling location. For

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instance, a sampling location may have high levels of dioxins, but when mixed with sediments from another core may reach levels below the threshold levels required to be reported as toxic to humans or aquatic species. This phenomenon represents the "hot spot" theory, where contamination may be localized in small areas. Bradwood's practice of compositing samples together essentially ignores the possible existence of "hot spots," where high levels of contamination may be present. When disturbed by the dredging, these hotspots may adversely affect aquatic life. Therefore, compositing samples by strata from the same area is not a reliable method to test for contamination.

In addition, compositing samples only works to get an average contamination for an area when the ratio of the number of samples to the area of sampling is relatively high. In Bradwood's study, large sampling areas were used with relatively few samples. Additionally, many areas had partial refusals and samples were omitted from laboratory analysis, thus further destroying the integrity of the compositing method. Bradwood should not be allowed to conduct a very cursory examination of contamination in the dredge sediments. Costs may be higher if each sample is analyzed individually, but the reliability of the data is worth the cost when the safety of this fragile ecosystem is at stake.

Not only does compositing multiple core samples cause problems such as missing "hot spots," but using large vertical sections, or strata, to delineate samples can also cause problems. The DEIS states that three strata were considered for each sample: 1) the top 4 feet, 2) the region from 4 feet to 10 feet, and 3) the material from 10 feet to project depth. DEIS at 4-30. What justification did Bradwood give for using such depths to delineate between samples? These cross-sections of the cores seem too large to accurately represent whether contamination is present in the soil. For example, if there is a contamination "hot spot" in only a few inches of sediment near the top of the core, the contamination is diluted when mixed with the sediment from the rest of the stratum, especially when multiple samples are composited as Bradwood did in this study. Therefore, using such large strata may not accurately represent the presence of contaminants at certain vertical layers of the sediment in the proposed dredging zone. FERC should require a more thorough analysis of the sediments based on these observations and require Bradwood to use smaller strata for sampling procedures. Based on the available sample data, that Corps cannot demonstrate that dredging will not unacceptably harm aquatic life.

FERC should require Bradwood to not only redo sampling as discussed above, but analyze individual samples with out compositing. As the data presented in the DEIS stands, the public can not meaningfully evaluate the contamination levels because of these flaws in the sampling techniques. Other studies funded by the Lower Columbia River Bi-State Commission and conducted by Tetra Tech, Inc. indicate high levels of contamination in the vicinity of the proposed Bradwood LNG Project.¹⁴⁵ The data from these studies has been submitted to FERC on previous occasions but has been virtually ignored. Data from these studies show contamination in the area based on tissue studies of various aquatic organisms, including resident and migratory fish. These studies have the advantage over the inadequate sampling techniques carried out by Bradwood because they more fully represent contamination levels in sediments and the water column around the Bradwood Landing area. This fish tissue study was conducted by a true scientific method with little to no bias in sampling, as opposed to the methods used by

¹⁴⁵ Bi-State Commission, Lower Columbia River Contaminant Ecology, April 1996.

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Bradwood. In addition, the fish tissue sampling techniques takes into account "hot spot" areas of contamination because they are in effect sampling the contamination levels of all sediments in the area, as opposed to picking and choosing which sediments to test. Moreover, fish tissue studies take into account bioaccumulation, which is an important factor to consider when determining the health of the ecosystem and possible detrimental impacts of the system due to dredging activities. The DEIS fails to analyze or disclose the fish tissue data from the Bi-State Commission studies. This data is critical to understand future impacts to the system from the proposed dredging. Also, given the observations above concerning the inadequacy of the sampling and analysis methods used by Bradwood, and given the Bi-State Commission data clearly showing contamination in the area, FERC should require Bradwood to conduct a more thorough and accurate sampling and analysis of the dredge area.

The DEIS indicates that phytosterols were found in the proposed dredge sediments but fails to analyze the effects phytosterols will have upon aquatic organisms if the phytosterols are released from dredge material. DEIS at 4-38. As the DEIS points out, phytosterols "may have reproductive effects and be responsible for some types of reproductive dysfunction observed in fish" *Id.* The DEIS further acknowledges the uncertainties regarding how the observed levels of phytosterols found in the sediment might affect fish, but also attempts to reduce concern about phytosterols by simply relating them to TOC levels found in the proposed dredge materials and noting the limited potential for mobilization of phytosterols based on this relationship. *Id.* This characterization is an oversimplification of the possible hazards to fish and other aquatic species from possible exposure to phytosterols from dredging activities. The DEIS fails to explain how phytosterols enter the food chain nor the bioaccumulation effects of these chemicals. FERC admittedly does not fully understand the toxicity of phytosterols. Not only are FERC's statements in the DEIS suspect due to the lack of knowledge concerning the effects of this chemical, but the public can not properly evaluate the dredging activities as a result of this lack of knowledge.

In addition, the DEIS failed to consider that the Bradwood dredging may degrade water quality conditions by introducing, resuspending, or making bioavailable the additional pollutants. DEQ noted that the geomorphic and hydraulic changes in the river due to dredging may cause erosion that introduces new toxic materials from the banks. DEQ stated:

Although in-stream sediments proposed for removal have been tested for contaminants, bank materials which may be eroded inadvertently have not been tested. No information is provided as to the historical and current pesticide and fertilizer applications in areas potentially susceptible to erosion and which have been exposed to agricultural or silvicultural practices. Inadequate analysis of bank stability during dynamic adjustment of the river to dredging could introduce bioavailable toxics to the water column and sediments that were previously tied up in upland material. Precaution in this regard is particularly important as data is scarce and implications are just beginning to be studied through the initiatives of EPA's and DEQ's toxics reduction goals in the high priority Columbia River system.

Oregon Preliminary Comments at 11.

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FERC must address these concerns. FERC must thoroughly analyze any possible input of sediments from the shorelines that may contain toxic contamination. It is highly likely that the former industrial site at Bradwood is contaminated, and adjacent sites may also contain contamination from upstream sources. DEQ specifically notes that dredging could cause bank failure of the contaminated soils at Bradwood. DEQ stated:

Additionally, stability of the former log pond at various stages of fill has not been analyzed with regard to dynamic changes to the river induced by dredging at the berth/burning basin and for channel deepening. Side slope sloughing in-stream caused by dredging could result in bank failure, which may release dredged sediment to fill the former log pond. The DEIS needs to thoroughly evaluate and address the impacts to the stream and habitat from a sudden release of up to 300,000 cy of sediment under this potential scenario.

Oregon Preliminary Comments at 11.

FERC must analyze the impact of hydraulic and geomorphic changes due to dredging, which causes erosion and introduces toxic materials from the shorelines. FERC cannot rely on FERC's analysis because, as noted by DEQ, FERC did not analyze this potentially serious impact.

The dredge samples also demonstrate that the Bradwood area contains heavy metals in concentrations toxic to fish and other aquatic life. FERC fails to analyze the cumulative effects of the metals, including the additive and synergistic effect of the combination of metals, on aquatic life. Bradwood's dredging samples detected arsenic, chromium, copper, lead, nickel, and zinc, along with mercury and selenium. The chromium exceeded the reference levels, which indicates high chromium levels that may be harmful to aquatic life. While the other metals were, according to FERC, "within the range of nearby background levels," DEIS at 4-34, this does not mean that the toxic metal levels in the sediments are safe for aquatic life. First, the reference levels may also be unsafe. FERC does not explain the purity of the reference locations so the relative comparisons do not mean anything. Second, because these metals are acutely toxic, small variations can have a strong adverse effect. Therefore, FERC must analyze the metal concentrations in the sediments and assess how the toxic pollutants will affect aquatic life once the sediments are disturbed by dredging, maintenance dredging, and the long-term disruption of flow patterns. FERC should note that the metal concentrations in the sediments exceed the water quality criteria for each pollutant. The DEIS fails to inform the public about the toxic pollutants in the sediment.

Additional pollutants also raise concerns which are not analyzed in the DEIS. For example, excess total organic carbon may degrade water quality. Dredge samples showed a value of total organic carbon up to 0.78 percent, compared to reference sites of 0.05 percent. In addition, total volatile solids samples of up to 1.61 % were twice as high as the value of reference sites.

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FERC must also analyze the affect of the organic compounds made available by dredging on aquatic life. Bradwood has identified samples containing PAHs and phthalates above reference levels. Due to the former industrial activity at the site and the upstream industries, the site may also contain PCBs, pesticides, dioxin and furans, sulfides, and ammonia. FERC fails to analyze whether the dredging will introduce any of these pollutants into the water column or the biota.

NMFS raised concerns about the presence of guaiacols, retene, and resin acids due to the site's history as a lumber mill. Several of these compounds do not have a screening level. FERC must analyze and make findings on whether the dredging of sediments containing these compounds may adversely affect aquatic life. If FERC is unsure of the data or the toxicity levels to fish, FERC must make these uncertainties clear and fully disclose all potential impacts. See 40 C.F.R § 1502.22

Biological impacts

Dredging will cause loss of habitat

Bradwood's dredging acres will result in the permanent destruction of at least 58 acres of prime salmon habitat. A portion of the dredged area is critical shallow water habitat. The area adjacent to Bradwood is widely recognized as vital fish habitat. The Columbia River is considered the "lynchpin" of salmon recovery.

The Bradwood Biological Assessment stated:

The Lower Columbia Estuary has been identified as a **critical area for restoration** (Johnson et al., 2003, Bottom et al., 2005). **Restoring diverse, complex, and interconnected wetland habitat would increase productivity and availability of shallow-water habitat, and expand transition areas for juvenile salmon** (Lott, 2004). Additionally, it is believed that improvements to estuarine habitat would result in significant population increases (Kareiva et al., 2001, Bottom et al., 2005) ... Juvenile salmon occur in the estuary all year, as different species, size classes, and life history types continually move downstream and enter tidal waters from upstream (Bottom et al., 2005). **Reconnection of isolated high-quality fish habitats is a high priority to restoration strategies for the watershed and for fisheries restoration projects generally** (Roni et al., 2002). Restoring the tidal estuarine habitat of the lower Columbia River is a priority in many conservation plans for the area including the Lower Columbia Salmon Recovery and Fish & Wildlife Subbasin Plan (2004), Lower Columbia River Estuary Program Comprehensive Conservation and Management Plan (1991), and recovery plans for salmon ESUs occurring within the lower Columbia River (NMFS, 2006f).

Biological Assessment at 6-2.

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The proposed dredging is the antithesis of salmon recovery and restoring estuarine habitats, as described in every local, state, and federal management plan. Quite simply, we cannot recover threatened salmon while simultaneously permitting this huge dredging project. Bradwood is a prime example of an unacceptable project due to its size, scope, and location in critical salmon habitat. The DEIS fails to discuss how the dredging and the project overall will affect salmon recovery. Thus, FERC violates 40 C.F.R § 1502.16(c) by failing to discuss possible conflicts between the project and the objectives of federal, state, local and tribal conservation policies for this site and the estuary.

The project will destroy habitat for 13 ESUs of Columbia River and Snake River salmon that are listed as threatened under the ESA, in addition to multiple other non-listed salmon and other species that rely on the estuary for rearing and migration. Each fish species likely passes directly through the proposed site. The DEIS fails to adequately consider the impact to the millions of individuals of salmon, sturgeon, lamprey, and other resident species that utilize this area as habitat at various times in their lifecycles.

FERC must evaluate the impact of the dredging and the project overall on estuary and fish health. FERC cannot rely on the insufficient DEIS in this regard. Despite its bulk, the DEIS fails to include any new field data regarding the impacts on salmon. The DEIS fails to include background information on fish migratory and behavior. FERC cannot assess the impact of this project is it does not present basic data on the aquatic resources present and how these organisms utilize the region. The DEIS also fails to assess the how the aquatic life, including salmonids, will be affected by the dredging and associated habitat changes. Assessing the impacts is a common scientific practice under readily available methods. It is shocking that the FEIS presented no data whatsoever on salmon migration, rearing, or spawning use of Clifton Channel, Hunt Creek, the adjacent mainstem, Puget Island, Tenasillahe Island, or other affected areas. FERC cannot evaluate the impact on salmon, or issue this site certification, without collecting site specific data and analysis on salmon.

Compounding the problem of dredging at this location is the fact that the Bradwood area is listed as designated critical habitat for threatened salmon species. This habitat must be protected. Yet, if FERC approves this permit, the destruction of critical shallow water habitat "will be certain, permanent, and immediate."¹⁴⁶ The DEIS fails to assess the cumulative impact of destroying critical habitat on salmon, and on the economy and ecology of the estuary and the Columbia River Basin. The DEIS focuses on mitigation, but fails to discuss adequately less harmful alternative that eliminate or minimize the impacts.

Dredging will introduce pollutants

As discussed above, the dredging will harm aquatic life by introducing multiple pollutants contained in the dredge sediments and on the shorelines. FERC must evaluate the effect of each pollutant, alone and synergistically, on the health of salmonid and other aquatic life. The adverse effects of excess temperature, turbidity, oxygen demand, chromium, and silver and other toxic pollutants is well known. The dredging will increase each of these pollutants,

¹⁴⁶ Rhodes, Summary of Review of FERC Biological Assessment and Essential Fish Habitat Assessment for Bradwood Landing LNG Terminal. Report to Columbia River Intertribal Fish Commission, at5.

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which will harm aquatic life. In addition, FERC must understand the effect of multiple each toxic, organic and traditional pollutant associated with dredging and erosion near Bradwood. The DEIS failed to collect adequate data. Other than a few questionable sediment cores (discussed above), the DEIS presents no data on the contaminant levels, and absolutely no data on the impact to fish. Because the adverse effects on fish is a major impact, the DEIS should have contained significant coverage of this issue.

Surprisingly, FERC did not analyze the tissue sample studies in this region that show high concentrations of toxic pollutants in fish tissue. The bi-state commission concluded that tissue samples were a more reliable measure of the pollution problem in the vicinity of Bradwood, and study of these tissues indicated significant chemical contamination problems in the Bradwood area. Disturbance of the area is likely to exacerbate the problem. Additionally, studies indicate that sediments prone to contamination should not be disturbed, and that the Bradwood site (which is close to the study area for LCREP, the Julia Butler Hansen Wildlife Refuge) should raise more serious concerns about the potential for release of bioaccumulative chemical contamination. Ultimately, the DEIS fails to examine how potential bioaccumulation will impact key wildlife species such as osprey, peregrine falcons, bald eagles, cormorants, river otters, and other predators. FERC must assess these impacts.

Dredging will decrease the velocity of the river in Clifton Channel

In addition, as discussed in detail above, the dredging will harm salmon and other aquatic life by reducing river velocity due to the modified hydraulic and geomorphic regime. The decreased velocity will slow the out migration time of smolts on the way to the ocean. FERC must analyze the cumulative impacts of this harm to salmon and whether alternatives exist to minimize the harm.

Dredging light, noise and vibrations will harm species

The intensity of Bradwood's dredging is unprecedented in the Columbia River. DEQ stated:

Dredging is proposed to occur **non-stop** (24 hours per day, 7 days per week) for 2-3 months. No other proposal for dredging in the Columbia has operated 24-hours per day, 7 days per week for multiple months. . . . **Potentially debilitating impacts to these [aquatic] species include noise, continuous light, suspension of sediment, turbidity, loss of salmonid habitat** and ability to rest or avoid predation, and potential attractant for sturgeon to a dangerous construction zone.

Oregon Preliminary Comments at 11 (emphasis added).

The DEIS fails to analyze adequately the effect of this barrage of noise, light, and vibration on salmonids and other resident species. The DEIS acknowledges that sound pressure levels produced during dredging activities could affect some fish, marine mammals, and other aquatic organisms, but also notes the paucity of information on the effects of exposure to underwater sound on most aquatic organisms. DEIS 4-135. Furthermore, the DEIS states the

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range of sound levels from dredging activities can be quite variable and attempts to dismiss the adverse impacts to aquatic organisms by citing studies (Richardson et al. 1995; Hanson et al., 2003) that purport sound ranges from dredging generally range from 112 to 160 dB, which is unlikely to cause physiological harm. *Id.* This analysis is completely insufficient to address the possible impacts to aquatic organisms from sound produced during dredging activities. If the sound levels are highly variable, as the DEIS points out, the sounds can reach levels higher than those listed by the studies above and may in fact cause physiological harm to organisms. The DEIS must consider the effects of this harm.

Furthermore, FERC admits there is a lack of information about the effects of sound levels to aquatic organisms, especially fish. What are the effects on aquatic organisms from long duration exposures to different levels of sound? This is important to know because Bradwood admits dredging activities may last up to 72 days and be conducted 24 hours a day, 7 days a week. FERC must require Bradwood to conduct further studies on how the fish and other aquatic organisms specifically found in the area to be dredged will be impacted by increased sound levels and the effects of long duration exposure to those sound levels during dredging. The DEIS fails to assess the impact on individuals and the cumulative effects on populations and aquatic communities due to dredging disturbance.

The DEIS also fails to analyze the effect of light pollution during dredging activities. Numerous studies show light can affect a variety of aquatic organisms and may attract or repel such organisms. According to the DEIS, dredging activities will be conducted 24 hours a day and 7 days a week. DEIS at 391. The DEIS does not indicate whether lighting will be used on the dredging ships during times of darkness. If so, lighting impacts to aquatic species during dredging activities should be analyzed by FERC. Possible adverse impacts caused by lights during dredging activity could be attraction of fish or aquatic organisms to the dredging area, causing harm either by increased sound levels, turbidity levels, or the possibility of harm from contact with the cutter head dredging equipment. FERC should analyze the effects any lighting during dredging activities will have on aquatic organisms so that FERC and the public may fully evaluate the impacts of dredging activities.

Dredging will entrain salmonids

The DEIS fails to analyze the impact of entrainment of salmon and fails to consider dredging alternatives. The proposed hydraulic cutterhead dredge method will entrain juvenile fish, including threatened salmonids, as well as benthic organisms critical to salmon diets. The DEIS stated, "hydraulic dredging has the potential to capture small fish and aquatic invertebrates in the flow of water and entrain them along with dredge materials being suctioned." DEIS at 3-52. These suctioned dredge materials and the fish will be deposited on shore, where the fish will asphyxiate if they survive the transport through the suction hose. With mechanical dredging, which Bradwood does not plan to use, "fish would be less likely to be entrained with the dredged materials compared to hydraulic dredging." DEIS at 3-53. Bradwood chose hydraulic dredging because it is not as cost effective as hydraulic dredging. The DEIS failed to analyze the alternative methods of dredging or alternative means to mitigation harm to fish.

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FERC must analyze the impacts of fish entrainment due to dredging. FERC must consider the fact that the fish killed will include salmonids listed as threatened under the federal ESA and the Oregon ESA. In analyzing the impact to salmon and aquatic life, FERC must consider that cumulative impacts on aquatic life, including the impacts from dredging, terminal construction and operation, pipeline construction and operation, as well as the impact of the channel deepening dredging.

Dredge material disposal will harm aquatic life

Not only will the actual dredging of the berth and ship maneuvering areas have a substantial impact on the environment, but the disposal of the 700,000 cubic yards of dredge spoils will also cause problems. According to the DEIS, Bradwood plans on placing between 350,000 and 400,000 cubic yards of dredge material at the LNG terminal site. DEIS at 4-70. The remaining 300,000 to 350,000 cubic yards of proposed dredge material will be disposed of at the Wahkiakum County Sand Pit site. DEIS at 4-71. Yet, the DEIS fails to analyze the impact of this substantial dredge disposal, and fails to consider the cumulative impact of this dredge disposal with the dredge disposal from the channel deepening dredging.

Disposal of dredge material at the terminal site will result in pollution to the Columbia River. Bradwood proposes to construct a perimeter berm to form a basin into which dredge materials will be placed. Filling this constructed basin with dredge materials will not only destroy the log pond, which is critical habitat for federally protected salmon, but may also result in polluted water runoff in to the Columbia River. The DEIS fails to analyze the impact of this pollution.

Hydraulic cutter head dredging requires large amounts of water to be sucked up along with the dredged sediments. The water taken up can often be in excess of the sediment removed depending on the type of cutter head dredge used. During this process, the water will mix with any contaminated sediments that may be present, resulting in pollution of the water. The DEIS claims that the infiltration capacity of the soils will be sufficient for the water to percolate into the ground before running off into the River. DEIS at 4-70. However, the DEIS fails to support these statements with any references to calculations or other scientific evidence, in violation of 40 C.F.R. § 1502.1, which requires that all statements be supported by evidence. The DEIS simply states the expectation that the water will infiltrate at a rate sufficient to accommodate the water deposited from the dredge spoils, without analyzing how much water will be included in the dredge spoils and calculating how much will infiltrate. *Id.*

Even if the dredge spoil water does sufficiently percolate into the ground, there is a good possibility the water will still run into the river by transport through the ground. However, the soil at the site will likely be compacted due to construction activities such as building the berm around the basin where the dredge materials will be placed. This soil compaction will invariably lower the infiltration rates of the soil, resulting in increased runoff. The DEIS fails to adequately address the amount of water to be deposited from dredge spoils and soil compaction due to construction activities in determining the amount of water that will not percolate into the ground. The total lack of analysis makes it impossible for FERC or the public to adequately analyze the possibilities of water runoff into the river from dredge materials. Therefore, FERC should

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reevaluate how much water will be deposited with the dredge sediment and the infiltration rates of the soil, after possible compaction through construction activities, where the dredge materials will be deposited.

The DEIS proposes that any water that does not percolate into the ground will flow into the log pond where any suspended sediments will be settled out before the water percolates into the ground or is discharged to the river through an overflow structure. *Id.* As a result, any contaminated water collected with the dredged materials and deposited in the basin may still pollute the River. The DEIS acknowledges that water may be continually present in the log pond, further reducing its capacity. *Id.* Bradwood proposes to prevent any overflows of the berm by installing an overflow structure that will release "clarified water" back into the river. DEIS at 4-71. The DEIS does not discuss the pollutant content of the "clarified water." The "clarified water" will contain pollutants, which must be described. Also, retention in the log pond does not insure any dissolved pollutants are removed from the water. FERC should analyze the possibility of dissolved pollutants from dredge spoils being released back into the river through the overflow structure. Water allowed to collect in the log pond and discharged back into the river will also likely have increased in temperature. The DEIS fails to analyze the impact of a new source of temperature pollution when the Columbia River is already water quality limited (303(d)-listed) for temperature.

The Wahkiakum County Sand Pit does not have the capacity to accommodate the dredge materials over the life of the Bradwood LNG Project. The DEIS completely fails to analyze the capacity of Wahkiakum County Sand Pit site. The DEIS has not shown that the site will be able to accommodate all the dredge materials from initial dredging as well as future maintenance dredging. NMFS has continually voiced concerns over the capacity of Wahkiakum County Sand Pit site to hold the initial 300,000 to 350,000 cubic yards of dredge spoil as well as dredge spoils from maintenance dredging. FERC must assess the ability of the Sand Pit to accommodate this large amount of spoils and how this will impact water quality.

Additionally, Bradwood has failed to obtain approval for disposal of all dredge materials at Wahkiakum County Sand Pit. If Bradwood can not obtain approval for disposal at the Wahkiakum County Sand Pit, where will the dredge materials be placed? The Corps may wish to use the Wahkiakum County Sand Pit for disposal of materials from future maintenance dredging of the main channel. The DEIS fails to consider the reduction of dredge material disposal site due to Bradwood's dredging.

The DEIS fails also fails to take into account the capacity of the Wahkiakum County Sand Pit site for disposal of dredge materials over the 40-year life period of the project. According to calculations conducted by NMFS, the Wahkiakum County Sand Pit site only has capacity for a range of years between 12 and 29 years. Therefore, the Wahkiakum County Sand Pit site will not be sufficient to accommodate disposal of dredge materials over the life of the project. FERC must determine whether a sufficient location for the disposal of dredge materials is found, and the environmental and economic impacts of using such a site. The DEIS is insufficient for not containing this information.

FERC must also consider the distribution of dredge materials along the shoreline of Puget

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Island from the Sand Pit. The DEIS acknowledges that a specific model has not been conducted to assess any increased turbidity levels associated with the distribution of dredge materials on the beaches of Puget Island. DEIS at 4-71. FERC attempts to alleviate this lack of analysis by simply saying the water quality impacts would be temporary and minor based on the grain size of the sediments in the dredge material. DEIS at 4-72. However, the shores of Puget Island are subject to constant erosion from wind, tides, and ship wakes. Placing large amounts of structurally unstable and possibly contaminated dredge sediments will likely increase the rate of erosion and, consequently, the amount of turbidity and pollution in the waters of the river off of Puget Island, causing harmful effects to fish located in the area. The DEIS provides no adequate basis for concluding turbidity increases will be "minor," in addition to completely ignoring possible contamination of the water column from contaminated sediments. Additionally, constant erosion of large amounts of material may last over a substantial period of time and will be anything but "temporary." FERC must conduct actual analysis of any expected turbidity and pollution increases and adverse biological conditions resulting from placement of dredge materials on the beaches of Puget Island and not rely on simple "expectations" based on general observations.

Economic and human use impacts

The DEIS fails to consider that dredging will adversely affect the commercial and recreational fishing industry, both vital components of the Clatsop County and State economy. In Oregon, Washington, and Idaho, 3,600 people earn their livelihood from salmon and steelhead fishing for a personal income of \$109 million. The recreational fishing industry is worth millions more. The continued success of these industries depends on the recovery of healthy populations of fish and continued access to the traditional fishing areas. Bradwood's dredging will adversely affect both of these requirements.

First, the dredging will degrade vital fish habitat, which will reduce health of the fisheries. The commercial salmon fishery is already severely limited due to dwindling populations. Bradwood's permanent destruction of key salmon habitat will further degrade the fishery, and, in turn, degrade the opportunities for commercial and recreational fishing, as well as tribal fishing rights throughout the Columbia River Basin.

In addition, the 24-hour per day dredging will completely block access to the traditional fishing grounds at the head of Clifton Channel, and may block Clifton Channel, for several months. This will seriously degrade commercial and recreational fishing and violate the public trust. The DEIS fails to analyze this impact on the public interest.

Terminal Fill

The DEIS fails to assess the impact of permanently filling at least 14 acres of estuarine and freshwater wetlands at the terminal site. The fill will modify the physical characteristics by replacing wetlands with sand and then concrete. The fill may contain toxic sediment, which will leech into surrounding wetlands or into the river. The fill will decrease the filtering capacity of the wetlands, which will lead to increased run-off, turbidity, and water temperature. The FEIS

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failed to assess the cumulative effect of this action on the hydrology, water quality, and aquatic resources in this area.

The biological impacts of the fill are severe. We have already lost 80% of the lower Columbia River's wetlands. In this degraded state, every remaining acre is important. The Bradwood location contains an impressive array of healthy wetlands that have returned to healthy habitat in the 50 years since the former mill closed. Bradwood dismisses the habitat value of former log pond, but this area is not a pond at all. It is now a healthy backchannel habitat, connected to the Columbia River, that is utilized as crucial shallow water habitat by threatened salmonids. The DEIS fails to assess the impact of destroying the log pond habitat, considering the historical destruction of wetlands in the estuary.

The log pond is designated critical habitat for 13 species of salmonids and is a valuable rearing habitat for these species. Bradwood proposes to mitigate the filling of the log pond through a Fish Salvage Plan, which would result in the "capture, record, release of as many salmonids as possible." DEIS at 4-212. Unfortunately, no matter how careful Bradwood is in implementing the Plan, some fish will invariably not survive the process or will be harmed. The ESA forbids the taking of any protected species by private or federal entities. If Bradwood is allowed to fill the log pond, it will result in the unavoidable taking of a federally protected species in direct violation of the ESA. Additionally, filling of the log pond will be destruction of critical habitat for a federally protected species, therefore jeopardizing the continued existence of 13 ESA-listed species.

In addition, the estuarine wetlands provide a nursery for young salmon and other aquatic life. The combination of losing shallow water habitat from dredging and losing shallow water habitat from filling wetlands is a devastating hit to the estuary ecosystem. The EIS must analyze the habitat loss of the dredge and fill cumulatively.

The wetland fill will also degrade habitat utilized by birds, amphibians, mammals, and invertebrates. For example, bald eagles utilize the Bradwood site for perching and hunting.¹⁴⁷ On one visit, a biologist recorded six different individual eagles perching at the Bradwood site and the mouth of Hunt Creek, and hunting over the wetlands and river. *Id.*

Bradwood states that it will mitigate the impacts to the species affected by destruction of critical habitat through their Mitigation Plan. The DEIS fails to provide enough details of the Mitigation Plan to assess its value. The DEIS is deficient for relying on an incomplete plan, and failing to assess the final plan.

The Mitigation Plan will be insufficient to mitigate the adverse impacts of filling the log pond. The filling of the log pond and its resulting destruction will be certain, permanent, and imminent. In contrast, the measures to be implemented in the Mitigation Plan and the effectiveness of such measures are highly uncertain. Furthermore, even if the measures of the Mitigation Plan are successfully implemented, the benefits from the measures may accrue slowly while the endangered or threatened species are put in further jeopardy by a lack of critical habitat. FERC should take these factors under consideration and provide a more thorough

¹⁴⁷ Cascade Avian Consulting at 1 (attached).

analysis in the EIS concerning the effectiveness of the Mitigation Plan.

Terminal construction and operation

Terminal construction and operation will have long-term adverse effects on the lower Columbia River ecosystem, economy and safety of the residents.

The terminal construction and operation will degrade the ecosystem

Construction Activities at the Proposed Terminal Site Will Disturb or Contribute to Contaminated Soils and Increase Sedimentation and Pollutant Transport into the River through Storm Water Runoff.

Approximately 70 acres are proposed to be disturbed by the construction of the LNG terminal. DEIS at 4-27. Construction activities at the terminal will have multiple long and short term adverse effects on the environment, including the disturbance of contaminated soils, water pollution from storm water runoff during construction, removal of vegetation, increased air pollution, substantial noise and light pollution, and the use of large quantities of water for hydrostatic testing of the tank and pipelines. The DEIS fails to analyze these impacts adequately, as discussed below.

The DEIS acknowledges that there are potentially contaminated soils present at the proposed terminal site. DEIS at 4-28. In fact, the DEIS states that "the Environmental Site Assessment did identify several Recognized Environmental Concerns (REC) on the property, including two gasoline underground storage tanks (UST), an area where a former train/maintenance shop building was located, asbestos containing cement board, solid waste disposal and burn areas, and the potential presence of polychlorinated biphenyls (PCB) and dioxins in dredged sand deposited at the site." *Id.* However, the DEIS also notes that the assessment only inspected known contaminated sites, and did not conduct any soil testing for contaminants at other locations. *Id.* It is alarming that FERC acknowledges the potential for contaminated soils at the proposed terminal site, yet does not require any further testing of the soils to ensure contaminated soils are identified and properly handled during construction. The DEIS does state that FERC is requiring Bradwood to develop a Contaminated Materials Management Plan (CMMP) before construction ensues, but only requires the identification and management of contaminants if any are encountered during construction. DEIS at 4-29. These precautions are inadequate to ensure the safety of the environment as well as the construction workers at the site. FERC should require Bradwood to conduct soil contaminant testing in areas likely to be disturbed during construction by clearing, grading, or excavation activities before any construction ensues. If these precautions are not taken, the possibility for soil contaminants uncovered during construction to adversely impact aquatic and terrestrial habitats will be unnecessarily high. Therefore, without soil testing for contaminants prior to construction, FERC and the public can not evaluate the possible environmental impacts from construction activities.

The DEIS fails to analyze the adverse environmental impacts to the river due to construction activities at the proposed terminal site. These impacts will occur through increased

erosion and sedimentation processes. In fact, construction activities often result in runoff that can increase total suspended solids to levels near 3000 mg/L (Barrett and Molina, 2000), a level harmful to many aquatic organisms. The potential for soil contaminants to be transported into the river due to storm water runoff is also greatly increased during construction activities. Construction activities will result in soil compaction and increases in impermeable surfaces, therefore creating a much greater potential for runoff into the river. Therefore, any possible contaminants spilled during construction activities will likely runoff into the river unless proper measures are taken. The DEIS states that Bradwood will attempt to mitigate these impacts through the use of its terminal Erosion Sediment Control ("ESC") Plan. DEIS at 4-29. However, the DEIS does not assess the environmental impact of construction when the ESC is employed. In addition, the detention ponds in the ESC for storm water runoff do not eliminate impacts to aquatic habitats.¹⁴⁸ The DEIS also fails to discuss construction alternatives that will eliminate or minimize adverse effects. There are multiple techniques and theories on management construction sites and stormwater pollution, but the DEIS fails to discuss any alternatives.

The ESC Plan fails to disclose specific information for adequate evaluation of the mitigation designs and procedures to be used mitigating these environmental impacts. FERC and the public can not possibly evaluate the effectiveness of any mitigation plans proposed by Bradwood without the specifics of the plans. Simply stating that BMPs will be used is insufficient for evaluation of mitigation measures specific to this site. For instance, when describing measures to be taken during "Phase 1" of construction, the ESC Plan simply states that "[s]tructural BMPs to be implemented as part of Phase 1 construction activities include perimeter controls (silt fencing, secondary perimeter controls for sensitive areas, and shrubbery), construction access, safety fencing, revegetation and vegetation maintenance, runoff discharge and disposal facilities, wheel wash, instream sediment management, and sand bag barriers." Terminal ESCP at 5-5. This listing of BMPs to be used is inadequate for a proper analysis of the probative value of the proposed sediment control measures.

In an attempt to provide some detail, Bradwood refers the reader of the Terminal ESC Plan to see the figures and lists of BMPs attached to the plan for the specifics of BMP measures to be used during certain construction activities. However these figures and lists do not adequately explain the aspects of the BMPs to be used at this site. For example, Bradwood lists the BMP for preservation of existing vegetation/ buffer strips, but fails to explain the detailed measures to be taken given the specifics of the site. Details of the measures Bradwood should include are the size of the buffer strips and the types of vegetation to be planted for buffer strips. Bradwood should be able to, and in fact be required to, disclose the specifics of the BMPs to be used based on current designs and local requirements. The description of a general BMP without site specific considerations is worthless to the public, and FERC, for proper evaluation of the measures to be used for mitigation of environmental impacts caused by construction activities.

FERC further asserts that a lack of specificity in the design of some aspects of the terminal site is a valid reason for not producing a detailed sediment control plan for certain aspects of the project. *Id.* If FERC is not sure of the design or preventative measures to be taken to mitigate environmental impacts, then the DEIS is by definition deficient because it cannot

¹⁴⁸ Booth, D.B., D. Hartley, and R. Jackson. 2002. Forest cover, impervious-surface area, and mitigation of stormwater impacts. *J. Amer. Water Resour. Assoc.*, 38:835-845.

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evaluate the effects of the ESC. FERC must require Bradwood to produce a more specific Terminal ESC plan and provide a more thorough analysis. Furthermore, FERC should thoroughly evaluate the possibilities of increased sedimentation and contaminant transport into the Columbia River through storm water runoff as a result of the construction activities.

The DEIS lacks adequate detail regarding the water quality and habitat impacts of the improvements to Bradwood Road and other roads. DEIS at 2-31, 2-41. Specifically, Bradwood fails to assess how much of an increase in impervious surfaces will result from road improvements, and how surface flow runoff will be affected from said road improvements. Increased storm water runoff resulting from greater areas of impervious surfaces from road construction will possibly increase pollution into Hunt Creek and Columbia River. These forms of pollution could be increased sedimentation due to the increased surface flow runoff, or debris and hydrocarbons such as oil washed from the road surfaces during storm events. FERC should evaluate the effects of greater impervious areas and changes in storm water drainage dynamics resulting from road widening and construction, and also evaluate the potential from increased pollutants entering Hunt Creek or Columbia River from resulting increased storm water runoff.

The DEIS fails to adequately evaluate the potential for releasing contaminants from the soil during road construction. According to the DEIS, Bradwood plans on widening Bradwood Road. DEIS at 4-344. Elsewhere in the DEIS, the area along Bradwood Road is designated as a REC, with possible soil contamination from solid waste disposal and burn areas. DEIS at 4-292. How does Bradwood plan on handling possible soil contaminants encountered during road improvements on Bradwood Road? The DEIS currently does not address this issue, which is of concern since road construction activities along with storm water runoff could release these contaminants and carry them to adjacent water bodies. FERC should require Bradwood to provide a plan on dealing with any soil contaminants encountered during road construction activities and analyze the possible environmental effects from the release of any such contaminants.

Bradwood proposes to replace the Hunt Creek Bridge, but the DEIS fails to adequately address the environmental impacts of the bridge replacement, including the bridge design and the potential for uncured concrete to be washed into Hunt Creek. As NMFS notes in their letter regarding the BA for the project, Bradwood has not adequately informed the agencies on how they propose to keep uncured concrete from entering Hunt Creek. Bradwood also fails to demonstrate how rainfall that comes in contact with uncured concrete during construction will be kept from discharging into Hunt Creek, and what controls they will employ to ensure concrete does not enter Hunt Creek. Additionally, the bridge design proposed by Bradwood shows a slope on the bridge with a curb to direct water runoff. Bradwood does not address the issue of how the bridge will keep storm water runoff from entering Hunt Creek while vehicles cross the bridge. Vehicles will displace rain water as they pass over the bridge, and the lack of a curb on the upslope of the bridge may allow for storm water runoff to flow directly into Hunt Creek. Storm water runoff from the bridge flowing directly into Hunt Creek is a problem because it will contain contaminants and sediments. FERC should address these issues with bridge construction and design as relates to the potential for polluted storm water runoff.

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In addition, the DEIS does not adequately analyze the environmental impacts of the proposed railroad realignment. NFMS expressed concern that Bradwood did not discuss what kind of treated wood will be used for the new railroad ties. If the railroad ties are treated with chemicals such as creosote, ammoniacal copper zinc arsenate, or chromated copper arsenate, the potential for soil contamination is highly likely. Furthermore, the DEIS did not evaluate how any contamination from the railroad ties will move through the soil.

The removal of vegetation will affect the ecosystem

The DEIS fails to consider that construction activities, including terminal construction, replacement of Hunt Creek Bridge, power line construction, relocation of the railroad tracks, and temporary parking lot construction, will destroy acres of vegetation. The DEIS recognizes that construction activities at the proposed LNG terminal would have a substantial impact "on riparian forest and scrub-shrub communities due to their high productivity, species diversity, and contribution to both aquatic and upland ecosystem function (Knutson and Naeff, 1997)." DEIS at 4-110. However, the DEIS fails to adequately analyze the full scope of vegetation removal, the effects of vegetation removal on surrounding habitats, and the problems associated with re-vegetating areas in the vicinity of the project site.

First, the DEIS fails to adequately analyze the quantity and type of vegetation to be destroyed as a result of construction activities at and around the proposed terminal site. For instance, the DEIS explains that in response to concerns raised by NFMS, Bradwood hired biologists to count cottonwood trees at the proposed terminal site. DEIS at 4-110. However, only cottonwood trees over 20 feet in height were included in the count of cottonwood trees at the site and the rest were considered riparian scrub shrub vegetation. *Id.* FERC gives no basis why a 20 foot height was used as the limit for cottonwood trees to be counted. Using an arbitrary height of 20 feet with no basis or justification is unacceptable for a valid survey.

FERC is also not clear regarding the amount of vegetation that will be removed due to road improvements or the construction of temporary roads. The terminal ESC Plan submitted by Bradwood mentions possible road improvements to Bradwood Road and Clifton Road as well as construction of temporary roads. The DEIS states "Bradwood would widen Bradwood Road to 24 feet by clearing and grading the area directly adjacent to the existing road." DEIS at 4-344. Also, Bradwood may make improvements to Clifton Road "consist[ing] of widening the roadway by 2 to 3 feet at selected locations based on available area." DEIS at 2-41. The DEIS fails to analyze how much vegetation is to be removed as a result of these construction activities and what kind of mitigation measures Bradwood proposes to conduct.

FERC also fails to consider the direct and indirect effects of vegetation removal during various aspects of construction. Adverse impacts on aquatic habitats through the removal of shoreline vegetation is well documented and, as the DEIS confirms, can lead to increased sedimentation and temperatures in waters adjacent to areas cleared of vegetation. DEIS at 4-140. However, FERC only attributes increases in water temperature to indirect effects such as increased solar radiation of the land, and the subsequent heating of runoff water running into water bodies. *Id.* Direct solar radiation to the Columbia River and Hunt Creek will also be increased due to the removal of shade produced by vegetation. The Columbia River is already

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water quality limited due to high temperatures. Any subsequent increases in temperature due to the removal of vegetation during construction will further endanger federally listed species in the Columbia River and Hunt Creek through adversely affecting critical habitat and EFH for these species. As the DEIS states, increased temperatures can lead to decreased salmonid productivity and the possibility of other species out competing salmonids. DEIS at 4-140, 4-141. FERC cannot allow the further degradation of critical habitat of federally listed aquatic species by Bradwood's proposed construction activities and must further analyze the effects removal of vegetation will have on the temperatures of the Columbia River and Hunt Creek in the EIS.

Removal of vegetation near the shorelines of the Columbia River and Hunt Creek during construction activities will also adversely affect aquatic species by removing a source of food. It is well established by numerous studies that riparian vegetation provides a valuable food source for fish, especially juveniles.¹⁴⁹ The food source is the result of invertebrates in the detritus, understory, and canopy of riparian vegetation. Many of these invertebrates find their way into the water and are subsequently eaten by fish. Clearing vegetation along the shore of the Columbia River and Hunt Creek will destroy this habitat for invertebrates, thus destroying a valuable food source for fish along the stretches of these water bodies. The DEIS ignores these impacts completely. The analysis of food source impacts due to removal of vegetation conducted in the DEIS is limited to possible increases in food in the form microorganisms and aquatic invertebrates in the water due to increased temperatures. DEIS at 4-140. However, FERC notes that any increase in food due to increased water temperature will be limited to the summer and be offset by increased fish loss due to loss of cover. *Id.*

Any increases in food by increased production of microorganisms and aquatic invertebrates will further be offset by losses of invertebrates along the shoreline due to the removal of vegetation. FERC should consider the impacts to fish and other aquatic organisms resulting from the removal of a valuable food source, in the form of invertebrates, through the destruction of terrestrial vegetation along the shores of the Columbia River and Hunt Creek, in the DEIS.

The DEIS completely fails to analyze the potential of fragmentation on terrestrial organisms that migrate through the region. Removal of vegetation, such as along the proposed power line corridor and around the proposed terminal, can result in a barrier to wildlife movement and cause a severance of connectivity between ecosystems.¹⁵⁰ Such fragmentation can exacerbate extinction pressures on animals because small populations are split off from each other, increasing the chances of adverse conditions completely eliminating a population.¹⁵¹ Therefore, removal of vegetation during construction around the proposed terminal and along the power line may cause fragmentation that can harm animals such as the endangered Columbian white-tailed deer. This is a permanent effect that the DEIS essentially ignores. Although, according to the DEIS, Bradwood has contemplated installing a corridor for animal movement

¹⁴⁹ Wigfli, M.S. 1997. Terrestrial invertebrates as salmonid prey and nitrogen sources in streams: contrasting old-growth and young-growth riparian forests in southeastern Alaska, USA. *Canadian Journal of Fisheries and Aquatic Sciences*. 54: 1259-1269.

¹⁵⁰ Rosenfield, R. N., C. M. Morsky, J. Bielefeldt and W. L. Loope. 1992. Forest fragmentation and island biogeography: a summary and bibliography. National Park Service Technical Report NPS/NRUV/NRTR-92/08

¹⁵¹ Soulé, M. E., editor. 1987. *Viable populations for conservation*. Cambridge University Press, Cambridge, United Kingdom.

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around the terminal fence, DEIS at 4-158, such measures would not be practical or possible for the barrier introduced as a result of construction of the power line. FERC should analyze habitat fragmentation due to the removal of vegetation and construction activities around the proposed terminal and power line, and should further analyze the possible adverse effects to animals such as the endangered Columbian white-tailed deer from fragmentation.

Bradwood asserts that it is committed to mitigating the adverse effects of the project and providing a net benefit to the ecosystem. However, not only are the mitigation plans vague and incomplete, mitigation measures carried out by Bradwood will not mitigate the immediate adverse impacts caused by the destruction of vegetation around the proposed terminal site. For example, the DEIS states that it will attempt to replace trees removed during construction in a 5:1 ratio. DEIS at 4-141. Nevertheless, the DEIS fails to take into account the difficulty of establishing some species of trees that will be removed during construction. As discussed above, Bradwood will remove hundreds of cottonwood trees around the terminal site and along Hunt Creek. These cottonwood trees are notoriously hard to re-establish because of their phreatophytic nature that requires precise soil conditions for successful establishment.¹⁵² Furthermore, seedlings and small trees replanted are very susceptible to grazing by various animals, making it even more difficult to re-establish trees. The preliminary mitigation plan by Bradwood does not adequately assess the possible mortality rates of trees that Bradwood will attempt to re-establish, and the measures Bradwood will take to ensure high survival rates. Additionally, neither the DEIS nor the mitigation plan adequately provide assurances that these trees will be protected during their early life stages from herbivory. FERC must include more detail in the plan for revegetation in the vicinity of the proposed terminal.

Construction Activities Degrade the Air

The DEIS fails to consider the temporary increases in air pollution resulting from construction activities. Numerous activities conducted during construction of the proposed Bradwood LNG terminal will cause increases in air pollutant levels in the region. These activities include anything from increases in vehicle traffic to and from the site to the burning of vegetation removed during clearing of the site. Also, construction equipment, including dredge ships, and vehicles transporting construction supplies will add to the emissions. FERC states in the DEIS that "[i]mpacts associated with construction vehicles are difficult to estimate based on the time and space variant characteristics of the emissions." DEIS at 4-383. After making this statement, FERC then concludes that emissions are not likely to exceed NAAQS. *Id.* This level of analysis is insufficient to address the environmental impacts from construction emissions. The DEIS shows that certain emission (NO_x and VOCs) will raise regional emissions by more than 10% during construction, a substantial increase. *Id.* If regional emissions are raised by more than 10% in some instances, the local effect may be sufficient to cause some respiratory distress in humans or animals. The DEIS ignores these important impacts.

Additional sources of increased air pollutant emissions may originate from burning vegetation removed from the site. According to documentation submitted by Bradwood, such as

¹⁵² Steinberg, P. D. (2001). *Populus balsamifera* spp. *trichocarpa*. Fire Effects Information System, [Online], USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). 2005.

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the terminal ESC Plan, vegetation cleared from the site may be disposed of by being burned. The DEIS does not discuss this source of pollution.

Construction Activities Will Cause Noise and Light Pollution.

The DEIS fails to consider that noise and light levels during construction of the proposed Bradwood LNG terminal will reach levels that could be a nuisance to humans and cause harm to animals. Noise will originate from a variety of sources during construction, including increased vehicle and railway traffic, engine driven construction equipment, pile driving, and blasting activities. The impacts from these sources of noise are either inadequately addressed by FERC or the mitigation measures to be used are not sufficiently clear or effective to prevent nuisance or harm to humans and animals in the affected region. In addition, light from construction activities and the overall terminal lighting plan can adversely affect animal behavior. FERC does not adequately assess the possible impacts of construction and terminal lighting.

The noise impacts underwater from various construction activities could produce substantial harm to animals. The DEIS notes that threshold levels for salmonids and pinnipeds will not likely be exceeded due to blasting, DEIS at 4-148, however acknowledges that the behavior of pinnipeds may be altered. Nothing is mentioned in the DEIS concerning the behavioral modifications to salmonids in the area and, for that matter, any other organisms present in the affected vicinity. FERC should more thoroughly evaluate and report the possible consequences the noise from blasting will have on not just the physiological but also the perceptual and behavioral well being of all animals in the vicinity.

In addition to blasting and dredging, pile driving will have a substantial adverse impact upon underwater organisms. FERC has provided a number of proposed mitigation measures to alleviate some of the harm of pile driving, DEIS at 4-137, 4-138, 4-139, but nonetheless has failed to analyze the harm that will occur to organisms in the vicinity, especially pinnipeds and salmonids. FERC relies entirely on the mitigation measures, but misses the fundamental purpose of NEPA to assess environmental harm. First, even if all the mitigation measures proposed by Bradwood work, the threshold level for physiological harm for salmonids of 180 dB re: 1 µPa will not be met within approximately 33 feet of the pile driving. DEIS at 4-138. Furthermore, even with the mitigation measures the noise levels will still exceed the behavioral impact levels of 150 dB re: 1 µPa more than a mile away. *Id.* Given that the pile driving is estimated to last for approximately 4 months, many endangered fish and other animals could be killed, or at the very least harmed, by this activity. The DEIS fails to discuss the fact that this project will violate the threshold harm limits for salmon.

Bradwood's proposed mitigation may not even work to reduce underwater noise. The DEIS notes that there is the possibility the bubble curtains proposed to be used by Bradwood may not have their full intended mitigating effect, *Id.*, and NMFS has echoed concerns about the efficacy of bubble curtains in their May 11, 2007 letter to FERC. The DEIS recommends that Bradwood file a contingency plan if the bubble curtains do not work as intended before pile driving commences. DEIS at 4-139. Yet, the DEIS failed to assess whether a contingent plan is likely to be effective and what effects are expected from alternative plans.

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As for the safety of pinniped species, Bradwood proposes to incorporate a safety, buffer, and impact zone. DEIS at 4-247, 4-248. As the DEIS pointed out though, Bradwood originally only proposed such measures for the Stellar Sea Lion. DEIS at 4-139. Additionally, the monitoring for the presence of pinnipeds within these zones is inadequately addressed by DEIS. The DEIS fails to discuss conditions under which more than one monitor could be used, under what conditions (i.e. bad weather) monitoring activities will be sufficiently doubtful to stop pile driving, and the methods Bradwood will use to monitor small and elusive marine mammals, such as harbor seals.

The DEIS also fails to consider that noise impacts from construction activities may disturb various birds, including the Bald Eagle, and other animals, like the Columbian white-tailed deer, and cause them to avoid the areas impacted. According to the FERC, these impacts will be temporary and the Columbian white-tailed deer, for instance, is likely to become acclimated to the noise. DEIS 4-250. But, the construction will last three years, and the noise will continue after the construction ends. FERC offers no evidence that the impact is temporary. In addition, avoiding traditional habitat may cause these animals to travel to less healthy habitat, thus increasing the danger to these animals.

Finally, the FERC recognizes that artificial lighting can have adverse effects on wildlife in the areas surrounding the proposed LNG terminal. DEIS 4-157. However, the NMFS in their May 11, 2007 letter notes, and DEIS confirms, that Bradwood has not submitted a detailed final lighting plan for either construction or terminal operations. DEIS at 4-147. The DEIS, therefore, is deficient because it does not contain a final lighting plan. FERC must analyze the impact of light on aquatic and terrestrial species.

The Removal of Large Quantities of Water for Hydrostatic Testing Will Harm to the Environment.

The DEIS fails to analyze that Bradwood will remove large volumes of water from the Columbia River to test the reliability of numerous pipes and tanks during construction of the proposed terminal. DEIS at 4-72. Bradwood proposes to appropriate water directly from the Columbia River using pumps with fish screens on the intake valves. DEIS 4-144. These fish screens will not prevent all fish impingement or entrapment. In the May 11 letter, NMFS pointed out that the fish screen design proposed by Bradwood will likely be insufficient for proper functionality.

Water will be discharged back into the river after use for hydrostatic testing of the LNG tanks, the pipeline, and the fire suppression system. DEIS at 4-72, 4-77, 4-86. The procedures for dechlorination (if chlorine is initially added to kill bacteria) described in the DEIS are vague and insufficient to evaluate the efficacy of the procedure proposed. Additionally, Bradwood claims it will test the water for any contaminants, but fails to explain what contaminants it will test for. Will water temperature also be tested prior to discharge of the tank hydrostatic testing water?

The DEIS claims that any scale and sediments in the water from the pipeline hydrostatic testing will be filtered out by straw bales, but provides no basis for the accuracy of this

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statement. DEIS at 4-86. Although Bradwood states that it does not anticipate contaminants, construction is far from a sanitary business, and contaminants could inadvertently be present within the fire suppression system or pipeline.

Increased Ship Traffic Will Adversely Impact the Environment.

One hundred twenty five LNG tankers will serve Bradwood each year. This number will greatly increase if Bradwood installs a planned third storage tank. The DEIS fails to analyze the from ship traffic, including vessel strikes, wake stranding, increased noise, entrainment and impingement of fish during ballast filling, and shoreline erosion.

Increased Ship Traffic Will Result in Vessel Strikes and Wake Stranding of Fish, Mammals, and Sea Turtles In and Around the Columbia River Estuary.

The LNG terminal will increase the number of deep draft vessels by 25%. This is a substantial increase of the largest ships with the largest wakes. FERC fails to analyze the ecosystem impacts of a 25% increase in deep draft ship traffic. The deep draft vessels are of greatest concern because of large wakes, increased vessel strikes, and sediment resuspension.

The DEIS does not provide a description of the routes the LNG vessels will travel to and from the proposed LNG terminal. Without detailed submissions of the possible routes LNG vessels will take on their way to the proposed Bradwood LNG terminal, the number and types of vessel strikes is extremely difficult to assess. NMFS raised concerns about LNG tankers striking whale, pinnipeds, and sea turtles.

The DEIS fails to consider that wake stranding of juvenile salmon is common in the lower estuary, and fails to consider the impacts due to increased ship traffic. Wake stranding will increase greatly due to the additional deep draft ships. Further, turning of the LNG tankers with high thrust tugs will increase wake stranding and disorientation of salmon. Bradwood argues that because ship wakes may increase due to speed, and because the Pearson et al. (2006) study indicated that 62% of the vessels causing wake stranding were traveling faster than 12 knots, then LNG ships that will not likely exceed 12 knots will not likely cause fish stranding. DEIS at 4-123. However, this statement does not take into account the size of the ships, which also substantially affects the size of the wake. LNG ships will be some of the largest vessels navigating the Lower Columbia River and the wakes of these large vessels can be much larger than even small vessels traveling at high speeds because of the amount of water displacement. Additionally, the DEIS has notes that "[t]he wakes produced by an LNG ship are only slightly larger than those of the large vessels currently using the Columbia River." DEIS at 4-109. Therefore, to insinuate that because LNG ships traveling to the proposed terminal will only be going approximately 12 knots, without taking into account vessel size, then the LNG ships will not likely produce wakes large enough to strand fish is absolutely groundless. As the NMFS May 11, 2007 letter fittingly affirms, Bradwood's "anecdotal analysis is inadequate" concerning juvenile fish wake stranding.

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Increased Noise from LNG Ship Traffic Will Harm to the Environment.

The DEIS fails to consider that the noise emitted from LNG ships is above the NMFS's noise threshold for physical harm to fish. LNG ships are considered cargo vessels and "[c]argo vessels are known to emit high levels of low frequency sound (6.8 to 7.7 hertz (Hz) at 181 to 190 dB, re: 1 μ Pa) capable of traveling long distances (Richardson et al., 1995)." DEIS at 4-224. As mentioned above, "[t]he NMFS' current noise thresholds for fish are a peak pressure of 180 dB re: 1 μ Pa for physical harm and an impulse pressure, or root mean square (rms), of 150 dBrms re: 1 μ Pa for behavioral disruption (NMFS, 2007a)." DEIS at 4-137. As the DEIS notes, noise from LNG vessels can have some adverse affects on whale behavior. DEIS at 4-244. However, FERC fails to address the adverse affects underwater engine noise from LNG vessels will have on salmonids and other aquatic species.

Removal of Engine Cooling and Ballast Water for LNG Vessels Will Cause Harm to Salmonids.

The DEIS fails to consider that the removal of water from the Columbia River for use in the cooling of engines and filling ballast tanks for LNG vessels will cause harm to salmonids through entrainment and impingement. The screens proposed to be used by Bradwood for water intake have been criticized by NMFS. DEIS at 4-145. Bradwood proposes to design the screens to minimize entrainment and impingement of fish and construct a system capable of supplying filtered water to the LNG ships for engine cooling and ballast using such screens. *Id.* For this system to work, the LNG ships docking at the proposed Bradwood LNG terminal must undergo significant retrofits. According to Bradwood, incentives will be offered to ships to retrofit. *Id.* However, offering incentives does not ensure that ships will in fact be properly equipped for using Bradwood's system, and therefore does not ensure the minimization of entrainment and impingement of fish. The DEIS fails to consider the impacts if the retrofits do not occur or are not effective. The DEIS fails also to consider alternative solutions to the ballast water problem.

In addition, the ballast flow volume calculations in the DEIS are questionable. The required ballasting flow volume rate is approximately 1.5 X the maximum usual output of the circulating pump for cooling water to the condenser aboard the ship. The flow rate is more than 2.5 X the usual flow rate for port operations. Bradwood proposes to have the ballast water go through the cooling system prior to entry into the ballast water piping. How will flow be controlled? In the DEIS, FERC states that each vessel will need 20 to 50 million gallons of ballast water and cooling water. If 50 million gallons are needed for any vessel, it will require a flow rate of 10,521 m³/hr. FERC and the public cannot assess the impacts to aquatic resources, the technical viability of the proposed system, or the practicable alternatives because even the basic piping diagram is classified as CEII.

Increased LNG Ship Traffic Will Cause Shoreline Erosion.

The DEIS fails to consider that increased LNG ship traffic will cause shoreline erosion because of the large wakes these ships produce during transport. Both the adverse impacts of shoreline erosion and suspended sediments have been discussed above. The DEIS simply states

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that “LNG marine traffic should not result in wakes causing significant shoreline erosion compared to existing ship traffic because LNG ship speed and size would be similar to existing deep-draft vessels currently using the Columbia River.” DEIS at 4-357. This utterly fails to consider that Bradwood will increase the deep draft vessels by 25%, which will cause more significant erosion.

The DEIS goes on to further state the existing causes of shoreline erosion and the characteristics that cause wakes from ships. DEIS at 4-450. The DEIS comments that ship speed is the most important factor determining wake size, DEIS at 4-5, 4-450, but contradicts itself by reporting “[a]n analysis undertaken for the COE concluded that the size of ship-produced waves in the Columbia River depends on the blockage ratio, which is the ratio of the cross-sectional area of the ship to that of the channel (COE, 2003).” DEIS at 4-5. The COE study clearly indicates ship size is the primary factor in wave size and FERC’s reliance on ship speed as the “most important” factor determining wake size seems to be little more than an attempt to lessen the actual severity of the wakes LNG ships will cause. The large size of the LNG tankers and the 25% increase in deep draft tankers will cause significantly more erosion, which will harm aquatic life.

The Draft EIS Fails to Adequately Address Air Quality

The DEIS does not adequately analyze or evaluate the direct, indirect or cumulative air quality impacts that could occur as a result of the Bradwood LNG project. Thus, the DEIS fails to comply with NEPA. Under NEPA, FERC has obligations to assess and report the cumulative impacts of expected emissions from the Bradwood LNG project on air quality. Moreover, the DEIS fails to comply with NEPA because it fails to specify mitigation for air quality impacts.

The proposed facility will be a large industrial source of air pollution on the Columbia River. The LNG carriers, associated support vessels, and terminal sources will emit large amounts of particulate matter (PM), including fine particles (PM10 and PM2.5), nitrogen oxides (NOx), carbon monoxide(CO), sulfur dioxide (SO₂), volatile organic compounds (VOCs), and hazardous air pollutants (HAPs). See Resource Report 9. Many of the individual emissions units combust fossil fuels, and therefore emit carbon dioxide (CO₂).

These pollutants have serious, long-term and short-term impacts on public health and the human environment. As the U.S. Environmental Protection Agency (“EPA”) recently explained with regard to pollution from large ocean going vessels:

The health and environmental effects associated with these emissions are a classic example of a negative externality (an activity that imposes uncompensated costs on others). With a negative externality, an activity’s social cost (the cost borne by society imposed as a result of the activity taking place) exceeds its private cost (the cost to those directly engaged in the activity). In this case, emissions from Category 3 marine engines impose public health and environmental costs on society. However, these added costs to society are not reflected in the costs of those using these engines and equipment. The market system itself cannot correct this

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negative externality because firms in the market are rewarded for minimizing their operating costs, including the costs of pollution control.¹⁵³

The public must bear the cost of this externality through an increased incidence of serious public health problems including premature death, cardiovascular diseases, and respiratory ailments. *Id.* at 11. In addition, many of the LNG carrier ships will be diesel propelled, and diesel exhaust has been classified as a likely carcinogen by EPA since 2002 – even at environmental exposure levels.¹⁵⁴ *Id.*

The DEIS fails to adequately address impacts on human health and the environment from the air pollution associated with the Bradwood Landing project. The Air Quality and Noise section of the DEIS (Section 4.10) does not contain any information on the public health and welfare effects of the air pollution associated with the likely pollutants from the project. Instead, the EIS implies that compliance with the National Ambient Air Quality Standards (“NAAQS”) and state ambient air quality standards ensures that there are no impacts on human health from the air emissions – that is, the DEIS fails to discuss human health impacts of air emissions at all. Compliance with the NAAQS is not an appropriate surrogate for a full and accurate analysis of air pollution impacts in the EIS, however, for at least two reasons. First, the ambient air quality standards are not protective of public health because the NAAQS are out of date and do not represent an ambient concentration under which no health or welfare effects will be experienced. Second, the DEIS’ analyses of the project’s emissions and the dispersion of those emissions are seriously flawed.

AMBIENT AIR QUALITY STANDARDS ARE NOT A REPLACEMENT FOR AN ADEQUATE DESCRIPTION AND ANALYSIS OF HEALTH AND WELFARE IMPACTS FROM THE PROJECT’S AIR EMISSIONS.

The DEIS does not discuss health and welfare impacts related to the project’s emissions. The DEIS seems to depend on modeled compliance with the NAAQS and state ambient air quality standards to demonstrate that the project does not have significant impacts on air quality, and thus human health and welfare. See DEIS at 4-383-84. The DEIS states that “[t]he NAAQS were set at levels the EPA believed were necessary to protect human health (primary standards) and human welfare (secondary standards).” DEIS at 4-367. In many cases, however, EPA has not satisfied its mandatory duty to review thoroughly and update as necessary the air quality criteria and NAAQS for air pollutants every five years. 42 U.S.C. § 7409(d)(1). Moreover, the NAAQS do not represent a level of pollution under which no health or welfare effects will be experienced, however. Thus, the DEIS cannot depend on compliance with the NAAQS or state ambient air quality standards for a sufficient analysis of impacts on the human environment.

For example, EPA has not reviewed the NAAQS for CO for over 13 years. EPA first set primary and secondary CO NAAQS in 1971 at 9 ppm over an 8 hour averaging time and 35 ppm

¹⁵³ U.S. EPA, *Advance Notice of Proposed Rulemaking: Control of Emissions from New Marine Compression-Ignition Engines at or Above 30 Liters per Cylinder 10* (signed Nov. 29, 2007) (attached as Exhibit).

¹⁵⁴ The DEIS contains no discussion of diesel exhaust occupational exposure or human/environmental health impacts of diesel exhaust.

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over a 1 hour averaging time. 36 Fed. Reg. 8186 (April 30, 1971). The primary NAAQS itself has never been revised from the initial level, though the secondary NAAQS was revoked in 1985. 50 Fed. Reg. 37,484 (Sept. 13, 1985). The last time EPA published a review of the CO NAAQS and a decision on whether to revise the CO NAAQS in the Federal Register was 1994. 59 Fed. Reg. 38906 (August 1, 1994). Thus, EPA has not satisfied its mandatory duty to review and decide whether to revise the CO NAAQS every five years, and the DEIS should not depend on compliance with an outdated NAAQS to demonstrate a lack of impacts on the human environment.

Similarly, the last time EPA completed a review to update the air quality criteria for NOx and the NAAQS for NO2 was in 1996. 61 Fed. Reg. 52,852 (Oct. 8, 1996). The 1996 review culminated in EPA's decision to retain the then-existing primary and secondary NO2 NAAQS, each an annual arithmetic mean of 0.053 parts per million (ppm). 61 Fed. Reg. 52,852. This review relied extensively on a 1993 air quality criteria document for NOx and a 1995 EPA staff paper that reviewed and integrated the research findings compiled in the earlier document. 61 Fed. Reg. 52,853. Even assuming the 1996 review was adequate, EPA has failed to satisfy the Clean Air Act's requirements, and a review of the NOx air quality criteria and the NO2 NAAQS is seven years overdue.

For SO2, the story is the same. The current NAAQS for SO2 has not changed since 1971 (though minor technical changes to the SO2 NAAQS were made in 1996). EPA's most recent consideration of the efficacy of the existing NAAQS for SO2 proceeded in two stages. In 1993, EPA elected to retain the existing secondary SO2 NAAQS, and in 1996 EPA came to the same conclusion regarding the existing primary NAAQS. See 58 Fed. Reg. 21,351 (Apr. 21, 1993) (retaining existing secondary SO2 NAAQS); 61 Fed. Reg. 25,566 (May 22, 1996) (retaining existing primary SO2 NAAQS). EPA's 1996 decision to retain the existing primary NAAQS for SO2 was challenged, and upon concluding that EPA had not adequately explained its rationale for retaining the existing primary SO2 NAAQS the District of Columbia Circuit Court remanded the decision to EPA. *American Lung Assn. v. EPA*, 134 F.3d 388 (D.C. Cir. 1998). Although it has now been over nine years since this remand, EPA has neither provided a new justification for its 1996 decision to retain the existing primary SO2 NAAQS nor completed a new cycle of review of those standards. Thus, the DEIS' reliance on the SO2 NAAQS to establish an acceptable level of air pollution impacts is unacceptable.

Even if the NAAQS were reviewed every five years, as required by the Clean Air Act, EPA sometimes sets NAAQS at levels that do not ensure that air pollution will not cause death and disease in the human population. For example, in the most recent review of the fine particulate matter health based ambient air quality, EPA was unable to discern a threshold level of pollution under which the death and disease associated with fine particles would not occur. 71 Fed. Reg. 2620, 2635 (Jan. 17, 2006). Studies reviewed by EPA revealed a linear or almost linear relationship between diseases like cancer and the amount of fine particulate matter in the ambient air. *Id.* Put simply, the more fine particulate matter emitted into our air, the more death and disease. Thus, the NAAQS, which allow a certain concentration of fine particle pollution in the air, does not ensure that public health impacts are eliminated, or even minimized. In fact, the NAAQS for fine particles and ozone are not set at the levels indicated as adequately protective by the Clean Air Scientific Advisory Committee ("CASAC") and the Children's

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Health Protection Advisory Committee ("CHPAC"), EPA's own scientific advisors. See Letter from Dr. Rogene Henderson, Chair, CASAC, to Stephen L. Johnson, Administrator, U.S. EPA, re: CASAC's Peer Review of the Agency's 2nd Draft Ozone Staff Paper, EPA-CASAC-07-001 (Oct. 24, 2006); Letter from Dr. Melanie Marty, Chair, CHPAC, to Stephen L. Johnson, Administrator, U.S. EPA, re: Proposed NAAQS for Particulate Matter (March 3, 2006). Because the NAAQS are not set at levels that prevent all human health and environmental impacts from the air pollutants that the project will emit, the DEIS must adequately discuss the health and welfare impacts associated with the pollution. Because it contains no discussion of human or environmental impacts of air pollution, the DEIS is inadequate.

In addition, there are no ambient air quality standards for hazardous air pollutants, many of which potentially or probably cause cancer. The DEIS contains no discussion of the human health and environmental impacts of the hazardous air pollutants that will be emitted as a result of the project. Therefore, the DEIS is inadequate.

In short, simply pointing to ambient air quality standards as surrogates for determining impacts on public health and welfare is not sufficient under NEPA. FERC must take a hard look at the health and welfare effects. In so doing, FERC must describe the impacts to be expected from the pollution that the project will emit into our air.

HEALTH IMPACTS OF BRADWOOD LNG'S AIR EMISSIONS

As stated above, the proposed project will emit large amounts of PM, PM10, PM2.5, CO, NOx, SO2, VOCs, and HAPs. See Resource Report 9. The DEIS is utterly devoid of any discussion of the health effects of these pollutants. Some discussion of the health impacts that FERC should consider follows, though this discussion is provided only to demonstrate the lack of any health and welfare information included in the DEIS, not to replace the agency's own analysis of health and welfare impacts.

Health Impacts of Particulate Pollution

Particulate pollution, also known as soot, has a variety of serious adverse health effects including premature death, heart attacks, strokes, birth defects and asthma attacks. Particulate pollution has also been linked to Sudden Infant Death Syndrome and low birth weight. The elderly, children, and those with respiratory disease are the most affected by particulate pollution. Particulate matter consists of small particles and liquid droplets that can be inhaled deep into the lungs and cause serious health effects. U.S. EPA. Air Quality Criteria for Particulate Matter (October 2004), Vol. 1, EPA 600/P-99/002aF-bF (both volumes available at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=87903>). PM can cause a variety of health problems include respiratory difficulties and illness, decreased lung function, aggravated asthma, chronic bronchitis, irregular heartbeat, heart attacks, and premature death in people with heart or lung disease. U.S. EPA, Health and Environment, Particulate Matter, <http://www.epa.gov/air/particulatepollution/health.html> (last visited Dec. 2, 2007). In addition, exposure to even low levels of fine particles has been linked to low birth weight. Michelle Bell, *et al.*, "Ambient Air Pollution and Low Birth Weight in Connecticut and Massachusetts," *Environmental Health Perspectives*, Vol. 115(7); 1118-1124 (July 2007) (this study also found

that exposure to nitrogen dioxide and carbon monoxide put children at increased risk for low birth weight). The impacts of particulate matter pollution on birth weight may be disproportionately borne by minority populations. *Id.*

Health Impacts of Sulfur Dioxide Pollution

Since the 1980's, courts have recognized that SO₂ pollution is "a medically recognized threat to human health" and that "high levels of pollution sustained for periods of days can kill." *Ohio Power Co. v. US EPA*, 729 F.2d 1096, 1097, 1098 (6th Cir. 1984). In addition, long-term exposure to SO₂ produces significant health effects, including "[a]cute respiratory infections in children, chronic respiratory diseases in adults, and decreased levels of ventilatory lung function in both children and adults." 729 F.2d at 1098. Like particulate matter, SO₂ aggravates respiratory illnesses. SO₂ is a lung irritant and can cause breathing difficulties, respiratory illness, and aggravation of existing heart disease. U.S. EPA, Health and Environmental Impacts of SO₂, <http://www.epa.gov/air/urbanair/so2/hlth1.html> (last visited Dec. 2, 2007). SO₂ reacts with other chemicals in the air to form sulfate particles that are associated with increased respiratory impairment and disease, difficulty in breathing, and premature death. *Id.* SO₂ is also a precursor chemical to fine particulate matter. 70 Fed. Reg. at 25,162. In addition, when sulfur dioxide emitted from industrial sources reacts with other elements in the atmosphere, it forms sulfates, sulfuric acid mist and other chemical derivatives that tend to stay airborne for days and affect areas at great distances downwind.

Health Impacts of Nitrogen Oxide Pollution

Nitrogen oxides ("NOx") are highly reactive gases emitted primarily from the combustion of fossil fuels in mobile and stationary sources. 70 Fed. Reg. 8880, 8888 (Feb. 23, 2005). NOx can cause respiratory problems such as asthma attacks, respiratory tract symptoms, bronchitis, and decreased lung function. Committee on Environmental Health, American Academy of Pediatrics, *Ambient Air Pollution: Health Hazards to Children*, 114 PEDIATRICS 1699, 1701 (Dec. 2004). Nitrogen oxides are among the main ingredients of ground-level ozone, or smog, which can trigger serious respiratory problems.

Health Impacts of Ground Level Ozone (Smog)

Although ozone ("O₃") serves a beneficial atmospheric purpose when located in the stratosphere ten to thirty miles above the earth's surface, ground-level ozone is a harmful pollutant. *Proposed Rule to Implement the 8-Hour ozone standard*, 68 Fed. Reg. 32802, 32804 (June 2, 2003). Ground-level ozone is created by a chemical reaction between NOx and volatile organic compounds in the presence of sunlight. *Id.* According to EPA, short-term ozone exposure "can irritate the respiratory system, causing coughing, throat irritation, and chest pain ... reduce lung function and make it more difficult to breathe deeply." 70 Fed. Reg. 25162, 25169 (May 12, 2005). Exposure to ambient ozone also exacerbates asthma, causing increased asthma attacks, and increases hospital admissions and emergency room visits due to respiratory problems. *Id.* Longer-term exposure can lead to permanent and irreversible decreases in lung function. *Id.* Sadly, active children are one of the groups at the highest risk from ozone exposure. *Id.* Courts have recognized that ozone is very harmful to human health. See e.g. *1000 Friends of*

Maryland v. Browner, 265 F.3d 216, 220, n2 (4th Cir. 2001).

Health Impacts of Carbon Monoxide Pollution

CO is a colorless, odorless gas emitted primarily through the incomplete combustion of fossil fuels in mobile and stationary sources. U.S. EPA, *Air Quality Criteria for Carbon Monoxide*, EPA 600/P-99/001F, at 3-1 - 3-6 (2000) [hereinafter CO 2000 AQCD]. CO is deadly to humans and other animals at high levels. At lower levels, CO has serious adverse effects on human health. Exposure to CO results in cardiovascular system problems, central nervous system problems and developmental toxicity effects. CO 2000 AQCD, Chapter 6. These effects are generally related to reduced levels of oxygen in the blood caused by CO's reaction with hemoglobin. These reduced oxygen levels result in tissue hypoxia. *Id.* at 5-22. According to EPA, CO may affect human health in other ways as well. *Id.*

For instance, exposure to CO has been linked to adverse effects on the cardiovascular and nervous systems of both adults and developing children, including exacerbation of heart disease, contributing to low birth weight, and increasing the daily frequency of respiratory illness. *Id.* at 6-1. Effects are most prevalent in the elderly, small children, fetuses, pregnant women, and people with anemia or pulmonary and heart disease. *Id.* at 4-3.

Significant new information has been published about CO's impact on fetuses since the CO 2000 AQCD. Since 2000, at least three studies have confirmed that CO exposure is linked to low birth weight. At least one study of children in the urban northeastern United States indicates a correlation between low birth weight and elevated ambient CO during each trimester. Mildred Maisonet, *et al.*, "Relation Between Ambient Air Pollution and Low Birth Weight in the Northeastern United States," *Environmental Health Perspectives* Vol. 109, Supp. 3, pp. 351-356, 353 (June 2001). The Maisonet study identified an increased risk of low birth weight at ambient CO levels greater than 1.46 ppm, a threshold level significantly lower than studies identified by EPA in the 2000 CO air quality criteria review. *Id.* at 355. Another study of children born in California during 1975-1987 noted a correlation between decreased birth weight and CO exposure in the first trimester. Muhammad T. Salam, *et al.*, "Birth Outcomes and Prenatal Exposure to Ozone, Carbon Monoxide and Particulate Matter: Results from the Children's Health Study," 113 *Environmental Health Perspectives* 1638, 1641 (Nov. 2005). That study noted that a correlation between low birth weight and exposure to CO is plausible because of the effect of CO on maternal hemoglobin (reducing oxygen available to fetal circulation) and direct effects on fetal hemoglobin - which has a greater affinity for binding CO than adult hemoglobin. *Id.* at 1642. This study also described a correlation between low birth weight and CO exposure at ambient levels greater than 1.4 ppm. *Id.* at 1643. A study of air pollution impacts on fetuses in Seoul, South Korea, found an increase of carbon monoxide concentrations during the first trimester was a risk factor for low birth weight in full term infants. Eun-Hee Ha, *et al.*, "Is Air Pollution a Risk Factor for Low Birth Weight in Seoul?" *Epidemiology* at 643-48 (Nov. 2001). The current National Ambient Air Quality Standards (NAAQS) of 9 ppm over 8 hours and 35 ppm over 1 hour does not protect pregnant mothers and fetuses from these adverse effects.

Health Impacts of Hazardous Air Pollutants

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Hazardous air pollutants (“HAPs”) are those pollutants suspected or known to cause serious health effects or adverse environmental effects. Although Congress initially established the list of known HAPs to be regulated under the Clean Air Act, EPA must “periodically review the list” and add pollutants which

present, or may present, through inhalation of other routes of exposure, a threat of adverse human health effects (including, but not limited to, substances which are known to be, or may reasonably be anticipated to be, carcinogenic, mutagenic, teratogenic, neurotoxic, which cause reproductive dysfunction, or which are acutely or chronically toxic) or adverse environmental effects whether through ambient concentrations, bioaccumulation, deposition, or otherwise[.]

42 U.S.C. § 7412(b)(2). Exposure to HAPs can occur through inhalation, consumption of contaminated food products, consumption of livestock that consumed contaminated plants, consumption of plants that grew in contaminated soil, drinking contaminated water, or dermal contact with contaminated soil, dust or water. U.S. EPA, About Air Toxics, <http://www.epa.gov/ttn/atw/allabout.html> (last visited Dec. 2, 2007). Potential human effects include cancer, damage to the immune system, and other neurological, reproductive, developmental and respiratory problems. *Id.*

ENVIRONMENTAL IMPACTS OF BRADWOOD LNG’S AIR EMISSIONS

In addition to health impacts, the criteria pollutant and hazardous air pollutant emissions associated with this project will have impacts on the human environment that have not been sufficiently analyzed in the DEIS. Many of the individual emissions units combust fossil fuels, and therefore emit carbon dioxide (CO₂).

Environmental Impacts of Particulate Pollution

Particulate pollution is linked with environmental damage such as reduced visibility (haze), altered nutrient balances in waters and soils, acid rain, and various other negative impacts on ecosystems. For a comprehensive review of particle pollution impacts on the environment, see U.S. EPA, Air Quality Criteria for Particulate Matter (October 2004), Vol. 1, at 4-1-4-230 EPA 600/P-99/002aF-bF (both volumes available at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?id=87903>). Fine particles are the major cause of reduced visibility – including in national parks and scenic areas. See *Introduction to Visibility*, Section 4, William Malm, National Park Service and Colorado State Institute for Research on the Atmosphere (May 1999).

Environmental Impacts of Sulfur Dioxide Pollution

SO₂ emissions contribute to impaired visibility in scenic areas and acid deposition (acid rain), which damages building materials and has deleterious impacts on plants and fish. U.S. EPA, *Latest Findings on National Air Quality, 2002 Status and Trends Summary* 12 (2002) available at <http://www.epa.gov/air/airtrends/aqtrnd02/2002_airtrends_final.pdf> (hereinafter

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2002 Air Trends). SO₂ also contributes to acid rain, and sulfate particles are the major cause of haze throughout the country, even in our national parks.

Environmental Impacts of Nitrogen Oxide Pollution

Much like SO₂, nitrogen oxides also contribute to acid rain, diminish water quality, and impair visibility. NO_x emissions directly result in nitrogen deposition in the aquatic and terrestrial ecosystem. See 70 Fed. Reg. 8892 (Feb. 23, 2005). Elevated soil nitrogen levels exacerbate the effects of acid deposition. *Id.* at 8893. Elevated nitrogen levels in water contribute to eutrophication, which depletes dissolved oxygen and can lead to “dead zones” in water bodies. EPA has stated that “airborne releases of NO_x are the largest source of nitrogen pollution in certain water bodies, such as the Chesapeake Bay.” 2002 Air Trends, at 2, 6. NO_x emissions also exacerbate atmospheric ozone depletion, and some nitrogen oxides are greenhouse gases.

Environmental Impacts of Ground Level Ozone

Ozone causes damage to vegetation and wildlife. 70 Fed. Reg. 25162, 25169. EPA acknowledges that ozone and its precursor pollutants can travel hundreds of miles from their sources. 2002 Air Trends, at 8.

Environmental Impacts of Carbon Monoxide

Animals exposed to CO experience similar effects to those experienced by humans. CO also has indirect effects on the atmosphere that the EPA even admits may contribute to or exacerbate global warming. U.S. EPA, *Greenhouse Gases and Global Warming Potential Values: Excerpt from the Inventory of U.S. Greenhouse Emissions and Sinks: 1990-2000*, EPA 430-R-02-003, at 4 (April 2002). CO reacts with hydroxyl (OH) radicals, which serve a mitigation role by decreasing the lifetimes of strong greenhouse gases like methane and assisting in destroying ground level ozone. *Id.* at 7. CO’s reactions with hydroxyl radicals decrease their availability to mitigate the effects of strong greenhouse gases and decrease ground level ozone. Moreover, CO in the atmosphere is eventually oxidized to Carbon Dioxide (CO₂), which directly contributes to climate change and global warming of the Earth’s surface. *Id.* at 6 (quoting the Intergovernmental Panel on Climate Change, *Climate Change 1995: The Science of Climate Change* (J.T. Houghton *et al.* eds., Cambridge U. Press 1996)).

Environmental Impacts of Carbon Dioxide

Heat-trapping gases, including CO₂, that cause global climate change come largely from burning fossil fuels. The proposed project features ocean-going vessels and industrial sized combustion equipment that will burn fossil fuels. Thus, the DEIS must consider the potential of the project to exacerbate global climate change. Global climate changes are already occurring. These include increased frequency and intensity of storms, and more frequent and severe heat waves, droughts and floods. In addition, the glaciers are rapidly retreating, and Cascade snowpack is melting earlier and faster each spring. These changes in the water cycle, along with other global climate changes, threaten crops, salmon, recreation, fishing, and water supplies. Global climate change also affects the reproductive success, range, and diet of vulnerable

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species. Both the Intergovernmental Panel on Climate Change (IPCC) and the National Research Council (NRC) have developed extensive data and information on climate change that should be considered when discussing and analyzing the impacts of the proposed project. See IPCC, *Climate Change 2001: Impacts, Adaptation and Vulnerability* (2001), available at http://www.grida.no/climate/ipcc_tar/wg2/index.htm; IPCC, *Climate Change 2007: The Synthesis Report* (2007), available at <http://www.ipcc.ch>; NRC, *Climate Change Science: An Analysis of Some Key Questions*, (2001) available at <http://books.nap.edu/html/climatechange/>.

THE DEIS FAILS TO PROPERLY QUANTIFY POTENTIAL EMISSIONS FROM THE PROPOSED PROJECT.

The DEIS must provide a quantitative assessment of the effects on the environment and public health from the maximum emissions that the project will generate. The DEIS provides a table of "Estimated Air Emission from the LNG Ships, Tugs and Security Vessels." DEIS at 4-370. The DEIS also provides a table of "Operating Air Emissions Summary for Proposed LNG Terminal." DEIS at 4-374. The DEIS also includes a table of "Estimated Total and Peak Daily Construction Vehicle Tailpipe Emissions for LNG Terminal." DEIS at 4-383. The DEIS also includes a table of "Estimated Total and Peak Daily Construction Vehicle Tailpipe Emissions for Pipeline." DEIS at 4-386. For a number of reasons, the potential emissions calculated and relied upon by FERC understate emissions. Thus, FERC has not taken the requisite hard look at the environmental impacts of air emissions because the applicant has not appropriately quantified emissions.

The type of ship to be used and the potential pollution control equipment the ships might employ is not disclosed in the EIS or any other publicly available documents. See DEIS at 2-1 – 2-2. FERC based its estimate of air emissions from LNG ships on the applicant's expectation of the number of "typical" LNG ships that will visit the terminal each year (125 ships.) DEIS at 2-3. Moreover, FERC based its estimate on emission factors from EPA documents. Many ocean-going LNG carriers exist. Thus, the emissions estimates should be based on actual source testing. The emissions estimates included in Resource Report 9 do not estimate the maximum emissions from the proposed project, and therefore do not provide the requisite hard look at air impacts.

The DEIS analysis must be based on the maximum air pollution emissions possible under the physical and operational design of the facility. That means that the maximum number of ships and the worst-case (that is, most polluting) ships must be considered, unless otherwise limited as to number or type by a permit, a law, or the physical or operational design of the facility. Because it is based on typical or expected conditions, rather than maximum emissions, the DEIS significantly understates emissions from LNG ships and support vessels.

For fugitive emissions from valves, seals, and lines (Table 9-A-11), the Resource Report upon which the DEIS is based does not indicate the source of the emissions factors.

THE DEIS FAILS TO INCLUDE APPROPRIATE EMISSIONS DISPERSION MODELING.

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The modeling analyses submitted by NorthernStar are flawed in several respects, primarily with regard to the validity of the model for this application, characteristics of the source, and background data. Adequate modeling was not performed to demonstrate compliance with the NAAQS, state ambient air quality standards, PSD increments, and Class I area air quality related values from all of the sources of air emissions that will be employed in constructing and operating the LNG terminal. Moreover, the modeling completed, even if it meets the requirements of the Clean Air Act, does not provide sufficient information about the dispersion and impacts of air pollutants associated with the project on public health and welfare values for FERC to draw a reasonable conclusion about air quality impacts.

The DEIS claims that "[u]sing an EPA-approved dispersion model, impacts of criteria pollutants from the LNG carriers plus the preliminary modeled impacts from the LNG terminal, competing sources, and background concentrations were added together and compared to the applicable federal NAAQS and Prevention of Significant Deterioration (PSD) Increments." DEIS at 4-370. For the results and methodology of this dispersion modeling, the DEIS refers to a March 22, 2007, Air Quality Modeling Report to the ODEQ. DEIS at 4-378.

There are several issues with these statements in the DEIS. First, the applicant has never completed dispersion modeling for impacts of criteria pollutants from LNG carrier emissions. The applicant modeled the emissions impacts from LNG carriers while hotelling at the terminal, but the applicant never modeled emissions calculated in the Air and Noise Quality Resource Report submitted to FERC. The calculated emissions included LNG carrier emissions from entry into US waters to hotelling at the terminal and on to exiting US waters, and assist tug emissions. See FERC Section 3 Application, Resource Report 9, Tables 9-A-13 – 9-A-19. The only LNG carrier emissions impacts modeled by the Applicant were for hotelling. Thus, the statement that the applicant modeled "impacts of criteria pollutants from LNG carriers. ..." is simply not true.

Second, because the applicant never modeled the impacts of emissions from LNG carriers and assist tugs, FERC cannot draw a rational conclusion about the effects of the project on the human environment, including impacts on PSD increment, Federal Class I areas, and other resources. FERC simply lacks information necessary to quantify and/or analyze the effects of the project on air quality values. Moreover, impacts from LNG carriers should be evaluated using an offshore model, OCD. See 40 C.F.R. Part 51, Appendix W.

Third, the modeling completed by the applicant did not model all relevant pollutants. Again, the DEIS claims that NorthernStar used an EPA-approved dispersion model to model the impacts of criteria pollutants from the LNG carriers and terminal, but this is simply not true. The March 2007 ACDP application indicates that NorthernStar modeled CO and NOx emissions from terminal stationary sources, and did not model SO₂, VOC, particulate matter (PM), PM₁₀, or PM_{2.5}. ACDP App. at 6-1. NorthernStar modeled only the emissions of CO and NOx from the Submerged Combustion Vaporizers, Emergency Diesel Generator, and Diesel Firewater Pump. See ACDP App. at 6-3, Table 6-2. Thus, impacts of all criteria pollutants were not modeled. Importantly, the applicant completed no modeling of PM_{2.5} impacts. See FERC Section 3 Application, Resource Report 9, Attachment 9A-4. Modeling of PM₁₀ impacts is not

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an appropriate surrogate for PM2.5 impacts because PM2.5 dispersion is generally much further than PM10.

FERC should have considered PM2.5 modeling results because there is no significant impact level for PM2.5, thus the SIL is zero. 40 C.F.R. § 52.21(b)(23)(ii); 40 C.F.R. § 51.166(b)(23)(ii). In the absence of a designated significance level, the SIL is zero for regulated pollutants. Thus, any impact exceeds the SIL and requires further modeling. Moreover, dispersion of PM2.5 is significantly different than dispersion of PM10.

Fourth, the model used was not appropriate and likely understated emissions impacts. NorthernStar employed the AERMOD program, version 07026, with PRIME downwash algorithms. DEIS 4-378; ACDP App. At 6-2. AERMOD is a steady state dispersion model with a boundary layer. It is possible for a steady state dispersion model with a boundary level to predict that a source will inject pollutants above the boundary layer and the computer assumes the pollution is lost. The other EPA "Preferred/Recommended" dispersion model, CALPUFF, does not "lose" pollution like that. Thus, even in near field applications, CALPUFF is a more reliable modeling program. CALPUFF is a non-steady-state puff dispersion model, and is appropriate for long-range transport and complex terrain. See 40 C.F.R. Part 51, Appendix W; EPA Technology Transfer Network Support Center for Regulatory Atmospheric Modeling (SCRAM) <http://www.epa.gov/scramp001/dispersionindex.htm>.

Fifth, FERC should not accept modeling using AERMOD to accurately reflect impacts on Class I areas more than 50 km away from the proposed project. Here, the applicant used impacts at 50 km in the direction of the Class I area to judge impacts inside the Class I areas. AERMOD is only applicable to a distance of 50 km. ACDP Application, App. B at 21. Thus, the applicant should have used, and FERC should have reviewed, CALPUFF modeling results to quantify and describe impacts to Class I areas and the Columbia River Gorge.

THE DEIS FAILS TO DISCLOSE, DISCUSS OR CONSIDER ANY AIR EMISSIONS CONTROL TECHNOLOGIES APPLICABLE TO THE BRANDWOOD LANDING LNG PROJECT.

Control technologies exist that are applicable to the types of equipment proposed for Bradwood Landing, and for the LNG ships and other vessels. For instance, engine-based and add-on control technologies are available to control NOx from ocean-going vessels. See U.S. EPA, *Advance Notice of Proposed Rulemaking: Control of Emissions from New Marine Compression-Ignition Engines at or Above 30 Liters per Cylinder*, Chapter 6 (signed Nov. 29, 2007) (attached as Exhibit X). In addition, control technologies are available to control particulate matter and SOx emissions from ocean-going vessels. *Id.* The SCVs are essentially industrial boilers, control technologies for which have been in use for decades. Moreover, the DEIS failed to consider use of a flare to control fugitive VOC and HAP emissions. This failure to disclose that air pollution control technologies exist that could be used to minimize impacts, even if rejected, renders the DEIS inadequate.

The EIS does not adequately consider the adverse effects of nitrogen emissions

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While the DEIS admits that nitrogen gas would be emitted during normal operations of the terminal facility there is not an adequate discussion of the impacts of increased nitrogen releases on either air quality or potential effects of nitrogen deposition around the project site or regionally that could contribute to increased nutrient levels in the Columbia River and its tributaries. This should be specifically discussed and considered in the EIS.

The DEIS needs to evaluate the impacts that would result from increased gas combustion that the proposed project and related projects would stimulate in the Lower Columbia River

Importing 1.3 bcf/day or more into the Lower Columbia River could create a significant incentive for the development of gas generating facilities in or around the proposed LNG terminals. This impact would only be increased should both the Oregon LNG and Bradwood terminals be approved and constructed. Similarly, the importation of large quantities of gas would similarly act as an incentive for gas intensive industries to locate along the Columbia River.

The combined presence of water from the Columbia River, an industrial land base, and a major influx of LNG derived gas would create significantly increased development pressures on the lower Columbia River that were ignored entirely in the EIS.

Question: How would the siting of an LNG terminal, or even two, in the Lower Columbia act to stimulate or encourage the development of electrical power generating facilities and other energy intensive industries? Please specifically consider the existing and potential transmission capacity to California as well as California's electrical demand. Similar evaluations should be made for Oregon, Washington and surrounding states that could create a demand for Oregon-produced electricity based on new gas supplies provided via the planned LNG terminals.

Question: What are the direct, indirect and cumulative effects of increased industrialization that would be encouraged by the siting of one or more LNG terminals in the Lower Columbia River. Please include impacts to air, water, fish, wildlife, humans, traffic, noise, lights and other impacts.

Concerns about the real potential for this increased industrialization is supported by the recent development of both PGE's Port Westward power plant (see attached article on Port Westward) and the development of the Mint Farm electrical generating plant in Longview (see attached article on Mint Farm). The attached analysis of projects in the lower Columbia River by CRK's Brett VandenHeuvel should be reviewed and its contents considered and discussed in the context of cumulative impacts on air quality, energy use, GHG emissions and their related impacts, including human health and environmental impacts.

The EIS should evaluate and consider the fact that the largest new gas-fired electrical generating plants in the Northwest have been planned for the Lower Columbia River and discuss how this reflects the areas likely increased attractiveness in the event the proposed LNG terminals are in fact sited.

Greenhouse Gas Emissions

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The impacts of global climate change represent what is likely the single most significant threat facing the planet today. That human combustion of fossil fuels is the leading cause of climate change is now beyond serious dispute. This is clearly described in the Intergovernmental Panel on Climate Change Fourth Assessment report, *Climate Change 2007: Synthesis report*, which is attached here. The extremely broad yet locally and globally significant impacts of climate change effects include: flooding; drought; heavier precipitation and storm events; more frequent heat waves; fires; heat stress; vegetation changes; sea level rise; rapid snow and ice melt; increased intensity of hurricanes; retreating glaciers and potentially significant impacts on virtually every aquatic and terrestrial species on Earth.¹⁵⁵ In popular literature, Time Magazine's cover story (attached) clearly places the threats of global warming among the most serious issue facing humans today.

The DEIS fails to properly evaluate the projects direct, indirect and cumulative effects that would result from the greenhouse gas (GHG) emissions that the project would cause. The proposed project would cause significant increases in GHG emissions as a result of both carbon and methane emissions related to the proposed facility. Contrary to the assertions of project proponents, LNG is not a "clean" fuel source. In fact, LNG is a fossil fuel and intensifies the pollution and global warming impacts of natural gas due to the need to liquefy, transport, and regasify the gas prior to bringing it to market. The EIS should evaluate the total lifecycle GHG emissions that would be associated with the project. This includes the GHG impacts from gas drilling, transport to liquefaction facility, liquefaction, transport, regasification, transfer through proposed pipelines and ultimate combustion.

This evaluation should specifically consider the increased lifecycle GHG impacts of LNG when compared to domestic or Canadian gas supplies. As supported in the attached studies from Heede, Jaramillo and Powers, the lifecycle GHG impacts from LNG are significantly greater than the impacts of domestic natural gas and this factor needs to be openly disclosed to the public and evaluated by decision makers. These studies support that the lifecycle GHG impacts of LNG are 30 to 40% greater than the GHG impacts of domestic natural gas and this was not evaluated or disclosed in the DEIS. While NorthernStar has admitted increased GHG emissions on the order of 20% this underestimates the actual GHG costs of LNG when compared to domestic or Canadian NG.

¹⁵⁵ Karl, T.R., *supra*; Levin, K., *supra*, citing Emanuel, K., *Increasing Destructiveness of Tropical Cyclones Over the Past 30 Years* (Nature, vol. 436, August 4, 2005); P.J. Webster, et al., *Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment* (Science, vol. 309, September 16, 2005); NASA Earth Observatory, *Record Low for June Arctic Sea Ice* (June 2005 at earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=16978); A.J. Cook et al., *Retreating Glacier Fronts on the Antarctic Peninsula Over the Past Half-Century* (Science, vol. 308, April 22, 2005); R.B. Alley et al., *Ice-Sheet and Sea-Level Changes* (Science, vol. 310, October 21, 2005); E.D. Domack, et al., *Stability of the Larsen B Ice Shelf on the Antarctic Peninsula During the Holocene Epoch* (Nature, vol. 436, August 4, 2005); F.S. Chapin III, et al., *Role of Land Surface Changes in Arctic Summer Warming* (Science, vol. 310, October 28, 2005); M. Hopkin, *Amazon Hit by Worst Drought for 40 Years; Warming Atlantic Linked to Both US Hurricanes and Rainforest Drought* (Nature, October 11, 2005); T.T. Stewart, et al., *Changes Toward Earlier Streamflow Timing Across Western North America* (Journal of Climate, vol. 18, April 2005).

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The EIS should also consider the effect of increased CO₂ content of the imported LNG when compared to domestic/Canadian gas. This was not considered in the EIS and the most likely sources of LNG for the Bradwood terminal should be considered for the CO₂ content of its gas, as well as, the content of other contaminant gases that are present in addition to the methane.

As a part of this analysis the EIS should consider the increased air pollution and related global warming impacts that would be caused due to a higher Wobbe index of the imported gas. The higher Wobbe index of LNG imported gas will lead to higher air pollution levels of NO_x and other contaminants when the gas is burned and create significant impacts on a wide variety of gas users. How this would affect air quality from all gas combustion scenarios in Oregon, Washington and California needs to be specifically analyzed in the EIS. The impacts of LNG imports on increasing the Wobbe index of NG is supported in the attached documents including the Report on the Joint Workshop on Natural Gas Quality Standards, Feb. 17-18, 2005, California PUC, CA Energy Commission, April 4, 2005 and South Coast AQMD, Reducing Air Pollution, GHG Emissions, and Petroleum Dependence May 31, 2007 2nd AB32 ETAAC Meeting as well as numerous documents on the issue that are already in FERC's possession. All documents in FERC's possession relating to the impacts of increased Wobbe index should be considered and disclosed in the EIS and the record for this project.

Question: What would the total lifecycle GHG emissions from the proposed project be?

Question: How would this affect total GHG emissions from Oregon, Washington, and California?

Question: Even assuming Oregon's use of gas did not increase if the Bradwood facility started importing 1.3 bcf/day, how would the increased GHG emissions from LNG affect Oregon's overall GHG emissions? This analysis should consider a scenario that NorthernStar has claimed would occur under even a 1 bcf/day import scenario where virtually all of Oregon's natural gas would come from LNG as shown in the diagram to the right taken from the Wood Mackenzie report which NorthernStar contracted for.

Question: How would the project affect GHG emissions for both California and Washington under scenarios that assumed the projections in the Wood Mackenzie report were accurate? How would GHG emissions be affected based on FERC's own projections of how the project would affect the source of gas being used by all west coast states?

Question: How would the effects of imported gas with a higher Wobbe index be on Oregon especially under any gas use scenario, but especially including a scenario where upwards



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of 92% of Oregon's gas supply would be from LNG as projected by Bradwood? What would the likely Wobbe index of imported LNG gas be and how would a high Wobbe index affect end users?

Question: How would a high Wobbe Index gas affect gas emissions in residential, commercial, industrial and electrical generating scenarios? How would indoor air quality in residential and commercial uses be affected and what would the effects on sensitive populations, such as children and asthmatics be? How would these increased emissions affect Class I airsheds, airsheds that are in non-attainment or close to non-attainment for the pollutants at issue, and important airsheds, such as the Columbia River Gorge where air quality is already significantly impaired?

The subject of climate change and greenhouse gas emissions is a significant omission in the EIS that must be addressed because of the global and local effects of global warming. In the context of the Columbia River Basin, the projected effects of global warming have been considered in the document entitled "Climate Change Impacts on Columbia River Basin Fish and Wildlife" which was produced by the Independent Scientific Advisory Board in 2007. This attached document should be the starting point for evaluating the effects that the increased GHG emissions would contribute to in the Columbia River Basin. Given the significant direct impacts that this project would have on species within the Basin that are already being impacted by global warming the need to carefully evaluate how this project would affect the Columbia Basin ecosystem is particularly important. The EIS, however, needs to evaluate and consider how the GHG impacts of this project would affect, both directly and cumulatively, the natural resources and human population of Oregon, the west coast United States, the United States and global environmental resources.

As a starting point the EIS needs to evaluate what the existing and projected impacts from global warming are and then consider how these impacts would be increased or exacerbated as a result of the increased GHG emissions from the proposed project.

Question: What would the cumulative, direct and indirect impacts of GHG emissions from the project be in the Columbia River Basin, Oregon, west coast U.S. and the United States? To what extent would the project exacerbate global warming over the life of the project?

Question: How is global warming likely to affect salmon species in the Columbia River basin, their habitat, and the hydrologic cycle (rainfall, snowmelt, glacial melt, timing of snow and rain, drought, water temperature, etc.)? How would increased GHG emissions from the project cumulatively affect salmon and other aquatic resources that are being impacted by global warming?

Question: How are terrestrial species in the Columbia Basin being affected by global warming and what are the projected impacts to these species, such as Columbia white tail deer? How would the proposed project cumulatively increase impacts to these species?

The GHG impacts of natural gas production, distribution and use has been described in the attached U.S. EPA's 2007 "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 -

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2005." This document identifies the significant contribution that natural gas production and combustion plays in the United States overall GHG emissions and should be considered as a part of evaluating the overall impacts of this project.

Question: How do the GHG emissions associated with the proposed project compare to GHG emissions from existing gas use in Oregon, California and Washington and how would the proposed project increase these emissions.

Question: Because FERC has not prepared any programmatic EIS that considers the cumulative effect of its approval and support for new LNG import terminals across the country, FERC must evaluate as a part of the current EIS the cumulative effects of the LNG projects it has approved, as well as, the projects it anticipates it may approve in the near future. How many LNG projects has FERC approved in the last ten years, how many applications for new project does FERC have? What would be the total GHG emissions that result from these projects including the lifecycle GHG emissions that would result specifically from the increased GHG impacts of LNG when compared to domestic, Canadian or Mexican gas?

The attached report by Rick Heede of Climate Mitigation Services that quantifies greenhouse gas emissions from the Cabrillo Port LNG terminal that has been proposed for California provides valuable information regarding the impacts of LNG import terminals on GHG emission and the information contained in this report should be evaluated, disclosed and relied on by FERC in evaluating the impacts of the proposed project.

Gas liquefaction will result in greenhouse gas emissions from refrigeration compressors, other plant electricity demands, acid gas venting, flaring, methane venting, and minor amounts of nitrous oxide emissions. Shipping LNG from its source to Oregon emits greenhouse gases as a result of converting propulsion fuel into carbon dioxide and methane. Operation of the LNG terminal, results in emissions during the transfer of the LNG to the terminal, flue consumption for tenders and tug boats and crew boats, vaporization, and electricity to power the facilities. Methane emissions will occur from incomplete combustion of fuel and fugitive releases. Construction activities will add to these emissions. Finally, combustion of natural gas by consumers causes significant greenhouse gas emissions.

According to Mr. Heede's analysis, the supply chain emissions for the Cabrillo Port project will range between 23,564,431 and 26,728,883 U.S. tons per year and a similar analysis based on the specifics of the Bradwood Landing project should be prepared.

Because methane is 20 times as powerful of a GHG than carbon, the EIS should specifically evaluate the total methane releases that will result from this project, again looking at the entire lifecycle of impacts that relate to this project from production to shipping to end use combustion.

Question: How much methane would be released into the atmosphere and local environment as a result of the proposed project? Values should consider the total life cycle impacts of LNG including fugitive releases during drilling, transport, combustion and distribution.

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All of the GHC impacts should consider the cumulative effects of other proposed fossil fuel projects that are proposed in the region. For example, the GHG impacts from the proposed coal plants in Kalama and Port Westward should be evaluated, as should the impacts from the LNG projects planned for Warrenton (Oregon LNG) and Coos Bay (planned by PGE). The effects of the PGE's newly constructed gas powered electrical generating plant (Port Westward facility-see attached article from Portland Business Journal) should be evaluated in addition to other major GHG emitters such as the Wauna mill and industrial gas generating facilities planned for Longview (Mint Farm) and other industrial GHG emissions in the Lower Columbia River basin. Please review the attached summary of Lower Columbia River projects by CRK's Brett VandenHeuvel.

Question: What would the cumulative lifecycle GHG emissions be should the Coos Bay, Oregon LNG and Bradwood projects be constructed? What would the cumulative impacts be if two of these projects were built?

Question: What effect would increased gas supplies have on existing contracts for domestic/Canadian gas with lower lifecycle GHG that Oregon is currently using from the Rockies and Canada?

Increased use of fossil fuels and impacts on conservation, increased efficiency, and renewables

The DEIS completely fails to consider the effects that massively increasing the gas supply in Oregon, California and Washington and the west coast generally would have on incentives for conservation, efficiency and renewable development. Assuming that Bradwood's claim that the imported gas was actually intended for the Oregon and Washington market was accurate, the proposed project would more than double current gas use in Oregon. See attached EIA documents reflecting current gas use in Oregon, Washington and California. The impacts of such a significant increase in gas supply were ignored in the EIS. There is little question that flooding the Oregon and Washington markets with LNG derived gas would undermine the incentives for conservation which are triggered by supply limitations.

Question: How would significantly increased gas supplies in Oregon/Washington decrease incentives for conservation, efficiency and renewables?

The EIS projects that significantly increasing gas supplies would not have any measurable impacts on gas use or undermining incentives for conservation is without merit. Assuming that NorthernStar's claims that LNG would be price competitive with NG was true, the influx of a large new LNG supply would create significant pressure to weaken Oregon's recently adopted renewable energy standard to allow for greater gas combustion.

Question: How would the proposed project be consistent with Oregon's renewable energy standard and how could it increase political pressure to weaken the standard to allow for greater combustion of gas? The EIS should specifically address how the proposed project would be consistent with Oregon's goal of significantly decreasing its reliance on foreign fossil fuels?

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Question: What independent evidence is there of the need for gas in Oregon? How does this compare to California and elsewhere? Where would the gas that is planned for import to Oregon go? Would the project proponent have any actual control over where the gas went? Specifically, even if the project proponent wanted to isn't it true that they could not prevent California from becoming a lead consumer of the gas which Oregon would bear the impacts of importing? As discussed elsewhere, FERC needs to clearly assess whether there is a need for additional natural gas supply in Oregon since such a determination is fundamental for determining whether the project would have the effect of stimulating increased gas usage above an existing need. Relying on the over stated projections of the NW Gas Association, whose leading members stand to profit from the proposed projects in the Lower Columbia River again reflects that FERC appears to see itself as more of a project booster than a guardian of the public trust which is charged with ensuring compliance with existing state and federal laws.

Geologic Hazards

The DEIS must analyze all the hazards associated with the facility. The geologic hazards at Bradwood may lead to human safety for workers and the public and ecological damage.

The DEIS fails to consider that impacts of siting a high risk gas terminal and pipeline in a high risk geologic area. There are clearly practicable alternatives that are less hazardous and will have less adverse impacts on aquatic resources that the DEIS failed to consider. The Oregon Department of Geology and Mineral Industries, who are the experts most familiar with Oregon's geology, stated:

High risk [site] because of the combination of a proposed hazardous facility and the high (severe) geologic hazards. The site has very poor foundation soils, is in a high seismic hazard area, and potentially subject to other severe geologic hazards.

Oregon Preliminary Comments at 23 (parenthetical term "severe" in original).

The poor foundation soils consist of recent dredging fill and very thick Columbia River alluvial deposits. The DEIS fails to consider that the construction of a large industrial site containing extremely heavy LNG storage tanks on top of loose, uncolidated soils is dangerous. The facility would be constructed on an astounding 190 feet of unconsolidated soils, sand, silts, and clays. Bradwood proposes to add another 10 feet of fill to bring the industrial site above the 100-year floodplain. It is unlikely that Bradwood will be able to anchor its tanks or other components into bedrock due to the thick alluvial deposits. If Bradwood does reach bedrock, the bedrock itself is unstable and unsuitable for anchoring. The soils could fail due to the weight of the facility, landslide, tsunami, seismic event, seiche, and increased pore pressure due to high water. A failure resulting in the release of LNG could have catastrophic effects humans and aquatic resources.

DOGAMI also stated that Bradwood is a high risk site because it is in a high seismic hazard area. The United States Geologic Survey also classifies the Bradwood area as a "High"

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hazard area for earthquake potential. FERC must evaluate the earthquake risk, the consequences of an earthquake, and the impact on the public interest.

The DEIS seeks to downplay the geologic hazard of this area and suggest that "design criteria" could mitigate the effects of ground shaking. DEIS at 4-11. But, FERC fails to include any support for this statement except for the vague statement that final engineering designs, which have not been submitted, will mitigate hazards. DEIS 4-12. FERC cannot rely on vague, future designs that have not been submitted. The high seismic danger of this project weighs strongly against the public interest.

The Bradwood site also suffers from extreme landslide and rock fall hazards, which could cause significant damage or breach of the LNG storage tanks. FERC stated that "the separation distance between the cliffs and the nearest LNG storage tank is about 250 feet, greater than likely rock fall runout distances." DEIS 4-9. This is a highly questionable statement because rockfall are known to travel much further than 250 feet. FERC offers no citation or scientific support for its conclusions.

FERC does not even mention the hazard of debris flows in the DEIS, even though debris flows or landslides are common in this area. So common, in fact, that "Landslide Debris" is listed as a stratigraphic unit in pipeline section of the DEIS. A recent example of a landslide occurred west of Clatskanie on December 10, 2007. This large slide caused a leak in a Northwest Natural natural gas line, destroyed homes and closed Highway 30 for nearly a week. This landslide had a far greater runout than 250 feet.¹⁵⁶

DOGAMI states that the DEIS is incorrect in multiple important conclusions. FERC should defer to DOGAMI's local expertise in Oregon geology. DOGAMI made the following comments regarding the geological analysis in the DEIS:

A hazardous facility proposed at the site and the site is potentially subject to severe geologic hazards. No mention of technical peer review of the submitted detailed geotechnical and seismic reports to ensure technical competency. Reference to or completion of technical peer review of the detailed geotechnical and seismic reports. An independent (non-government agency) technical peer review should be performed on the detailed geotechnical and seismic reports to ensure technical competency. Review should be done by qualified and licensed geologists and engineers.

Erroneous technical statements raise overall concerns about the qualifications of the applicant with respect to technical issues. No reference to detailed geotechnical and seismic reports (URS reports) on some very complicated geotechnical issues (specific examples are given below). Also erroneous statements which do not match the URS reports. Reference to detailed geotechnical and seismic reports (URS reports) on some very complicated geotechnical issues. Adequate integration of technical issues into the DEIS. A technical review of the DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results.

¹⁵⁶ See Oregonian, "Mudslide" December 12, 2007.

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The site has very poor foundation soils, is in a high seismic hazard area, and potentially subject to other severe geologic hazards. The role of the geotechnical and geologic hazard information and project members appear to be inadequate. The geotechnical and geologic hazard information has not been fully considered in the DEIS. Effectively integrate geotechnical/geologic hazard project members into the design, construction, inspection and operations so that the site's severe geologic hazards are mitigated adequately.

Discussion of vertical deformation rates appear to only consider long-term rates (hundreds of thousands of years) based on geologic studies. Contemporary vertical deformation rates may be different. Evaluation of contemporary deformation rates. The DEIS should differentiate between long-term and short-term (contemporary) uplift rates at the site and evaluate the potential for earthquake-related subsidence at the site.

Erosion features do not form deposits. Example of global item #2. Erroneous technical statement. Such erroneous technical statements raise overall concerns about the qualifications of the applicant with respect to technical and public safety issues. A technical review of the DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results.

Since significant dredging is proposed, shoreline erosion may not be the only geologic hazard affected or influenced along the waterway. Does not consider other hazards such as slope stability. Scientific data to support the statement. Increase in depth of channel may cause slope instability along with shoreline erosion. Detailed study or evaluation by a qualified and licensed geologist or engineer. Evaluate potential slope stability due to increase channel depth.

This statement is unsubstantiated and may be inaccurate. May not consider geologic processes and hazards such as river course migration and slope stability. Scientific data to support the statement. Analysis is missing. Increase in depth of channel may cause slope instability along with shoreline erosion. Detailed study or evaluation by a qualified and licensed geologist or engineer. Evaluate historic current shoreline stability (including potential slope stability). Evaluate shoreline with proposed facilities and channel modifications.

DEIS reports that LNG tanker wave heights would be "slightly larger" than other smaller, but similar sized tankers and does not report on the resulting erosion potential from this generalized wave height. Does not report how big the resulting waves will be and the erosion potential from these waves. Scientific data to support the statement. Detailed study or evaluation by a qualified and licensed geologist or engineer. Study that provides specifics about the boat wakes generated by the vessels, their impact at the shore (which is currently vague as it stands). Also baseline study and monitoring at the site.

Since it is difficult to determine before hand, some sort of baseline study and monitoring program should be implemented. Does not propose an idea to solve and/or determine the potential impacts. Proposed solution. Baseline study and monitoring.

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Since there is a hazardous facility proposed at the site, reclamation should be performed to adequate standards for this type of facility. DEIS proposes standard reclamation. Reclamation should be performed with the proposed hazardous facility in mind. Reclamation should be performed with the proposed hazardous facility in mind. Propose reclamation not to standard regulations, but to levels so that a hazardous facility can operate without influence in any way from the reclaimed area.

Significant landslide hazards like debris flow impact, should be evaluated in detail by a qualified licensed geologist or engineer. No reference to a detailed study or evaluation by a qualified geologist or engineer. Scientific data to support the statement. Detailed study or evaluation by a qualified licensed geologist or engineer. Modeling to show debris flow won't impact the site.

Significant landslide hazards like rock fall impact, should be evaluated in detail by a qualified geologist or engineer. No reference to a detailed study or evaluation by a qualified geologist or engineer. Scientific data to support the statement. Detailed study or evaluation by a qualified licensed geologist or engineer. Modeling to show rock fall won't impact the site.

This is not a map of known faults. It is simply a copy of the USGS fault and fold map, which identifies only certain types of faults. Example of global item #2. Detailed geotechnical evaluation for pipeline indicates that the pipeline will cross 4 mapped faults. These 4 faults are not shown on the map. Such erroneous technical statements raise overall concerns about the qualification of the applicant with respect to technical and public safety issues. A technical review of the DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results. Show ALL faults on the map or indicate map is not complete.

Ground motions are not expressed in terms of "acceleration due to gravity" as stated in the DEIS. Example of global item #2. Ground motions are not expressed in terms of "acceleration due to gravity." Erroneous technical statement. Ground motion maps are usually expressed in term of "percent of gravity." Such erroneous technical statements raise overall concerns about the qualifications of the applicant with respect to technical and public safety issues. A technical review of the DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results.

What about earthquakes between 8.0 and 8.5? Why only earthquakes occurring on the CSZ? Text is not substantiated. I don't see any references to magnitudes of earthquakes for OBE and SSE in the URS reports. FERC's draft seismic design guidelines on OBE (section 5.2) are based on probabilistic ground motions (not maximum earthquakes). Magnitudes between 8.0 and 8.5 and earthquakes not on the CSZ. Approach is not documented. Evaluate OBE-SSE between 8.0 and 8.5 earthquakes not on CSZ. Substantiate approach. A technical review of the DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results. Provide consistent statements based on URS analyses.

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The susceptibility, severity, extent and risk of lateral spreading was not discussed. The global stability of the site was not discussed with respect to lateral spreading, including the extent inland, the potentially impacted area, and the associated risks. The site requires safety and stability from damaging permanent ground deformation from lateral spreading. Discuss the global stability of the site with respect to permanent ground deformation from lateral spreading including severity, extent and risk. Discuss mitigation measures that specifically address lateral spreading risks.

Additional parts of the support facility should be considered for ground improvements against liquefaction in addition to the tanks. Support facilities are important and deep foundations should be considered as well. Potential deep foundations under support facilities. Evaluate and state why no deep foundations under support facilities or add.

The proposed facility should be evaluated on a site-specific basis. Regional maps developed over 10 years ago are cited. Site should be re-evaluated on a site-specific basis and include recent scientific data. Site-specific evaluation. New modeling.

Conclusions like impacts to the site from locally derived tsunamis should be from qualified professionals. No reference to a detailed study or evaluation by a qualified geologist or engineer. Scientific data to support the statement. Detailed study of evaluation by a qualified geologist or engineer. Modeling to assess local tsunami impact to the site. Should include detailed landslide map of the area and dynamic slope stability analysis.

This does not consider that the FEMA maps maybe out of date and/or simply incorrect because they are based on old topographic data. Also does not consider potential dam break. FEMA maps maybe out of date and/or incorrect. Does not consider dam break and subsequent inundation/flooding levels. Scientific data to support the use of old FEMA maps. Missing dam break completely. Evaluate old FEMA maps and evaluate dam break.

URS report (Dec 2005) indicates "softer compressible soils" and significant settlement. DEIS does not consider regional seismic induced subsidence. No reference to URS report of subsidence and settlement. Inconsistent statement to URS report. A technical review of DEIS by URS and relevant consultants to ensure adequate integration of technical analyses and results. Provide consistent statements based on URS analyses. Also consider settlement monitoring during operation.

Pipeline report indicates significant landslides adjacent to the site. No reference to a detailed study or evaluation by a geologist or engineer. Scientific data to support the statement. Detailed study or evaluation by a qualified geologist or engineer to support statement.

How was this landslide determined to have "lack of recent activity"? No reference to a detailed study or evaluation by a qualified geologist or engineer. Scientific data to

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support statement. Inclinometers or some type of monitoring to determine it is not currently moving.

This statement and the sentence after are inaccurate. Also inconsistent to the references referred. DEIS states that future Mt. St. Helens eruptions will be reduced because of the explosion in 1980 thereby precluding lahars over the design lifetime of the pipeline. Scientific data to support the statement. Detailed study or review by a qualified geologist of engineer to support statement.

Oregon Preliminary Comments at 24-28.

As shown by these comments, the geology section of the DEIS is inadequate and inaccurate. DOGAMI's questioning of the FERC's scientific competence makes FERC look very bad and calls into question the entire DEIS. DOGAMI's analysis is also relevant to the practicable alternative analysis because any geologic event has the potential for great damage to the LNG terminal, which will adversely affect aquatic resources. FERC failed to analyze alternatives in terms of better geologic settings.

In addition, the DEIS failed to analyze the alternative pipeline routes. As stated in a letter from Dan McShane, the proposed pipeline route crosses landslide hazard areas and areas containing bauxite soils that are difficult to revegetate.¹²⁷ The DEIS must consider the cumulative impacts of this route and consider alternatives.

a. The project will harm fish and wildlife

The DEIS fails to adequately analyze the impact to fish and their habitat, including the 13 threatened ESUs of salmonids, non-listed salmonids, green and white sturgeon, eulachon, shad, striped bass, starry flounder, three spine sticklebacks, pea mouth, Pacific and river lampreys, marine fish (including tomcod, surfperch, rockfish, sandlabs, smelt, English sole, Pacific staghorn sculpin) and crab. The DEIS also fails to analyze adequately the impact to terrestrial wildlife and their habitat, including each species listed in DEIS Table 4.5.1-2.

The DEIS fails to analyze the project's harm to Essential Fish Habitat for salmon, groundfish, coastal pelagic species, and highly migratory species.

In addition, the DEIS fails to analyze adequately the impact on protect wildlife habitat in the Julia Butler Hansen Wildlife Refuge, Lewis and Clark Wildlife Refuge, and Fort Stevens State Park.

Specifically problematic, the analysis for the Columbian White-tailed deer fails to account for fragmentation of habitats between population pockets in the Estuary. The overall population is more stable if there is some degree of mobility from more stable to less stable populations. The relatively large, stable population in the Julia Butler Hansen Wildlife Refuge acts as a source for Columbian White-tailed deer to other areas. The fragmentation of habitat is not mitigated by one area of mitigation at Peterson Point, and it does not appear that mitigation

¹²⁷ Letter to FERC from Dan McShane, Licensed Engineering Geologist.

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will occur along the pipeline route, which impacts hundreds of acres of Columbian White-tailed deer habitat.

The project will harm marine mammals and sea turtles

The DEIS fails to consider that The LNG terminal and the tankers will harm marine mammals due to habitat destruction and vessel strikes. NMFS described the presence of marine mammals, as follows.

The following non-ESA-listed marine mammals are likely to be present in the immediate project vicinity during construction or seasonally abundant in the near or off shore approaches to the Columbia River:

California sea lion (*Zalophus californianus*) – U.S. Stock. Peak abundance in the Columbia River estuary from late fall through spring, mainly absent during the summer breeding season.

Harbor seal (*Phoca vitulina*) – Oregon/Washington Coastal Waters Stock. Common in the Columbia River estuary year round, resting areas (haulouts) documented within five miles of construction site. Peak in winter months and move upriver. Decrease in spring. Seals pup at Desdemona Sands and use haul-out sites up to RM 45. Spring smelt run is important prey resource. In May, after the run is over the counts decline to about 1/3 of winter counts. Adult female dive time recorded in excess of 17 minutes (Bowen *et al.* 1999)

Gray whale (*Eschrichtius robustus*) – Eastern North Pacific Stock. Abundant passing the Columbia River mouth in late fall (south bound) and spring (north bound), feeding animals may be present outside of the migratory periods.

NMFS BA comments at 23.

In addition, multiple ESA-listed mammals and turtles are also present, including: green leatherback, loggerhead and olive ridley sea turtles; blue, fin, humpback, north pacific right, sei, killer, and sperm whales; and Steller sea lion. Each of these ESA-listed species, as well as the non-ESA-listed species, will be adversely affected by the proposed project. The DEIS fails to consider the harm to these species. This is particularly problematic because NMFS has not completed consultation yet, so FERC is blindly proceeding with the EIS.

The DEIS fails to consider that the 25 % increase in deep draft vessels due to the LNG terminal will increase the risk of vessel strikes of marine mammals and turtles. The NMFS' unpublished data compiled indicates 9 vessel strikes were either reported in the Region or detected during necropsy by the NW Marine Mammal Stranding Network between January 2002 and January 2007. Fin whales (6) were encountered most frequently, with individual strikes reported for blue, sei and humpback whales. Seven of the strikes were reported from Washington and two from Oregon, during the four year period (start of 2002 through start of 2007). The closest strikes to the proposed action area involved a fin whale that came into the Port of Portland on the bow of a vessel in September 2002, and a blue whale that was reported struck and killed off Tillamook, Oregon, in January 2007. Far more actual strikes occur than are reported. FERC must assess the impact of these strikes to individuals and populations. FERC

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must fully understand the tanker route to the Columbia Bar and the tanker routes in the Exclusive Economic Zone.

The project will introduce and increase invasive species

Bradwood will introduce or allow the proliferation of invasive species to the Columbia River, the terminal site, and the pipeline route. First, ships from foreign ports will transport exotic species on multiple surfaces and in water releases from ballast or engine cooling water. These species may harm the aquatic ecosystem. Second, the removal of vegetation, and long-term disturbances, at the site will allow the introduction and proliferation of exotic species, which will harm native ecosystems and may require herbicides and pesticides to manage. Third, a large swath of clearing and ground disturbance across Oregon and Washington for the pipeline will create an ideal site for exotic species to thrive and harm native ecosystems, forestland, and farmland.

LNG terminal operation harms the local and state economy

FERC fails to consider the economic impacts of Bradwood. The DEIS cannot simply repeat the applicant's position that the 35 full-time jobs and increased tax base automatically makes this facility economically advantageous. The DEIS must consider the advantage of the 35 full-time jobs and the short-term construction jobs versus the detriment to the existing industry in Clatsop County and the State.¹⁵⁸ The DEIS fails to consider the tremendous risk to multiple industries and municipalities.

The LNG tankers and terminal will disrupt the fishing industry

A moving tanker will have a minimum safety/security zone of 500 yards. Therefore, during the tanker approach and docking, the southern access to Clifton Channel will be shut off. In addition, there will be a minimum 200-yard security zone around docked tankers. This will impair access to traditional fishing grounds offshore of Bradwood and impair use of productive drift lines. Further, simply the threat of delay or unknown security problems may force fishermen off the traditional fishing grounds at Bradwood and Clifton. The size of the exclusion zones are subject to increase at any time, which would have serious consequences on fishing access. The DEIS fails to consider these impacts.

In addition, the LNG tankers will block access to traditional fishing areas along the entire length of the river. Each time a tanker enters the river, commercial and recreational fishermen will have to leave traditional fishing areas. Gillnetters in the estuary will need to haul in nets. The hugely popular Buoy 10 salmon fishing location will be disrupted when tankers arrive because boats within 500 yards of the shipping channel must clear the area. During peak fishing season, even a slight delay is significant.¹⁵⁹ ODFW stated:

¹⁵⁸ See Gustanski, J. Preliminary Assessment of Economic Impact from the Propose Bradwood LNG Terminal

¹⁵⁹ In commenting on the proposed LNG terminal in Warrenton, local salmon and crab fishermen stated that an hour delay during peak season may cost them \$1000.

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"The moving 500-yard safety and security zone around 125 LNG ships per year (2 – 3 per week) as they move up the Columbia River will be very disruptive to commercial and recreational fishing boats." State Comments at 54.

The DEIS fails to evaluate adequately the impact of the LNG tankers on the commercial and recreational fishing industry and fishing access. The DEIS states: "[t]he Columbia River is also visited¹⁶⁰ by commercial and recreational fishing boats. An estimated 1,500 fishing boats use the Lower Columbia River in a year." DEIS 2-12. According to ODFW, over 46,000 commercial and recreational fishing boats use the Columbia River estuary each year for fishing and transit to the ocean. State Comments at 56 (from table titled, Estimated average monthly boat count by fishery in the Columbia River downstream of the Astoria-Megler Bridge). FERC's highly inaccurate data on the use of the river renders the impact analysis in the DEIS useless.

Each of these 46,000 boats will have to avoid the 500 yard safety zone around LNG tankers. This will cause delay and headaches in the extremely short and regulated commercial fishing season, and frustrate recreational anglers. Due to heavily regulated fishing seasons, missing just one drift could cost thousands of dollars. Further, LNG tankers and fishing boats will both want to cross the notoriously dangerous Columbia River bar at favorable tides. Because the LNG tankers would have priority, fishing boats are left with more risky crossings.

The LNG tankers and terminal will disrupt the shipping industry

In addition to fishing boats, the 500 yard safety exclusion zones apply to all other ships. Thus, container ships bound for the Port of Portland or Port of Vancouver, must avoid the LNG tankers. Any delay in shipping caused by the LNG tankers will cause significant economic harm. The DEIS fails to analyze the economic impact, including the cumulative economic harm due to the delay on the importers and exporters of goods, producers, and consumers. In addition, FERC must consider the impact of delay cause ports to lose clients, and the cumulative impact of reduced shipping jobs and income. In addition, the DEIS fails to analyze the cumulative effects of impact to the shipping industry due to LNG accident, terrorist attacks, or threatened terrorist attacks.

The LNG tankers and terminal will disrupt the tourism and real estate industries, and burden local communities

Economically, the proposed terminal and accompanying carriers will cause economic harm inhibiting the flow of boat traffic, diminishing the tourism appeal of the area, and negatively impacting the housing market.¹⁶¹ In addition to these delays faced by tourist vessels, LNG would diminish tourism in the area in general, a \$352 million industry for Clatsop County. Economic Impacts Assessment at 10 (See also Don West, *Letter to Clatsop County Planning*

¹⁶⁰ Commercial fishermen, some from 5th generation families of fishermen, do not "visit" the Columbia River, but live in river towns, depend on the river for their livelihood, and spend much of the lives on the river.

¹⁶¹ See Gustanski, J. Preliminary Assessment of Economic Impact from the Propose Bradwood LNG Terminal

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Commission, June 15, 2007) (“Don West Letter”). As put by Don West, President of the Astoria Lodging Association and Vice President of the Columbia River Business Alliance, “LNG . . . carries with it a connotation of being unsafe.” Don West Letter. In an industry where “[p]erception is reality,” “tourism as an economic generator depends on a positive perception of the area.” *Id.* Thus, “[m]ilitarizing the mouth of the Columbia to protect LNG shipping from terrorists” would change tourists’ perception of the area for the worse, thereby leading to decreased tourism, decreased jobs, and a decreased taxable base for the County. *Id.* Additionally, property values of areas near Bradwood landing or anywhere along the LNG tanker pathway would experience a considerable decrease, due to factors such as the diminished aesthetic appeal of the area as well as the ongoing subjection to the blast zone of the LNG carriers.¹⁶² Also associated with the risks inherent in LNG are increased insurance costs. The DEIS fails to consider these costs.

In addition, the DEIS fails to consider that the LNG terminal will require significant investments by local communities, including costs related to emergency response costs and the increasing the capabilities of emergency responders. See comments by Clatsop County and Cowlitz County, PBSJ Report to Clatsop County.

Furthermore, Bradwood has not provided protection against abandoning the site, the consequences of which would fall on the taxpayers. Oregon’s DOE stated:

[Oregon] rules require a detailed engineering estimate of site retirement cost, and a surety to provide adequate funds. Without the study and the surety, FERC has no basis for the statement that future abandonment can meet applicable regulations. In fact, there is no protection against the licensee declaring bankruptcy and abandoning the site. Department of Energy, at 63.

As DEQ summarized:

“The proposed Bradwood Landing project would place additional burdens on coastal communities related to emergency response costs and measures, declining fishing and recreation industries, and unknown safety concerns due to geologic instability and proximity to rising river waters due to global warming.” Oregon Preliminary Comments at 9.

The LNG terminal and tankers will disrupt recreation and recreation-based businesses

The DEIS fails to consider the impacts to recreation in the estuary. In addition to recreational fishing, the estuary is a popular location for kayaking, boating, bird watching, botany, plant collection, hiking, aesthetic enjoyment, drawing, and picnicking. The DEIS fails entirely to assess the impacts on these activities. A large industrial site will disrupt the enjoyment of the estuary and will preclude some recreational activities. The recreational impact is especially large because the tankers will travel the length of the river from the mouth to Bradwood, passing by the City of Astoria and popular waterfront recreation areas along the way.

¹⁶² *Id.* at 11.

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The impacts are compounded because LNG transport is a dangerous activity that many people will avoid.

In addition, a significant portion of the Clatsop County economy is based upon recreational businesses.¹⁶³ In addition to the tourism industry discussed above, Clatsop County has kayaking, boat rentals, gear stores, outdoor clubs, supply stores, gas stations, and hotels that benefit from locals and visitors recreating on the Columbia River. The DEIS fails to assess the impact of the LNG terminal and tankers on local businesses.

Construction Activities Will Disrupt Local Use of Clifton Road.

The DEIS fails to consider that construction activities at the proposed Bradwood LNG terminal will substantially increase traffic and decrease safety on Clifton Road. Clifton Road is already a dangerous road to traverse, with numerous sharp turns and narrow paved surface. If construction of the Bradwood LNG terminal and related facilities is allowed to proceed, the use of Clifton Road will become even more perilous to local residents using the road to get to and from Clifton. Bradwood proposes to cycle traffic one-way through the 2.5 mile affected portion of Clifton Road. DEIS at 4-345. This would be both inconvenient and unsafe to local residents and construction workers because of the estimated average 10 minute wait times for vehicles at the one-way section of road. This may delay emergency vehicle access.

The DEIS suggests that the increased traffic due to construction is an acceptable impact because of the temporary nature of the construction, but the construction activities will last for 3 years, DEIS at 4.344, a substantial period of time to disrupt local resident’s commute to and from Clifton. Additionally, Bradwood has failed to propose sufficient safety measures for the 2.5 mile stretch of Clifton Road. *Id.*

The DEIS grossly fails to evaluate the direct, indirect and cumulative impacts of the proposed project on public safety

The DEIS glosses over and ignores the serious safety treats of the proposed project and reads more like a public relations document for the project developer than the type of unbiased evaluation that the public has a right to expect from FERC. The DEIS fails to consider the direct, indirect and cumulative safety impacts that the project would have related to the LNG tankers, LNG terminal facility, and LNG pipelines that would be associated with the project. The project’s safety threats are significantly exacerbated because of its site-specific location 38 miles up the Columbia’s narrow river channel, but this fact is essentially ignored in the EIS. The EIS should specifically disclose the relative safety threats associated with this inland proposed port compared to other proposed LNG terminals that are offshore or on the coast.

Question: Does the proposed site-specific location of the proposed facility make it any more vulnerable to intentional terrorist attacks that could be launched from a shoreline that in many locations is just a few hundred feet from the path of LNG tankers? As a part of this analysis please discuss the justifications for security exclusion zones on either side of LNG tankers that

¹⁶³ See Gustanski, J. Preliminary Assessment of Economic Impact from the Propose Bradwood LNG Terminal

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are typically 1,500 feet. Since it would be geographically impossible to actually provide these buffers on tankers traveling to the Bradwood site how would this factor increase the overall risk of an attack on an LNG tanker? This risk should be compared to risks at other proposed LNG sites on the west coast where the safety security zone would not be rendered meaningless as a result of encroaching shoreline.

The safety risks of the proposed project can be broken down into the risks associated with LNG tankers, the LNG terminals and the LNG pipelines associated with the proposed facility.

LNG tanker risks

LNG tankers carrying 30 millions gallons or more of LNG present a significant safety threat to those who live, work and recreate along the lower Columbia River. LNG tankers contain an extremely large amount of energy and an LNG release due to either accidental or intentional (terrorist) acts could cause a fire of unbelievable proportions. Sandia National Labs has projected that an intentional breach of an LNG tanker that spilled just 10% of an LNG tankers load could produce a vapor cloud that could affect a 1.5 mile radius from a given tanker. The attached map shows the vapor cloud overlay map for Astoria and the Puget Island that would result from LNG tanker traffic associated with the proposed project.

The Government Accountability Office, however, has indicated that the risk projections in the Sandia Report are likely underestimates since they ignore the potential for the type of cascading fire on an LNG tanker that would likely occur if one LNG tank ignited and therefore spurred additional ignitions of adjacent tanks. The GAO has called for additional study of this threat and this risk needs to be directly considered in the EIS given dramatically larger risks associated with a cascading fire and how it would affect the vapor cloud and thermal exclusion zones around an LNG tanker. The significant risks of LNG accidents are further supported by the attached report by Dr. Jerry Havens on the general safety threats related to LNG.

The DEIS appears to tacitly acknowledge the threats of a cascading fire but without any explanation explains that it is "not likely to involve more than two or three cargo tanks." DEIS at 4-426. The DEIS does not explain why if a one tank fire was hot enough to cause a rupture in an adjacent tank that the combined fire from two tanks would not be sufficient to rupture a third tank and so on until all tanks on a given tanker were ruptured and ignited. The DEIS appears to dismiss the increased effects of a cascading fire while at the same time suggesting that such an event could cause up to a 30% increase in the fire hazard distance and a longer fire duration. DEIS at 4-426.

Despite acknowledging that a cascading event could result in a longer fire duration, the DEIS makes no evaluation of how long of a fire duration such an event may cause. This is significant given that the damage that a given fire may cause correlates directly with the length of time a given target is subjected to a given heat intensity resulting from a fire. Whether considering the impacts on humans or structures the DEIS should have considered the effects of how a cascading fire would affect sensitive resources including humans, homes, businesses, forests along the shoreline and other combustible structures within the vapor cloud and thermal impact zones.

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Question: What would the effects of a cascading fire event on an LNG tanker be from the perspective of impacts to humans, private property and infrastructure on shore and what facts does FERC rely on to support its findings on this issue?

The DEIS's limited reference to potential thermal radiation hazard distances is also flawed since it only assumes a breach of one tank on a 140,000 cubic meter tanker. DEIS 4-426. The DEIS should have considered the effect of a breach on the 200,000 cubic meter tankers the proposed facility is being planned to accommodate and should not be limited to the unrealistic assumption that only one tank on a given tanker would breach. As is supported by the 2007 Government Accountability Office report on LNG tanker pool fires, the risk of a cascading fire is a genuine threat in the event of an LNG tanker fire. The unsupported dismissal of any real consideration of the effects of a cascading fire event on an LNG tanker is contrary to the requirements of NEPA and should be remedied in a subsequent EIS.

Question: What would the effects of a cascading fire be on the type of 200,000 cubic meter tankers that would used at Bradwood? How long would a cascading fire on such a tanker likely burn and what would the resulting on-shore effects be?

The DEIS also uses an assumed 4.5 mile per hour windspeed estimate to project its vapor dispersion calculations, but this may not represent the scenario which would result in the greatest dispersion distance.

Question: What would the vapor cloud dispersion distance be if windspeeds were 10 mph or other higher windspeed that would result in a greater dispersion of a vapor cloud?

The DEIS appears to try to justify its near complete failure to discuss or consider the potential effects of an LNG tanker accident (even for the vapor cloud dispersion effects that are described) by the fact that the Coast Guard has responsibility for the operational safety of the LNG tankers. EIS at 4-436. The DEIS is conflicting in its treatment of the potential terrorist threats facing LNG tankers. On one hand the DEIS admits that, "terrorism has become a very real concern for the facilities under the Commissions' jurisdiction," while at the same ignoring almost entirely what the effects of a potential terrorist attack may be. This has the effect of essentially removing any ability of the public or expert agencies to evaluate the potential effects that a terrorist attack could have were the proposed project approved. While we understand some limits on how the effects of a terrorist attack maybe described, the complete absence of any clear evaluation of what the effects of a tanker breach may be, whether accidental or intentional, undermines the most important function of NEPA and is not justified by any rational national security concerns.

Question: In the event of either an accidental or intentional breach of an LNG tanker what would be the resulting damage due to loss of human life, injuries to human, damage to private structures and infrastructure, along the tanker path? This should specifically include scenarios for the type of intentional tanker breach evaluated in the Sandia Labs report should such a breach occur off the shoreline of Astoria, as well as at the proposed terminal location.

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Question: What would the vapor cloud and thermal impact zones be and how many people and structures would fall within these zones assuming that 200,000 cubic meter tankers are used at the Bradwood facility which is being specifically designed to support this size tanker? What would the economic impacts of this vapor cloud and thermal impact zone be in the event of a tanker breach?

The DEIS provides only a cursory and vague evaluation of the risks of an LNG tanker fire, either from accidental or intentional causes. No clear evaluation is made of the actual impacts that would occur in the event of an LNG tanker breach on the Lower Columbia and this analysis should be provided in the FEIS.

The DEIS fails to consider size of ships that are likely to use terminal

The evaluation that the DEIS does provide is flawed since it unreasonably assumes that the LNG tankers would be 140,000 cubic meters, despite acknowledging that Bradwood tanker facility as currently designed has a capacity to accept ships up to 200,000 cubic meters. ES-L. The EIS should evaluate the effects of tankers, on both safety and other considerations, of tankers that are 200,000 cubic meters in size, as well as, the tankers that are currently being planned and constructed for use in the U.S. market that are 265,000 cubic meters in size or larger. See attached article from MarineLink.com.

<http://www.marinelink.com/Story/Linde+Group+to+Supply+for+LNG+Tankers-207124.html>
Additionally, Bradwood has proposed using tankers that were 200,000 cubic meters as a part of their permit application to the Army Corps of Engineers. Notice for Permit Application, U.S. Army Corps of Engineers, Oct. 18, 2007.

Question: What basis does FERC have for only considering 140,000 cubic meter tankers in the EIS when the proposed facility is intended to accommodate significantly larger ships and new LNG tankers under construction are significantly larger than the 140,000 cubic meters?

That the Coast Guard may require additional evaluations before allowing ships larger than 148,000 cubic meters to use the proposed terminal fails to release FERC from its obligation to evaluate the effects of the larger ships that the facility is actually being designed for. DEIS 4-427. Regardless of what the Coast Guard does, the effects of FERC's action in approving the proposed facility needs to be specifically considered in the DEIS prior to project approval and this evaluation cannot be delayed until after the project is constructed simply because the Coast Guard may require some vague and undefined additional analysis in the future. The use of larger tankers and three tanks at the facility is clearly reasonably foreseeable and must be considered by FERC per NEPA and its implementing regulations.

All impacts of these larger ships, from increased stranding of juvenile salmon to increased risks from an LNG tanker accident, should be considered in the final EIS.

DEIS underestimates projected ship traffic

The DEIS is also inherently flawed in that it only assumes ship traffic of 125 ships per year and a two tank terminal design despite the fact that the facility is being explicitly designed

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to support three tanks. The foundation for a third tank is even being designed specifically into the project plans and the proposed pipeline is being sized for a 1.5 bcf/day sendout rate which would similarly support three tanks. Because a three tank design is reasonably foreseeable the DEIS must evaluate the increased tanker traffic that such a facility would allow and the DEIS's failure to do so seriously undermines its evaluation a broad spectrum of impacts relating from projected ship traffic. This includes the DEIS's evaluation of factors such as the impacts on non-LNG ship traffic, recreational use, impacts to salmon, air pollution impacts related to ships, and the risks of an LNG tanker accident to name a few.

FERC's willingness to evaluate the proposed project based on an intentionally minimized scale and scope instead of based on the size of the facility that is actually being designed is unreasonable and only emphasizes that FERC appears to see its role more as a promoter of the planned terminal than a neutral reviewer.

Question: Is it foreseeable that Bradwood will use three tanks because the Bradwood facility is being designed with a foundation for a third onshore LNG tank, with space for vaporizers and other equipment necessary to handle the LNG capacity a third tank would provide and with a pipeline that is sized to facilitate a third tank scenario?

Failure to consider or disclose flammable nature of insulating foam on LNG tankers

The DEIS fails to address the fact that a majority of LNG tankers use a flammable foam as insulation around on board LNG tanks that could significantly increase the risk of a cascading failure. The attached documents attached as "Collection of LNG tanker insulation risk does" directly support that the potential risks of a cascading fire resulting from insulation failure and/or ignition needs to be considered in the DEIS as an inherent safety weakness of LNG tankers. This needs to be evaluated in the EIS

Question: Does FERC acknowledge that the foam used in the majority of LNG tankers in use today is flammable? Please discuss the factual basis for any answer to this question. How would this design flaw increase the risk of a cascading fire and how does this consideration alter the DEIS's discussion of the likely vapor cloud impact distances that are discussed in the DEIS?

Question: How would the effects of a prolonged fire resulting from a cascading fire event on an LNG tanker increase the impacts of such an event on shore, particularly in the area of downtown Astoria and the terminal site including Puget Island?

Failure to adequately consider the risks of the impacts that brittle fracture could have on LNG tanker or terminal facility

While briefly acknowledging that brittle fracture is a possibility that could be caused by an LNG leak on an LNG tanker, the DEIS fails to describe what the potential effects of a leak caused by brittle fracture could be and what the resulting effects would be on sensitive resources including humans and on shore structures. The Lloyds Register study prepared for the proposed Boston harbor and referenced in the DEIS LNG terminal supports that the risks of brittle fracture are significant and should have been considered in the DEIS.

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Failure to evaluate an Emergency Response Plan and emergency response capabilities of local emergency responders

The DEIS fails to discuss or describe the Emergency Response Plan (ERP) or the effects, impacts, or mitigating effects of such a plan because no such plan had been prepared at the time of the DEIS to the frustration of local fire districts and governments alike. This is only one of the numerous impacts from FERC's rush to issue the DEIS prior to being providing fundamental information about the project, its operations, and safety protocols. FERCs attempt to cover up for its lack of basic information by repeatedly making suggested "recommendations" to NorthernStar as to what it should do or prepare is no substitute for the type of actual review and analysis that NEPA requires. This information should have been prepared in the DEIS and FERC should re-issue a supplemental DEIS before proceeding to a final EIS so that the public, state and expert agencies can have a reasonable chance to evaluate the effects of the proposed project.

The DEIS fails to discuss in any detail how the local communities along the proposed LNG tanker route would be able to respond in the event of a tanker incident either accidental or intentional and should have done so. The EIS, for example, did not disclose the fact that there is no burn center in Clatsop County and that emergency response capabilities are wholly inadequate for responding to a potential LNG tanker breach or even a tanker grounding that threatened a tanker breach. Essentially, the EIS hides behind the assumption that because a breach of an LNG tanker is unlikely there is no need to plan for a realistic scenario that evaluates how the communities along the tanker route and terminal maybe affected by an LNG accident or tanker breach. This is inconsistent with the requirements of NEPA.

Question: Does FERC acknowledge that there are inadequate emergency response assets currently available to respond to a serious event involving an LNG tanker?

Failure to evaluate effects of cost-sharing plan

The DEIS ignores the potential fiscal impacts that a cost-sharing plan would have on local and state governments. The impacts that having to re-direct scarce resources away from essential public services to LNG security and emergency response protocols would have on local and state governments was also not considered. Despite the DEISs regurgitation of NorthernStar's unsubstantiated claims about the tax revenues that the proposed project would create there is no evaluation about whether the LNG related costs that local governments would have to share would exceed the projected tax revenues the project may create. The costs of local government's emergency response responsibilities could significantly exceed the tax revenues the project would create and this should be disclosed and discussed in the EIS.

Failure to consider unconfined vapor cloud explosion

While the DEIS generally dismissed the potential for an unconfined explosion in the event of an LNG tanker accident it ignores the fact that should non-methane gases account for 15% or greater of the LNG content then such an explosion is in fact possible.

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Question: Does FERC acknowledge that LNG sources that could be used to supply the Bradwood terminal may contain contaminate gas concentrations that exceed 15% of the total LNG? Does FERC acknowledge that the Coast Guard and others have recognized the potential for an explosion if non-methane gases exceed 15% of an LNG source? What would the effects of such an explosion be?

Failure to consider effect of Astoria's extensive dock structure over the Columbia River in causing a potential explosion of gas vapors

A significant amount of Astoria's shoreline is composed of extensive pier structures that extend out hundreds of feet over the water and contain numerous structures and businesses on top of these piers that create what is at least a partially confined environment where there would be a significantly increased risk of explosion in the event of an LNG leak. The DEIS completely fails to discuss let alone assess the potential effects of the unique shoreline environment that characterizes Astoria.

Question: Does FERC acknowledge that the unique pier and dock structure along Astoria's shoreline creates what is at least a partially contained environment that would pose an increased risk of an explosion caused by LNG vapor? What would the effects of such an explosion be on the structures and humans that occupy and use these structures?

LNG terminal risks

The LNG terminal similarly poses significant risks to the public and particularly those who live on Puget Island that make clear that the proposed project is not in the public interest. The risks include the thermal and vapor dispersion risks that could affect those using the Columbia River, as well as, areas such as Puget Island and Clifton. The DEIS significantly underestimates both the thermal radiation and vapor dispersion risks associated with the proposed terminal and this undermines the purpose and intent of NEPA. Additionally, the design considered in the DEIS is inconsistent with the design requirements of NFPA 59A and 49 CFR 193 and this should have been disclosed and evaluated in the DEIS.

As discussed above, the DEISs first failure is that it only considers the effect of a two tank facility despite the fact that a three tank facility is reasonably foreseeable and must be considered as a part of the current EIS. Additionally, the DEIS failed to consider that the facility is designed to handle LNG tankers with a 200,000 cubic meter capacity. This is important because although FERC failed to consider the potential for a terminal based fire to cause an ignition of LNG tanks on board a docked tanker it should have.

The DEIS is also inadequate because of a number of significant technical and legal failures related to its analysis of the safety risks associated with the LNG terminal. These failures are discussed in Dr. Jerry Havens comments on the project which we incorporate here by reference. DEIS failures to address the safety issues surrounding the LNG terminal at Bradwood include:

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Improper use of the DEGADIS model for estimating the facilities vapor dispersion zone

The DEIS analysis of the Bradwood vapor dispersion zone relies on the improper use of the DEGADIS model. As discussed by Dr. Havens, one of the authors of the DEGADIS model, DEGADIS is not appropriate to use when attempting to calculate vapor dispersion rates from liquid impoundment sumps. Instead, as is supported by FERC's own regulations, the proper model to use when accounting for the effects of a containment berm is the FEM3A model. The improper use of the DEGADIS model undermines the accuracy of the analysis required by NEPA and constitutes a violation of application FERC regulations. This inconsistency with applicable law needs to be disclosed and considered under NEPA and its implementing regulations.

Failure to use proper design spill criteria

The vapor dispersion modeling contained in the DEIS was improperly based on a design spill from the 6-inch diameter recycle line attached to the unloading line rather than the 32" unloading line that would actually carry LNG from the tanker to the on shore tanks. Allowing NorthernStar to rely on a spill from its 6" line instead of a much more likely rupture of its 32" line is arbitrary and capricious and fails to reasonably evaluate the potential effects of the proposed project. While we believe that this is supported by the requirements by NFPA 59 A and 49 CFR 193 regardless of these design regulations an evaluation of the vapor dispersion impacts from a breach of the 32" transfer line is warranted under NEPA since the breach of the offloading line clearly a reasonably foreseeable impact of the proposed project.

The DEIS admits plainly that a spill from the transfer line would result in a 529,091 gallon leak after ten minutes. DEIS 4-414. While we support the fact that FERC staff plan to require a spill impoundment area that is sized to contain this size spill, this requirement does serve to support that this sized spill event is reasonable to plan for and evaluate in the EIS. Again, irrespective of design criteria requirements of NFPA 59 A and 49 CFR 193 NEPA's requirement to inform the public and decision makers about the potential effects of the proposed project require a clear evaluation of the vapor dispersion that would result from a breach of the transfer line. An evaluation of a 6" line breach is not a reasonable proxy for such evaluation and is inconsistent with how FERC has calculated design spills for other LNG terminals it has reviewed. See attached excerpts from Weaver Cove LNG terminal. We request that FERC specifically discuss and disclose how it has calculated design spills for vapor dispersion calculation in other proposed LNG facilities. The attached document prepared by Dr. Jerry Havens comparing vapor cloud exclusion zones as calculated by FERC for various LNG terminals further supports that FERC's determination of the proposed vapor cloud dispersion zone is arbitrary and capricious and inconsistent with NFPA 59 A and 49 CFR 193.

Question: What is the vapor dispersion zone when calculated using the FEM3 model and a design spill that was based on the 32" rupturing as opposed to merely the 6" line? How would this enlarged dispersion zones affect a LNG tanker that was docked in the event a transfer line breach and subsequent ignition? Could a breach of the transfer line cause brittle fracture impacts to a docked LNG tanker or could the subsequent ignition in such a release scenario result in

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damage to a docked tanker? How would this larger dispersion zone affect users of the Columbia River, the railroad tracks through the project site and other resources on and surrounding the project site? How would such an event affect the LNG storage tanks?

The fact that FERC released the DEIS without having NorthernStar's design calculations that supported that its trough feeding the impoundment pumps would handle a 10 minute transfer line spill is yet another sign that in FERC's rush to issue the DEIS it lacked basic information about the facility that is needed to characterize its impacts.

Question: What size design spills has FERC used to evaluate vapor dispersion and thermal radiation zones in its review of other LNG proposals, such as the Trunkline LNG terminal? How does the methodology FERC has used for other LNG terminals differ from the methodology it is applying to the current proposal for the purpose of identifying vapor dispersion and thermal radiation zones?

The modeling used improperly assumes no air/methane mixture in any spill impoundment in the event of a breach of the onshore LNG tanks or inlet or outlet lines thereto

The DEIS modeling of the LNG terminal risks also improperly assumes that should the integrity of the on shore LNG tanks or inlet or outlet lines thereto be compromised that gaseous vapors from the spilled LNG would not mix with air thus reducing the vapor dispersion distance. This assumption, however, is inconsistent with relevant field studies of the issue, such as the Gas Research Institute's Falcon Series Data Report on the 1987 LNG Vapor Barrier Verification Field Trials which is attached. It is also inconsistent with FERC's own acknowledgments in the Weavers Cove EIS. This flawed assumption is discussed in greater detail in the attached paper by Dr. Jerry Havens and Dr. Spicer entitled "Error in FERC environmental impact statement determinations of LNG vapor cloud exclusion zones: failure to account for air mixing in vapor impoundments."

Question: Does FERC acknowledge that it is not realistic to assume no mixing of air with gas vapors in modeling vapor dispersion distances? What is the proper vapor dispersion distance if the unrealistic assumption that there will not be a mixture of LNG vapors with air above a containment tank in the event of a tank breach?

The DEIS assumption that outer tank wall would effectively contain LNG lacks a reasonable basis in fact

The DEIS fails to properly consider or disclose the actual affects that an LNG vapor fire at the facility would have on Columbia River users adjacent to the facility or to residents of nearby Puget Island. The effects of vapor dispersion and a subsequent ignition based on realistic spill scenarios is similarly lacking. The DEIS, for example, presumes that in the event that the on shore storage tanks were compromised and that an LNG fire ignited on top of the LNG storage tanks that the out concrete tank shells themselves would not fail. Given the intense heat of an LNG fire, the intense cold of direct LNG contact with the concrete and the combination of the two extremes FERC should have very specific evidence to support an assumption that these outer tanks would not fail.

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Question: If an LNG vapor fire ignited on a roofless LNG storage tank, as appears to be presumed in the DEIS, how long would such a fire burn? What evidence does FERC have to support that the concrete outer tank would not structurally fail in face of what could only be presumed to be many hours of exposure to intense heat? What would be the effect if the outer tank did fail? How would Puget Island be affected by either vapor dispersion? How would such a failure affect a docked LNG tanker and one what evidence is this evaluation based?

Geologic risks at site were not adequately considered

The geologic risks at the proposed site have not been fully or adequately considered or evaluated in the proposed EIS as is supported in comments submitted by the State of Oregon and others. The DEIS failed to adequately consider the risks of landslides at the site, the effects of earthquakes including the effects of liquefaction, the potential tsunami risks (both ocean caused and from a cross river landslide). The fact that the superficial analysis contained in the DEIS did not find any evidence, either through written reports or from photographic evaluation, of the landslide-triggered tsunami that did affect the area despite the clear records of this event in local newspapers highlights the need for a much more in-depth geologic evaluation of the risks posed by this high hazard site.

We believe that the concerns addressed by the State of Oregon DOGAMI in regards to inadequate geologic evaluation at the site need to be fully addressed in a supplemental DEIS.

While the DEIS notes the risks of liquefaction it wholly fails to reasonably describe the risks of liquefaction that would remain even after the loosely proposed and vaguely described mitigation measures. For example, while the proposed LNG tanks would be put on "deep" foundations, how would liquefaction affect the other key components of the facility such as the transfer pipes, dock, vaporizers etc.? As with so many other parts of this rushed DEIS any potential to even reasonably evaluate the effects of the proposed project is undermined by the lack of even final design specifications that would allow the public or other agencies to actually evaluate the geologic risks of the project and understand the likely effectiveness of mitigation measures. The DEIS states, for example, that "While the final engineering design for the LNG terminal would incorporate detailed seismic specifications and other measures to mitigate the impacts of seismic hazards." DEIS at 4-12. Deferring the design specifics of the facility, however, and the mitigation measures it may include is fundamentally at odds with NEPA and eliminates the ability of the public and others to understand and evaluate what the effects of the proposed mitigation measures may be and what the remaining impacts would be.

Similarly, throughout the DEIS the proposed mitigation measures lack a degree of specificity that would allow a reader to understand with any degree of certainty what the final effects of the proposed project would be. There is typically no detail about how the mitigation measures would be required and if they are not required what basis FERC relies on to assume that they would actually be implemented. FERC's "recommendations" to NorthernStar hardly constitute assurances that the suggested mitigation measures would be implemented.

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These recommendations on information that NorthernStar should provide such as "Details of the liquefaction mitigation methods, procedures, plan extent and verification methods..." are exactly the type of thing that FERC should have required be produced before the DEIS was released. In FERC's rush to issue the DEIS, however, it has undermined the public's ability to evaluate and comment on these specifics and as a result FERC needs to re-issue a supplemental DEIS that the public would have a chance to review and comment on.

The DEIS statement that the shoreline along the project site "appears to be moderately resistant to erosion" is without support or relevance since the shoreline has not been subject to the type of high intensity wave action that will result from the proposed port facility. The photos to the right shown an example of wave action on the lower Columbia River just up-river of the proposed project site that was generated from a ship far smaller than the proposed LNG tankers. These impacts are import, but largely ignored in the DEIS, in the context of both shoreline erosion as well as impacts on salmon stranding which is common as a result of ship wake. Again the DEIS's failure to consider the erosion related effects of the larger 200,000 cubic meter capacity ships that the terminal is being planned for undermines the accuracy of the EIS evaluation.

While the DEIS generally ignores or unrealistically downplays the impacts of wave action on erosion and salmon stranding outside the terminal area, its treatment of these issues inside the terminal area is similarly inadequate. It is wishful thinking, for example, to assume that "in general, tugboats would be operating within the proposed turning basin with their sterns directed away from the nearshore banks" and therefore would not impact shoreline erosion. This is plainly ridiculous as tugboats would clearly have to move around the site before, during and after the arrival of an LNG tanker and assuming that they would be pointed away from the shoreline is just another example where the EIS preparers intentionally blindfold themselves to the impacts of this project.

The DEIS notes that NorthernStar would deposit dredge material on the site to raise the final site elevation above the 100-year flood level. The DEIS, however, fails to consider how this dredge material would withstand the flood action of a 100 year flood and the risks to the whole site that would result from using highly erosive dredged fill for both the site foundation and for the earthen berm around the LNG storage tanks.

Question: How would the use of dredged spoils for what would essentially be the site foundation and for the containment berms affect the ability of the site to withstand high flood events, that are predicted to increase in coming decades with global warming, as well as other similar events ranging from liquefaction to tsunamis?

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Question: The DEIS provides not information about the effectiveness of vibrocompaction and no information about the effectiveness of the proposed deep foundations planned for the LNG storage tanks. What would the remaining geological risks be assuming even that these mitigation measures are used?

The geologic analysis used in the EIS assumed that only the upper 85 feet of the soils below the project site were likely to experience liquefaction, but the DEIS also admits that there is at least 100 feet of sand, silt and clay alluvium under the site, and there is every reason to believe this entire soil structure is likely to liquefy in the event of a large enough earthquake. What justification does FERC rely on in its assumption that soils deeper than 85 feet would not liquefy?

Poor site selection for and LNG port

The DEIS fails to discuss the fact that the proposed terminal location is a poor site for an LNG terminal for multiple reasons. The DEIS ignores that the fact that the project is likely one of the highest risk sites in the United States being currently proposed given its location 38 miles up a narrow river channel which would make the proposed safety and exclusion zone meaningless for much of the tanker trip up the river since the shoreline would be well within the 1500 foot exclusion zone along the sides of LNG tankers.

The DEIS also ignores the fact that the project is located on a curve in the river and would located barely one LNG tanker's length from the Columbia River shipping channel. This is inconsistent with SIGTTO standards for terminal location siting and this fact should be disclosed and evaluated in the DEIS. Site Selection and Design for LNG Ports and Jetties Information Paper No. 14.

The DEIS also fails to adequately consider the effects on shipping and other river users, such as commercial and sport fishermen and recreational boaters who heavily use the area in and around the project site.

LNG pipelines

The DEIS's evaluation of the safety threats of the proposed pipeline which would run through Columbia and Cowlitz Counties is wholly inadequate and reflects an extreme callousness towards the people who be affected by this misguided scheme to generate revenue for New York energy speculators. FERC's almost laughable decision to segment analysis of the Palomar pipeline similarly violates NEPA and its implementing regulations.

These high pressure un-odorized gas pipelines have a blast zone of over 1,400 feet and hundreds of homes, businesses, farms and other sensitive facilities would be placed within the blast zone if the proposed project is approved. The Palomar line would result in over 33,000 acres of new blast zone being created in Oregon and thousands of acres of blast zone would similarly be created along the Cowlitz County line.

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While the DEIS completely fails to address the risks of the Palomar line it does only slightly better in terms of the proposed line through Cowlitz County. While the DEIS does a cursory review that acknowledges that the line crosses over 31 "potential" landslide areas it admits that it lacks significant information about these areas thereby undermining any ability of the public or decision makers to actually evaluate the risks of the proposed project on pipeline integrity. A similarly limited review of earthquake faults undermines any reasonable evaluation of the risks of the proposed pipelines.

FERC's recommendation that NorthernStar should "conduct additional field mapping and subsurface investigations as needed to develop a Final Pipeline Design Geotechnical Report" is exactly the type of advice that FERC should have given before putting out a DEIS that was based on cursory reviews and a lack of the type of site-specific data that NEPA requires for agencies charged with taking a "hard-look" at the impacts of a given project. DEIS at 4-20.

The threats of the proposed pipelines would loom over every property and its owners that are along the pipeline regardless of whether an accident ever did occur and this impact on people's daily lives, as well as the reduced property values that would result, needs to be carefully considered. The EIS makes no mention of the impact that having a three foot diameter high pressure high volume pipeline running through your property would have on the psychological health of those who live along the pipeline. While the DEIS attempts to downplay any actual risk to landowners in the DEIS a revised DEIS should specifically evaluate the social effects of how the proposed project would affect landowners along the pipeline. This should include the serious social impacts of experiencing a condemnation proceeding. If FERC is going to recklessly wield its condemnation power for the benefit of a private for profit corporation than it should at least have the decency to acknowledge the serious impacts that this have on those it wishes to impose it on and the proper place for that evaluation is in the DEIS.

Question: How many condemnation actions does FERC expect on both the proposed northern pipeline and on the Palomar pipeline? What is the projected total loss in property value that the proposed pipeline right of way would cause a result of loss of currently allowed uses along the pipeline?

Additionally, the potential for a catastrophic accident along the pipeline route will and in some cases already has significantly lowered property values along the proposed route. This should be specifically considered by having a trained and qualified real estate appraiser familiar with the local real estate market make actual market determinations about how playing host to a massive un-odorized pipeline would decrease individual property values for residents and business owners along the pipeline route.

The DEIS also generally ignores the fact that the proposed gas pipelines will lack the most basic safety feature that has been used for gas safety for many decades: odorization.

Question: Why would the proposed gas line not be odorized? What would the costs of adding odor to the line be? How would the unodorized gas decrease detection of gas leaks along the Williams pipeline that the proposed northern pipeline would connect to? What could the effects of this lack of such a basic safety provision be?

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The proposed northern pipeline appears to be a dummy pipeline that is potentially not actually even intended as a route through which gas from the Bradwood project would reach the market. The most obvious fact support this contention is that the Williams pipeline lacks the capacity for the 1.3 bcf/day of gas that the Bradwood terminal is planned for. Knows Where the Gas Will Go?" Cassandra Profita. The Daily Astorian. Nov 27, 2007. Instead, there are good reasons to believe that Palomar pipeline would send the Bradwood gas to market and that the northern line maybe intended to transport gas to geologic formations underneath the hills in Cowlitz County for storage. Veneco and others are currently drilling exploratory wells looking for such storage areas in Cowlitz County, yet this was not disclosed in the DEIS and should be since such an action would be both a connected action and one that would have cumulative effects to the proposed project.

FERC should consider the collection of news articles and other documents related to the Palomar pipeline labeled as "Collection of Palomar pipeline docs" and then stop the proposed process until such time as a DEIS can be re-issued that considers the effects of the Palomar pipeline. FERC should also incorporate all documents, including maps and aerial photo overlays, that it has as a part of its file for the Palomar and Oregon LNG projects and include such documents in the record for the Bradwood terminal. This includes the attached transcripts from two of the Palomar scoping meetings which are attached as well as the transcripts from all additional Palomar scoping meetings.

Question: What does FERC know about the potential consideration to develop a gas storage site in Cowlitz County or anywhere in the surrounding area? How would this project be related to the proposed Bradwood project? How would this affect use and purpose of the northern pipeline route? What would the effects of this type of gas storage project be on humans, fish, wildlife, public safety and the broad range of sensitive resources that should be considered in a DEIS?

Question: On what basis can FERC accept the incredulous assertions of NorthernStar that it intends to use the northern pipeline route to send gas to the Williams line when the Williams line lacks capacity to accept the gas? What is the current maximum capacity of the Williams line and how much excess capacity in the line is there? Without adequate capacity in the Williams line how can FERC find that the northern pipeline route constitutes a viable distribution line for the gas? Does FERC acknowledge that the lack of capacity in the Williams lines supports the notion that the Palomar pipeline is a necessary part of the proposed project?

The Revised DEIR Fails to Analyze the Potential Risks of Onshore Leaks due to Chemical Composition of the Natural Gas from the Proposed Project

Between 2003 and 2005, Washington Gas, Inc., a natural gas distributor in the State of Maryland, experienced an unusually high number of dangerous gas leaks in certain areas of its suburban gas distribution network. Washington Gas contracted scientific analysis to determine the cause of the leaks. In a detailed report, the analysts concluded that the chemical composition of natural gas delivered by Washington Gas from the Cove Point LNG terminal to consumers in the high-leak areas contributed to degradation of seal quality in the gas pipeline network and the unusual number of gas leaks discovered

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among Washington Gas customers. FERC is in possession of this document from the proceedings on the Cove Point LNG terminal and should include it in the record for the instant project.

Several findings from the Washington Gas report pertain directly to the environmental impact review for the Bradwood project. The DEIS fails to include these considerations, despite the grave implications for the safety of potential consumers of Bradwood's vaporized LNG.

Among the important findings, the report states:

- *The process of natural gas liquefaction and re-vaporization results in a lower C5+ [gaseous hydrocarbons with molecular weight equal to or greater than pentane] content (mostly pentanes and hexanes) in the revaporized LNG than that of the pipeline [domestic] gas. The gases used in our experiments demonstrated this difference: concentrations of C5+ hydrocarbons were 1053 ppm in the Shenandoah pipeline gas versus 105 ppm in the Cove Point gas.*

- *The elastomer in the seals can adsorb and desorb pentane, hexane, and other higher hydrocarbons with molecular weight equal to or greater than pentane] content (mostly pentanes and hexanes) in the revaporized LNG than that of the pipeline [domestic] gas. The gases used in our experiments demonstrated this difference: concentrations of C5+ hydrocarbons were 1053 ppm in the Shenandoah pipeline gas versus 105 ppm in the Cove Point gas.*

- *The change to [Cove Point LNG] gas that has a lower concentration of pentane and higher molecular-weight (C5+) compounds, caused a slight shrinkage in some seals due to de-sorption of previously adsorbed C5+ compounds. 87*

According to Washington Gas officials, the low C5+ compound concentrations in the Cove Point LNG was "a key contributing factor" in the deterioration and leakage of more than 1,400 gas seals, requiring a \$144 million project to replace gas lines and equipment. Illustrating the danger of the leaks, a high energy explosion that razed a four bedroom Maryland home (fortunately, uninhabited) was implicated in the shrunken seal leaks. See Baltimore Sun, *Officials look for cause at Cove Point for leaks in Pr. George's houses; Dominion blames equipment.* July 8, 2005.

Question: How would the composition of the gas imported to Bradwood potentially affect seals and other gas line and gas combustion equipment used by gas customers and in the transport of LNG derived gas? What would the composition of the gas that would be imported to Bradwood likely be based on the most likely suppliers?

This issue and many others relating to inherent problems and risks associated with LNG are thoroughly addressed in comments on the Cabrillo Port LNG project that were prepared by the Santa Barbara Environmental Defense Center. We attach these comments here and incorporate the concerns, questions and issues raised in these comments into our own comments as such concerns apply to the Bradwood Project. If FERC is unable to easily obtain any of the documents referenced in the EDC's comments please contact us and we will provide these documents to you for inclusion in the record.

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Pipeline construction and operation

Along with the ecologic, economic and safety impacts of the tankers and terminal, Bradwood proposes to construct a 36-mile high-pressure natural gas pipeline, which would traverse multiple rivers and streams in Oregon and Washington. The pipeline requires a 100 to 120 foot construction easement, which will clear vegetation and disturb soils and natural resource industries (forestry, fishing, farming) in a long linear swath. This disturbance is permanent.

The physical, chemical, biological, and economic impacts of the pipeline are discussed below. These comments focus on the 36-mile pipeline proposed by Bradwood. However, as demonstrated in the alternatives analysis section, FERC must also consider the proposed Palomar pipeline, which is a necessary component of the Bradwood project. The Palomar pipeline is a 220-mile pipeline that will cross hundreds of streams and cause dramatic water quality issues. FERC must consider the impacts of the Palomar project and must require Bradwood to submit aquatic resource data on Palomar.

Physical and chemical impacts

The DEIS fails to consider that the pipeline will adversely affect the physical and chemical characteristics of the project area.

Bradwood proposes a very large, high pressure pipeline in an area with highly unstable soils. An incredible 51% of the soils along the proposed pipeline route are designed "Highly Erodible Land" or "Potentially Highly Erodible Land." FERC must analyze the effect of these unstable and erodible soils on pipeline stability and safety. In addition, the ground disturbing activity will increase the erosion of these already highly erodible soils. Erosion is especially problematic at waterway crossings and steep slopes, both of which are common along the pipeline route. Pipeline construction and maintenance will increase the turbidity, temperature, and oxygen demand in each stream along its route.

Digging pipeline trenches and HDD bore sites on steep, unstable slopes will increase the landslide risk. The pipeline will pass through high landslide hazard areas. As stated above, landslides are so common in Cowlitz County, that "Landslide Debris" is a stratigraphic unit into which the pipeline trench will bore. In fact, recent landslides in Cowlitz County have severed natural gas lines and caused large fires. Just this month, a landslide west of Clatskanie, Oregon occurred approximately 1 mile from the proposed pipeline route.¹⁶⁴ This large landslide ruptured a smaller existing natural gas line. The DEIS does not adequately address the danger of clearly foreseeable landslides to the pipeline or the increase of landslide risk due to pipeline construction.

In addition, all of the geologic hazards discussed above regarding the terminal are applicable to the pipeline. The DEIS fails to consider the impact of the geologic hazards on the pipeline and alternative pipeline designs or routes that minimize environmental and social risks.

¹⁶⁴ See Oregonian, "Landslide" December 12, 2007.

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We attach and incorporate the comments of Dan McShane, registered geologist, on the DEIS. Based on his long history working in Cowlitz County and his experience with natural gas pipelines, Mr. McShane discusses multiple errors and omissions in the DEIS.

Biological impacts

The DEIS fails to consider how the Bradwood pipeline will adversely affect biological resources. The primary impact will occur at stream crossings. First, riparian vegetation will be removed across a wide construction easement and permanently destroyed in the maintenance zone. The loss of riparian vegetation will decrease habitat for riparian mammals, amphibians, reptiles, birds, and macroinvertebrates. This will also destroy fish habitat that depends on healthy riparian areas for bank stability, shade, physical complexity, the input of coarse woody debris, and detritus from vegetation. In addition, removing riparian vegetation will increase water temperature by decreasing shade. The beneficial filtering and buffering by the riparian area will also be degraded. This destruction will decrease water quality and harm fish. DEQ stated, "There are 94 stream crossings and 24 wetland area crossings proposed to accommodate 30 miles of new pipeline. Associated with these disturbances to the streams and wetlands themselves, are **significant impacts to riparian and wetland vegetation**." Oregon Preliminary Comments at 12 (emphasis added).

Second, the pipeline construction will disturb soils, stream banks, and stream beds, which will harm aquatic life. Pipeline construction will necessarily involve heavy equipment in sensitive riparian habitat. The pipeline construction will remove and destroy topsoil adjacent to streams and remove the streambed substrate when trenching across the stream. Some of these sites are salmon spawning streams, so spawning gravels could be removed and harmed by the turbidity plume. The construction will generate tremendous turbidity and suspended solids and deliver sediments to downstream habitat, including downstream salmon habitat. Downstream sediment delivery will occur in habitat utilized by ESA-listed salmon and EFH. In some circumstances, bank hardening may be required, which will further degrade aquatic habitat. In addition, multiple roads will be created to access the pipeline route. The vehicles will compact and disturb soils. Further, Bradwood will construct multiple structures associated with the pipeline, which will disturb soil, vegetation, and water quality.

Third, the pipeline construction will disrupt fish passage by damming the streams during the trenching and pipeline placement. It is unclear how long fish passage would be interrupted. The mitigation of capturing and removing fish behind the dams is historically not effective, and will result in the take of threatened salmonids.

Fourth, any pipeline boring, including the multiple proposed HDD, risk frac out and the introduction of bentonite to the waterway. Bentonite smothers fish habitat and fouls streams. A recent pipeline through similar topography in southern Oregon experienced multiple problems with frac out and the introduction of drilling mud into the waterway. FERC must analyze the tremendous impact of the introduction of very large amounts of fine sediment on the Columbia River or salmon-bearing tributaries. The following photos show stream degradation from Coos County natural gas pipeline construction.

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Fifth, the lateral pipelines and other associated features (including power lines) will impact water quality. FERC must consider the impact of lateral pipelines – the DEIS failed to assess these impacts. Sixth, the pipelines will result in habitat fragmentation in important riparian habitats and associated uplands. Seventh, the pipeline will adversely affect rare plants. As the USFWS noted, the surveys and impact assessments for checker mallow, water howelia, and other rare plants must extend to all areas that will be impacted by the permanent and temporary right of way for the Bradwood pipeline. Additionally, the DEIS does not incorporate an assessment of how potential serious failures in unstable slopes and erosion throughout the area will impact habitat of sensitive plant species along the pipeline.

Cumulative Impacts

40 C.F.R. § 1508.25 requires FERC to consider the cumulative impacts of the proposal. This includes the cumulative effects of conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, property ownership and the needs and welfare of the people. FERC's analysis, therefore, is not limited to the region directly adjacent to Bradwood. Nor is the review limited to short-term impacts, but it must consider the long term impacts on the estuary and the entire length of the pipeline. Further, EIS must analyze connected actions and similar actions, as defined in the regulations.

The DEIS fails to include a cumulative impacts analysis of proposed Palomar Pipeline, which, as explained in the alternative section above, is directly connected to the Bradwood LNG terminal. Because detailed Palomar Pipeline maps are not available to the public or FERC at this time, it is difficult to assess the impacts and impossible to say which practicable alternatives exist related to pipeline route. However, due to the massive size and scope of the Palomar Pipeline, the adverse environmental, social, and economic impacts are extreme. The DEIS fails to analyze the cumulative impact of the Bradwood terminal, along with the two proposed pipelines, will of which have a tremendous adverse impact on each of the factors listed above.

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The DEIS does not even attempt to acknowledge important past, ongoing, and future actions that will continue to hamper recovery of sensitive wildlife, fish, and their habitats. The cumulative impacts analysis also omits the obvious impact that industrialization and hydropower development have had on the Columbia River – developments which harm the estuary and the Lower Columbia's critical salmon nursery. The Columbia River Channel deepening project, which will also occur in the immediate project area, will impact fisheries and should be incorporated into a consideration of how the Bradwood area will function as even more important migration and refuge habitat during and in the wake of this project.

As part of the cumulative effects analysis, FERC must also consider Bradwood's degradation of fish habitat in light of the already tenuous state of salmon, sturgeon and groundfish in the Pacific Northwest. First, the wetland and shallow water habitat in the Columbia River has been significantly degraded over the last century. The remaining habitat at Bradwood, therefore, takes on added importance. The Columbia River dams degrade water quality by increasing temperature, decreasing dissolved oxygen and flow, all of which harms salmon.¹⁶⁷ The dams also decrease the amount of habitat available to salmon. In addition, other upstream uses, such as pollution from agriculture, forestry, and industry contribute to salmonid population declines. In addition, the Columbia River channel deepening project is ongoing. This large dredging project will seriously degrade water quality directly adjacent to the Bradwood site, and all along the lower Columbia River. Threatened salmon and other species will be harmed by the pollutants, disruption, and loss of habitat due to channel deepening dredging. Further, fish hatcheries degrade the survival of protected, native salmon. Due to the dams, other upstream impacts, habitat loss in the estuary and current dredging, 13 ESUs of salmon are on the brink of extinction.¹⁶⁸ The Bradwood LNG terminal's impact on salmon must be evaluated in light of the cumulative ecological stress that salmon already face. The DEIS has failed to consider adequately these cumulative effects.

In addition, global warming is reducing snow pack and increasing temperatures, which will adversely affect water temperature and flows. FERC must consider each of these cumulative effects on salmon and other aquatic life, and wildlife. As part of this analysis, FERC must consider the indirect effects of increasing the fossil fuel supply in the Pacific Northwest, which will lead to greater carbon emissions and accelerate global warming. The DEIS also failed to analyze the indirect effect of LNG creating additional gas-fueled power plants, which will decrease the demand for renewable energy, thereby hindering efforts to combat global warming and hindering the economic opportunities that renewable energy has brought to the Pacific Northwest, such as investments in wind, wave, and solar energy.

In addition, the DEIS has failed to consider the cumulative economic effect of Bradwood on the fishing industry and communities dependent upon the fishing economy. The direct harm to fish will harm the fishing industry, as will the lack of access to traditional fishing areas.

Mitigation is inadequate

¹⁶⁷ Ninth Circuit FCRPS Opinion

¹⁶⁸ *Id.*

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The proposed mitigation projects do not offset the tremendous damage that the LNG terminal and pipeline would cause. First, the mitigation violates the fundamental tenant of EPA wetland mitigation sequencing by failing to avoid adverse impacts. As described in these comments and by NMFS and Oregon, there are practicable alternatives to the Bradwood location with less adverse impact.

EPA describes the mitigation sequencing as follows:

In 1990, the Environmental Protection Agency (EPA) and the Department of Army entered into a Memorandum of Agreement (MOA) to clarify the type and level of mitigation required under Section 404 regulations. The agencies established a three-part process, known as mitigation sequencing to help guide mitigation decisions:

1. Avoid - Adverse impacts are to be avoided and no discharge shall be permitted if there is a practicable alternative with less adverse impact.
2. Minimize - If impacts cannot be avoided, appropriate and practicable steps to minimize adverse impacts must be taken.
3. Compensate - Appropriate and practicable compensatory mitigation is required for unavoidable adverse impacts which remain.¹⁶⁷

The MOA describes the requirement of the law:

Avoidance. Section 230.10(a) allows permit issuance for only the least environmentally damaging practicable alternative. The thrust of this section on alternatives is avoidance of impacts. Section 230.10(a) requires that **no discharge shall be permitted if there is a practicable alternative** to the proposed discharge which would have less adverse impact to the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. In addition, Section **230.10(a)(3) sets forth rebuttable presumptions** that 1) alternatives for non-water dependent activities that do not involve special aquatic sites are available and 2) alternatives that do not involve special aquatic sites have less adverse impact on the aquatic environment. **Compensatory mitigation may not be used as a method to reduce environmental impacts** in the evaluation of the least environmentally damaging practicable alternatives for the purposes of requirements under Section 230.10(a).¹⁶⁸

Bradwood flips this sequence on its head by siting the terminal where it will have tremendous adverse impacts, but then attempting to mitigate those impacts. As the MAO states, compensatory mitigation may not be used as a method to reduce environmental impacts. The DEIS fails to raise the legal requirements of mitigation sequencing, fails to assess the adverse

¹⁶⁷ <http://www.epa.gov/owow/wetlands/pdf/CMitigation.pdf>.

¹⁶⁸ Memorandum Of Agreement Between The Department of the Army and The Environmental Protection Agency. 1990 (emphasis added).

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effects of Bradwood's proposal to operate out of sequence, and fails to assess alternative design, operation and mitigation options that have less impacts.

Second, even if Bradwood had properly avoiding adverse impacts, the mitigation does not adequately compensate for the damage. The destruction of 58 acres of prime estuarine salmon habitat is irreplaceable. In addition, adequate mitigation must replace habitat values with "in-kind" and "in-place" habitat. The MAO states:

Generally, in-kind compensatory mitigation is preferable to out-of-kind. There is continued uncertainty regarding the success of wetland creation or other habitat development. Therefore, in determining the nature and extent of habitat development of this type, careful consideration should be given to its likelihood of success.¹⁶⁹

Here, much of the proposed mitigation is not "in-kind" or "in-place", as NMFS noted in its May 11 letter. The construction and operation of the terminal will cause immediate, severe, deleterious impacts to salmon, critical habitat, and essential fish habitat. Bradwood asserts that salmon habitat will receive a net benefit from the project, but provides no scientific basis for this questionable statement. Bradwood has understated the extent and severity of impacts that will need to be mitigated, and so the analysis of how mitigation will offset these problems is thus inherently flawed. Most importantly, the mitigation measures put forth by Bradwood do not necessarily offset the types of habitat being destroyed by dredging, filling the log pond, and damaging wetlands, streams, and riparian areas at the terminal and along the alignment of the pipeline. NMFS has raised these issues as well as the problem that the effects of the mitigation will take hold at best several years after damage occurs along the pipeline and at the site. The DEIS must describe more thoroughly how proposed mitigation efforts will address this problem during construction and early operation of the terminal and pipeline.

Specifically, the DEIS does not adequately describe how it is mitigating impacts of dredging. The Svensen Island mitigation site is being used to offset the filling of the log pond and other tidal wetlands on the site. Lower Svensen Island and Hunt Creek do not represent a significant creation of new habitat, while dredging will directly degrade 58 acres of habitat (pg. 9-2). While Bradwood intends to improve and/or maintain habitat at its mitigation sites, they fails to show how this restoration will directly result in a positive gain in salmon habitat lost from the area dredged in the Columbia River and the filled log pond, an acreage which exceeds the amount of new habitat created at Svensen Island. The mitigation efforts are, by themselves, inadequate, but they also occur out of step with the impacts of the project itself, which are severe. The mitigation efforts for creating new habitat are downstream, and the mitigation plan is unclear as to the timeline for when new created habitat will provide offsetting benefits for damage done at the site. The mitigation plan does not demonstrate how habitat of similar importance and function will be created in other areas to account for the in-stream habitat, in particular. In addition, Bradwood fails to mitigate damage from the pipeline. The mitigation site at Delameter Creek is decided as inappropriate for mitigation of the pipeline impacts. Despite all of these shortcomings, the DEIS does not analyze the inadequacies of the mitigation plan or

¹⁶⁹ *Id.*

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analyze the impacts to aquatic resources under the plan. The DEIS also fails to analyze alternatives to mitigation and alternative mitigation plans.

Expert agencies have roundly criticize the Bradwood mitigation plan. ODFW summed up the problem concisely: *“Significant fish habitat will be lost and mitigation is not adequate.”* Oregon Preliminary Comments at 4.

NMFS stated:

The mitigation plan included in the DEIS appears **inadequate and incomplete**. The preferred alternative **does not contain any mitigation for several adverse impacts on NMFS’ trust resources, including listed species under the ESA**. Sediment sequestration and wake stranding of juvenile salmonids are areas of particular concern. Where mitigation is proposed at Svensen Island, the description of the action has changed and is inadequate for assessment of beneficial effects to NMFS’ trust resources that are impacted by the proposed project. For example, not all of the island is currently within the applicant’s ownership or subject to the applicant’s right to make modifications. In addition, FERC needs to clearly articulate how the benefits provided at Svensen Island for salmonids adequately compensate for the decrease in habitat and habitat quality 14 river miles upstream and for on-going operational impacts that affect the viability of the affected populations. Furthermore, because the terminal would be operated for 40 years, a monitoring and adaptive management plan needs to be developed by the applicant, in consultation with NMFS that assures continued benefit to the target species over the lifetime of the project, and beyond if the affected habitat is not restored.

NMFS DEIS comments at 3-4.

When the state and federal agencies in charge of salmon both expressly state that the mitigation is inadequate, FERC must carefully assess the efficacy of the plan.

Bradwood’s claims that this project will enhance salmon habitat are completely unfounded. The agencies state that the proposed mitigation plan will not compensate for the dramatic loss of habitat. In fact, the agencies note that Bradwood’s proposed mitigation sites are already healthy habitat:

“All mitigation proposed would preserve and enhance existing areas **which already provide functional water quality and habitat benefits.”** Oregon Preliminary Comments at 12 (DEQ).

“If the Hunt Creek/Clifton Channel [mitigation] site is just going to be preserved, but already functioning, how are the waters impacts being mitigated for?” Oregon Preliminary Comments at 34 (Department of Land Conservation and Development)

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“Although the targeted areas may function better if mitigation actions are successful, **the project will still result in a permanent loss of 33 acres of wetland and 58 acres of in-stream areas, as well as temporal losses from an additional 98 acres of temporary wetland impacts**. Not only is this **contrary** to both the intent and requirements for mitigation to fulfill permit requirements under the Clean Water Act, but it is of additional significance under the recent EPA elevation of the Columbia River to a national priority.” Oregon Preliminary Comments at 8.

In addition, Bradwood has touted its Salmon Enhancement Initiative (“SEI”) to the agencies and the public, but few have been impressed. Descriptions of SEI activities are far too vague to add mitigation value to Bradwood’s project. ODFW stated, “Bradwood has proposed to implement a Salmon Enhancement Initiative that would be entirely voluntary ... Because the plan is voluntary and not regulatory, questions persist about it. [There are] **no details about specific projects** so it is extremely difficult to assess benefits or project impacts.” Oregon Preliminary Comments at 55. The DEIS does not adequately describe the nature and effectiveness of the SEI, or alternatives to the SEI, such as requiring that the voluntary money be a mandatory component of compensatory mitigation.

Furthermore, the benefits and funding for the SEI depend on the ability of Bradwood to operate the LNG terminal consistently for 35 years. With persistent uncertainty in the global and Pacific Rim LNG markets, the Bradwood proposal cannot be expected to operate consistently and without interruption in funding for 35 years.

The DEIS proposes that Bradwood will employ noxious weed control as a form of mitigation. But, the DEIS does not adequately describe how controlling noxious weeds will directly benefit salmon and offset the type of impacts the project will have at the site, where terminal construction and dredging will destroy dozens of acres of critical habitat. Furthermore, as NMFS has noted, the methods of noxious weed control are important. If Bradwood intends to use chemical control measures, the impacts of these control measures must be assessed on salmon that may use the restored areas. The DEIS fails to analyze the efficacy of noxious weed control as mitigation, the extent of the control, the positive and negative attributes, and alternative means of control. In addition, the DEIS fails to discuss the proposed mitigation for construction, stormwater, and operational mitigation.

The proposed project will adversely affect water quality for the Columbia River and contribute to violations of Oregon’s and Washington’s Water Quality Standards.

The DEIS fails to consider the impact on water quality and the fact the proposed dredging, filling, and pipeline construction will cause violations of both Oregon’s and Washington’s numeric and narrative water quality standards, including harming designated uses.

Bradwood will cause or contribute to violations of Oregon’s water quality standards

FERC must assess whether the project will conflict with state policies. 40 C.F.R § 1502.16(c). Here, the DEIS failed to discuss the conflict between the project and state water quality standards. In reviewing the Bradwood proposal, DEQ made clear that project would

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likely violate water quality standards. For example, DEQ stated, “the hydrodynamic geomorphic changes in the river ... may contribute to **unacceptable levels of erosion ..., introduction of toxics to the waterway, habitat loss, and wetlands loss – all of which reduce water quality.**” Oregon Preliminary Comments at 11. In addition, “**potentially debilitating impacts to these [threatened] species include noise, continuous light, suspension of sediment, turbidity, loss of salmonid habitat** and ability to rest or avoid predation, and potential attractant for sturgeon to a dangerous construction zone.” *Id.* ODFW agreed, stating, “**Significant fish habitat will be lost and mitigation is not adequate.**” *Id.* at 4. DEQ expressly noted that the impacts of the pipeline are contrary to state law: “**Loss of riparian vegetation in these areas is directly contradictory to the applicable Water Quality Management Plan ...** which requires preservation and restoration of riparian areas in tributaries to address temperature and other water quality parameters.” *Id.* at 12. DEQ also stated that the impacts of the pipeline are contrary to state law: “Loss of riparian vegetation in these areas is directly contradictory to the applicable Water Quality Management Plan ... which requires preservation and restoration of riparian areas in tributaries to address temperature and other water quality parameters.” *Id.* Oregon’s review indicates that the project does not comply with Oregon’s water quality standards.

Specifically, Bradwood will cause or contribute to violations of the following water quality standards, all of which the DEIS fails to discuss:

Protection of the designated use of aquatic life, OAR 340-041-0101

The LNG terminal and pipeline fail to protect the designated use of aquatic life, including threatened salmonids and the North American green sturgeon. As described in detail above, the expansive acreage of dredging and filling in critical salmon habitat fails to protect salmon. The construction and operation of the terminal and pipeline, including removing riparian vegetation, tanker traffic, wastewater discharge, ballast water intake, pipeline stream crossings, and the risk of catastrophic damage due to a gas fire combine to create unacceptable harm to aquatic life. The fact that some of the aquatic life, including 13 ESUs of salmon and the North American green sturgeon, are on the brink of extinction makes the project less acceptable.

The LNG terminal also fails to protect the designated use of fishing because the terminal and tankers degrade the struggling fishery and block or delay access to traditional fishing grounds, as described in detail above.

Narrative criteria, OAR 340-041-0007

OAR 340-041-0007 prohibits “the creation of ... toxic or other conditions that are deleterious to fish or other aquatic life” Bradwood’s 58 acres of dredging and expansive wetland fill is clearly a condition deleterious to fish due to permanent loss of habitat. In addition, NMFS and DEQ raised as a major concern that LNG tankers will impinge and entrain juvenile salmon and other fish when the tankers take 6,000,000,000 gallons of ballast water each year. Additional deleterious conditions include: modification of river flow and hydrology at mouth of Clifton Channel, wake stranding of juvenile fish, discharge of warm engine cooling

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water, long-term piling driving and dredging, and destruction of riparian and upland habitat along entire pipeline.

Biocriteria, OAR 340-041-0011

Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities. As described above, the LNG terminal will degrade resident biological communities due to habitat destruction, wake stranding of juvenile fish, toxic discharges, increase temperature and turbidity, and removal of riparian vegetation, among other impacts.

Dissolved Oxygen, OAR 340-041-0016

Dredging and lengthy in-water work will reduce the dissolved oxygen in the Columbia River to levels that violate the water quality standard. The Columbia River is water quality limited for dissolved oxygen so any additional oxygen demand from Bradwood’s dredging or terminal construction and operation will certainly cause or contribute to violations of the water quality standards.

Temperature, OAR 340-041-0028

Bradwood’s dredging, vegetation clearing, and wastewater discharge will contribute to the exceedance of the temperature water quality standard of 68 degrees F for salmon rearing and migration. Bradwood’s proposed summertime discharges of firewater system testing of 74 degrees F and hydrostatic testing water of 75 degrees F will violate the temperature criterion. Because the lower Columbia River is already water quality limited, any contribution of heat from Bradwood above the ambient river temperature causes or contributes to a violation of the temperature water quality standard. The Ninth Circuit has recently made clear that new dischargers may not add a pollutant into a water body that is water quality limited. *Friends of Pinto Creek v. United States Environmental Protection Agency*, No. 05-70785, (9th Cir. Oct. 4, 2007).

Toxic substances, OAR 340-041-0033

Toxic substances may not be introduced above natural background levels in concentrations that may be harmful to aquatic life. Bradwood will discharge chromium, silver, and other toxic pollutants from the SCVs at concentrations harmful to aquatic life. In addition, DEQ and NMFS raised concerns about toxic pollutants, including phytosterols, mobilized from dredging or erosion of former industrial site.

Bradwood’s wastewater will contain the toxic pollutant silver at levels 14,900% greater than EPA considers safe for fish. Bradwood will discharge at 0.018 mg/L when the safe level is 0.00012 mg/L.¹⁷⁰ In addition, Bradwood’s discharge of the highly toxic chromium III and chromium VI are 119% and 2,354% greater than Oregon’s chronic water quality criteria,

¹⁷⁰ Technical Memorandum: Mixing Zone Analysis for Bradwood Landing Point Source Discharges, July 27, 2007 at 3, 5.

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respectively.¹⁷¹ This discharge violates both the numeric and narrative water quality standards. Bradwood's solution for their toxic discharges is to create a giant toxic mixing zone, in which the "silver concentrations determine the size of the chronic mixing zone."¹⁷² This backwards approach – building a big enough toxic mixing zone to accommodate any amount of pollution – is contrary to the CWA. DEQ cannot issue a permit that contains this toxic mixing zone. The DEIS failed to discuss the conflict between DEQ regulations and this project.

Turbidity, OAR 340-041-0036

Bradwood's long-term dredging will violate the standard of no more than a ten percent increase above background levels. The turbidity from the dredging is likely much worse than presented by FERC because the DEIS failed to consider dredging through organic matter and packed sand, and it failed to consider the necessity of blasting, clamshell dredging, and other methods that create more turbidity.

The turbidity standard has an exception for "limited duration activities necessary to address an emergency or to accommodate essential dredging." The 24-hour, 7-day dredging over 3 months is not limited in duration and not essential.

Antidegradation, 340-041-0004(7)

Oregon rules state that "water quality limited waters may not be further degraded . . ." OAR 340-041-0004(7). The Columbia River is water quality limited for temperature, dissolved oxygen, and other pollutants. Therefore, Oregon cannot allow Bradwood's new, additional discharge of these pollutants into the already degraded Columbia River. OAR 340-041-0004(7) says Oregon may grant narrow exceptions, but only if the "benefits of the lowered water quality outweigh the environmental costs of the reduced water quality" and the discharge will not harm endangered species. The environmental costs of this project are tremendous and the discharge will certainly harm endangered species by permanently destroying critical habitat, including the designated critical habitat of the Snake River sockeye.

Bradwood will cause or contribute to violations of Washington's water quality standards

The DEIS must assess the entire project's compliance with Washington's standards, not just the pipeline, because the terminal construction and operation will affect Washington's waters in the Columbia River. The DEIS fails to discuss compliance with Washington's standards at all. As described above, the LNG terminal and pipeline do not protect the Washington designated use of aquatic life, including threatened salmonids and the North American green sturgeon, due to expansive acreage of dredging and filling in critical salmon habitat.

¹⁷¹ *Id.*

¹⁷² *Id.*

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The LNG terminal also fails to protect the designated use of fishing, WAC 173-201A-010, because the terminal and tankers degrade the struggling fishery and block or delay access to traditional fishing grounds. The pipeline crossings will degrade fishing access and fish habitat.

Bradwood's dredging and pipeline construction will violate the one-day maximum turbidity criterion. Multiple streams that the pipeline would cross, including Cameron Creek, Abernathy Creek, Germany Creek, Tributary 5 to Coal Creek, Coal Creek, Ostrander Creek, and others are designated salmon spawning streams. The turbidity criterion is 5 NTU over background when the background is 50 NTU or less, or a 10% increase in turbidity when the background turbidity is more than 50 NTU. WAC 173-201A-200(e). FERC and the public cannot adequately assess the impact to salmon because the application materials do not discuss which streams contain salmon. For the streams that do not contain salmon, the criterion is 10 NTU over background when the background is 50 NTU or less, or a 20% increase in turbidity when the background turbidity is more than 50 NTU. *Id.* The dredging will greatly exceed this standard. The pipeline construction will also exceed the standard for trenching, and has the possibility of exceeding the standard for HDD and bore due to the potential for frac out, which causes bentonite clay or drilling mud to foul the streams.

The turbidity criteria allows a temporary mixing zone for in-water construction, but dredging and pipeline trenching will even violate the mixing zones in WAC 173-201A-200(e)(i). In addition, the mixing zone is not allowed here because it will substantially interfere with the salmon using the waterbody and damage the ecosystem as prohibited by WAC 173-201A-200(e) and WAC 173-201A-400(4).

The LNG terminal and pipeline will also violate Washington's temperature, WAC 173-201A-200(c), and dissolved oxygen, WAC 173-201A-200(d), water quality standards due to removal of riparian vegetation and increased siltation, and turbidity, as described in detail above. In addition, Cameron, Abernathy, Germany, Tributary 5 to Coal Creek, Coal Creek, and Ostrander Creek are listed on 303(d) list for temperature. The proposed pipeline will cause an increase in temperature in these streams during construction, which is prohibited by the CWA. Also, the long-term removal of riparian vegetation will increase temperature, which will further degrade the listed streams, in violation of the CWA.

The project will also violate Washington's antidegradation policy, WAC 173-201A-300, the purpose of which is to restore and maintain the highest possible quality of surface waters in Washington. The project fails to protect Tier I streams, including those on the 303(d) list, which "must be maintained and protected." WAC 173-201A-310(1). No degradation is allowed. *Id.* The pipeline construction would certainly degrade these Tier I streams. In addition, the pipeline will cross multiple Tier II streams, in which new activities are prohibited unless the lowering of water quality is necessary and in the overriding public interest. WAC 173-201A-320. Bradwood could redesign the pipeline route or crossing procedures, so the lowering of water quality is not necessary. Also, the pipeline route is not in the overriding public interest.

Overall, the DEIS fails to disclose and discuss the fact that the project will violate Oregon's and Washington's water quality standards, and the DEIS fails to discuss any alternatives that can eliminate or minimize this conflict.

The DEIS fails to adequately consider cultural resources and environmental justice

The DEIS fails to analyze the cumulative, direct, and indirect impact to cultural resources and environmental justice.

Lack of current data for analysis

On page 4-334 and 4-335 are located three tables (4.8.1-6, 4.8.1-7 and 4.8.2-1) which demonstrate income distribution and ethnicity in areas affected by the project. Two of these tables are derived from U.S. Census Bureau Census of 2000, while one of them (4.8.2-1) includes information from the U.S. Census Bureau Census of 2006. This raises concern regarding the use of outdated statistics. If the 2006 Census has been made available, then the EIS should include and analyze data from those graphs. A considerable change in ethnic composition and income distribution for the affected areas could easily occur within that 6 year gap. If data from 2006 was available at the time of data analysis for this DEIS, then why is it not included here? This should be remedied prior to an EIS being published so as to provide accurate information and appropriate analysis of affected populations.

Non-compliance with section 106 of the NHPA

On page 5-13 it is stated that "We have not yet completed the process of complying with section 106 of the NHPA. Cultural resource surveys are needed for about 11 miles total of the pipeline route." This analysis must be completed for any accurate statements to be made regarding impact on disenfranchised or minority populations. This should be remedied prior to an EIS being published.

No consideration for other disenfranchised communities, especially senior citizens and the physically disabled

Residents living along the pipeline route who are elderly or have physical disabilities are at a great disadvantage in participating in the FERC/NEPA process. With informational meetings being held at night and at various locations the participation of affected citizens with disabilities or frailties due to age becomes very difficult. Analysis should be done on these affected communities and information should be made available to them in an accessible format (such as large print and daytime meetings in all the affected communities -- not just a central location that people are expected to drive long distances to attend).

Questionable conclusions made by analysis of minority populations which result in a lack of information being made available to the public

In analyzing data regarding ethnic make-up and income distribution in areas that are affected by the project (terminal, marine traffic and pipeline) it appears that erroneous conclusions have been drawn. In the community of Navy Heights in Astoria the population is 22.9% Hispanic (table 4.8.1-6, which relies on the outdated 2000 census), but the conclusion drawn in the DEIS is that "there are no predominantly minority communities within the Zones of

Concern." (page 4-333) Additionally, table 4.8.1-7 shows that over 25% of the population of Navy Heights lives below the poverty level. What percentage of the population would have to be non-white and/or impoverished for it to be considered a "predominantly minority community?"

Furthermore, within section 4.8.1.9 on environmental justice it is stated that "each federal agency must ensure that public documents, notices, and hearings are readily available to the public." The DEIS claims that this is achieved through making notices available through "local government representatives, local libraries and newspapers, and local environmental groups." (page 4-333) Were notices written in Spanish and submitted to Latino-based newspapers that circulate in areas like Navy Heights? Were meetings held with translators in an effort to inform the quarter of the population of that area that is Hispanic and potentially non-English speaking? Were notices to Hispanic property owners provided in Spanish? And was this done in other areas where Hispanic population makes up a lower percentage of the overall population (such as Clatsop County where 4.5 % [1,603 actual residents] were Hispanic at the time of the 2000 census)?

With regard to the impoverished peoples living in the zones of concern, it appears that in most areas there are typically well over 10% of the population living below the poverty line (tables 4.8.2-10, 4.8.1-7 and 4.8.3-6). And yet he conclusion is repeatedly drawn that "there are no predominantly low-income or minority communities" in the zones of concern. Again, the question must be raised- what percentage of impoverished and/or minority groups would be relevant for a consideration to be made on the impact on those communities?

Further consideration of historic sites such as the LCNHT, Hunt Lumber Mill, historic shipwrecks and site 35CO16

In section 5.1.9 the conclusions and recommendations of cultural resources indicate that more work must be done on the part of the applicant to verify that historic cultural sites will not be adversely affected by the project (marine traffic, terminal and pipeline). Of primary concern are the Lewis and Clark National Historic Trail, the Hunt Lumber Mill and site 35CO16. These analyses and mitigation plans should be addressed before publishing an EIS. Additionally further analysis should be made regarding the impact of a low-probability high-impact event on the 37 shipwrecks that are identified outside of the navigation channel. Mitigations should be considered that would protect historic sites potentially impacted by a disaster that may cause damage to outlying areas surrounding the project.

The DEIS fails to discuss conflicts between the project and federal, state, and local plans, policies and controls

The DEIS fails to include discussion of the project's conflict with federal, state, and local plans, policies and controls. The project is inconsistent with multiple regulations and policies to protect the estuary. First, the project is inconsistent with Clatsop County's Comprehensive Plan and land use development ordinances. Bradwood has asked for over 20 amendments to the Clatsop County land use plans, including radically modifying the Comprehensive Plan's designation portions of the project site from "Natural" to "Industrial" and from "Conservation"

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to "Development."¹⁷³ The DEIS must discuss the conflicts with County land use plans, as described in: the June 28, 2007 Clatsop County Staff Report from Mitch Robse to the Planning Commission; the July 10, 2007 letter from the Coalition to the Clatsop County Planning Commission; and the July 20, July 24, July 31, and August 8, 2007 letters from Columbia Riverkeeper to Clatsop County Planning Commission, all of which are attached. The DEIS fails to explain the existence and importance of this conflict. Even if Clatsop County modifies its land use plans, which it has not done, FERC must still address the conflict between the project and the land use plans. If Clatsop County amends its land use plans specifically to accommodate this project, the EIS must discuss the all direct, indirect, and cumulative effects of this land use amendment, including the environmental, economic, and social impacts of amending these plans and laws, and any alternatives to amending the plan that would avoid or minimize the adverse impacts.

The DEIS fails to include a discussion about conflicts between the Bradwood pipeline and Cowlitz County laws that protect natural resources, economics, and public safety. For example, the pipeline will violate the Cowlitz County Comprehensive Plan, zoning ordinances, development ordinances, Critical Areas Ordinances ("CAO") and Shorelines Management Plans. The DEIS fails to discuss the direct, indirect, and cumulative effects of violating these laws, including the environmental, economic, and social impacts. The DEIS also fails to discuss any alternatives to violating the laws that would avoid or minimize the adverse impacts.

The DEIS fails to discuss the conflicts between the Bradwood project and Oregon law and policies. First, the DEIS fails to disclose and discuss that the project may violate Statewide Planning Goal 16, attached, which requires the protection of Oregon's estuarine resources, including the economic, social, and environmental values in the estuary. The DEIS fails to discuss the impact of disregarding or taking an exception to Goal 16. Second, the DEIS fails to discuss the project's noncompliance with Oregon's implementation of the CWA's wastewater permitting program under CWA section 402. Oregon cannot issue an NPDES permit to Bradwood because the Columbia River is water quality limited for temperature and dissolved oxygen. Also, the proposed discharge violates the toxic pollutant criteria. Third, the DEIS fails to discuss the project's conflict with Oregon's obligation to certify a project as consistent with water quality standards under CWA section 401. Bradwood does not comply with water quality standards, and Oregon cannot issue the permit, because the project does not protect designated uses and does not comply with narrative and numeric criteria for temperature, turbidity, dissolved oxygen, chromium, silver, and other pollutants. Fourth, the DEIS fails to discuss the project's conflict with Oregon's duty to evaluate whether a water appropriation should be granted by the Water Resources Department. Oregon's evaluation must consider the public interest, and should consider the 6,000,000,000 gallons of ballast water used each year. The DEIS failed to consider project's conflict with the public interest assessment. Fifth, the DEIS failed to discuss the project's conflict with Oregon's duty to protect the public interest when leasing state land. The DEIS failed to distinguish which land is State-owned and which land is private at the facility site. This distinction is critical because the project conflicts with Oregon's

¹⁷³ Bradwood Landing LLC Narrative in Support of Applications for Local Approval of the Bradwood Landing LNG terminal and Associated Facilities; Comprehensive Plan and Zoning Ordinance Text Amendment application; NorthernStar Natural Gas Narrative in Support of Applications for Local Approval of Natural Gas Pipeline.

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fiduciary duties to protect State land in the public trust. A conflict exists because Oregon may not be able to lease the land to Bradwood. The EIS must look at alternatives to Oregon abdicating the public trust. In addition, Oregon has a duty to evaluate the public trust when issuing a dredge and fill permit. The DEIS fails to discuss the direct, indirect, and cumulative effects of not complying with these laws, including the environmental, economic, and social impacts of noncompliance, and any alternatives to noncompliance that would avoid or minimize the adverse impacts.

In addition to state law, the DEIS fails to discuss the conflict with federal laws, as required by the NEPA regulations. The DEIS fails to discuss the project's conflict with the CWA section 404 dredge and fill permit, as described in detail in the Coalition's December 18, 2007 letter to the Corps. In addition, the DEIS fails to discuss the project's conflict with the Endangered Species Act of 1973. As discussed in detail above, the dredging and filling of over 70 acres of prime estuarine habitat will jeopardize the struggling populations of 13 threatened ESUs of salmonids and the threatened North American green sturgeon. In addition, the proposal will increase in deep draft ship traffic by 25%, which will increase wake stranding of juvenile fish and increase vessel strikes and other harassment of endangered and threatened marine mammals, including several whale species and steller sea lion. The conflict exists because FERC cannot issue a cite certification in violation of the ESA. The DEIS fails to discuss the direct, indirect, and cumulative effects not complying with these federal laws, including the environmental, economic, and social impacts of noncompliance, and any alternatives to noncompliance that would avoid or minimize the adverse impacts.

The DEIS fails to integrate the environmental analysis with other agencies

40 C.F.R. § 1502.25 states, "to the fullest extent possible, agencies shall prepare [DEISs] concurrently with and integrated with environmental impact analysis and related surveys required by the Fish and Wildlife Coordination Act, the National Historic Preservation Act of 1966, the [ESA], and other environmental review laws and executive orders." FERC violated this requirement by proceeding with the DEIS without acting concurrently with the review required by each of these laws. For example, FERC produced the DEIS long before the ESA section 7 consultation has been completed. In fact, Bradwood does not even have a current Biological Assessment submitted the NMFS and USFWS, yet FERC blindly moves forward without the assistance of the expert analysis at NMFS and USFWS. In fact, NMFS submitted critical comments that the DEIS is inadequate and too vague to conduct a reasonable evaluation. An integrated analysis would reduce this problem. The failure to comply with 40 C.F.R. § 1502.25 also harms public review because the public, like FERC, cannot take advantage of the insight of the expert agencies.

The DEIS information is inadequate and inconsistent with the CWA section 404 application

The DEIS is inconsistent with other documents submitted by Bradwood, including the 404 application. The 404 application states that the "impact area in acres" is "45.87 (temporary and permanent)." This differs greatly from the DEIS, which show the impact area is over 100 acres. Both the DEIS and the 404 application simply do not contain adequate information to

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assess the impact on aquatic resources and to conduct an alternatives analysis. The application materials contain inadequate information on the site of stream crossings due in part to the fact that the applicant has not visited many of the locations in which they plan to conduct major work. How can FERC assess the impact on aquatic resources if no one has conducted a field assessment of the specific site?

The DEIS states that the facility will contain two storage tanks, DEIS ES-1; 2-20. To the contrary, the 404 application states, "the Terminal would be designed with three LNG storage tanks." This is a major difference that affects the aquatic resources at the site, the number of tankers arriving per year, and the entire alternatives analysis. For example, NMFS stated that "Originally, during conversations with the applicant, it was stated that the addition of a third tank would likely correspond with an approximate 50 percent increase in LNG vessel traffic." NMFS DEIS comments at 4. It is unclear whether the applicant has backtracked on that statement, or how the third tank would influence vessel. The number of tanks is a prominent issue, but not the only discrepancy between the 404 application and the DEIS. FERC must circulate a new DEIS that contains accurate information about the design and operation of the facility.

The project has dramatically changed since the application was submitted. FERC must request a new application to reflect these changes. If FERC issued the permit now, it would be unclear which project FERC is approving. NMFS stated, "the applicant's proposed action has changed significantly since the DEIS was issued and aspects of the proposed action remain poorly defined." NMFS DEIS comments at 3.

In addition, the DEIS defers many design specifications to later in the process. This is inappropriate for LNG. When dealing with a project that can cause explosions and fires, and that would be located in an area known for high seismic activity and severe wind and river conditions, it is critical that the applicant submit complete information so that the DEIS can thoroughly and adequately assess the safety implications of the Project. Deferring the analysis to staff review after Project approval does not provide the public and decision-makers with complete information *before* the Project is approved, in accordance with the mandates of NEPA.

In addition, FERC cannot evaluate the environmental impacts and alternatives of this project without evaluating the proposed Palomar Pipeline. As described in great detail in the alternatives analysis section of this comments letter, the Palomar Pipeline would directly connect to the Bradwood terminal. NMFS stated, "extension of the [Palomar] pipeline to Bradwood Landing would have no utility independent of the proposed action." NMFS DEIS comments at 5. In fact, the Bradwood terminal is fully dependent on the proposed Palomar Pipeline for gas distribution. FERC cannot let Bradwood and Palomar attempt to obtain approval of this large project in a piecemeal fashion.

Incorporation by reference

These comments include all the documents referenced herein and the documents attached hereto and all documents we submitted to FERC. We request that all of these documents be part of the record before FERC for this matter. The Coalition's comments also adopt and incorporate by reference the comments submitted by the Columbia River Intertribal Fish Commission

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("CRITFC"), Gloria McKenzie, Duncan McKenzie, Marjie Castle, Frans Eykel, Carolyn Eady, George Exum, Irene Martin, James Reed, and Rick Beck. In addition, we request FERC to pay particular attention to the critical comments submitted by NMFS, U.S. Environmental Protection Agency, the State of Oregon, Cowlitz County, Clatsop County, and the City of Astoria.

Conclusion

For the reasons stated above, the DEIS is wholly inadequate for public review and does not satisfy the requirements of NEPA. The Coalition urges FERC to reissue a supplemental EIS permit for this misguided project.

Sincerely,
/s/ Brett VandenHeuvel
Staff Attorney
Columbia Riverkeeper

Brent Foster
Executive Director
Columbia Riverkeeper

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List of Attachments:

Comments of Oregon Department of Geology on Bradwood DEIS. December 2007. (DogamiComments). This file contains comments of the Oregon Department of Geology and Mineral Industries (DOGAMI) on the Bradwood project.

Excerpts of State Agency Comments on Bradwood DEIS. (State_agency_quotes). This file contains excerpts of key State agency comments on the Bradwood project.

Heede, Richard. May 2007. LNG Supply Chain Greenhouse Gas Emissions for the Cabrillo Deepwater Port: Natural Gas from Australia to California. Climate Mitigation Services. (Heede_e_c_report). This file offers an analysis of the life-cycle carbon impacts of LNG import and usage from a California perspective. It is likely an underestimate for Oregon projects, should they also receive LNG from the same possible sources.

P. Jaramillo, et al, 2007. Comparative Life Cycle Carbon Emissions of LNG Versus Coal and Gas for Electricity Generation, Carnegie Mellon. (Jaramillo_LifeCycle). This file contains a summary of the study conducted by Paulina Jaramillo et al. regarding the life-cycle greenhouse gas emissions of LNG.

P. Jaramillo Presentation. Lifecycle_GHG. This file gives a presentation of the overall life-cycle GHG emissions of LNG.

J. Jensen, *Progress Report on Worldwide LNG Trade*, presented at CEC Staff Workshop on the Inputs, Assumptions, and Issues for the Natural Gas Assessment Report, March 26, 2007. (Jensen_Pres). This file offers an independent analysis of the likely pitfalls of the global LNG industry – characterizing the industry as dominated in the future by Russian and Middle East LNG exports.

NOAA May 11 Letter to FERC Re: Bradwood Biological Assessment. (NMFS_BA Letter.)

NOAA Comments on Bradwood DEIS. December 2007. (NOAA_Comments.)

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Palomar Gas Transmission Press Release. Aug 6, 2007. (Palomar_Aug6_PR).

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EIA Summary Data For WA State Natural Gas usage. 2007. (EIA_WA_Summary)

Comments of Columbia Riverkeeper on Clatsop County Bradwood Landing Land Use Application. July 10, 2007. (LandUseJul10). One of several comments submitted by CRK to Clatsop Co.

Comments of Columbia Riverkeeper on Clatsop County Bradwood Landing Land Use Application. July 31, 2007. One of several comments submitted by CRK to Clatsop Co.

Comments of Columbia Riverkeeper on Clatsop County Bradwood Landing Land Use Application. July 31, 2007. (More_J31_LUse).

Ratepayers for Affordable Clean Energy. July 2007. Comments to Clatsop County Regarding Bradwood Landing land use application. (RACE_Comments).

Summary EIA statistics for California's natural gas usage. (EIA_CA.)

Summary EIA statistics for Oregon's natural gas usage. (EIA_OR)

Havens, Markey. 2007. Risks of LNG Tank Insulation Failures. (Insulation_Risks). Information provided by Congressman Markey (Mass.) and Dr. Jerry Havens to the Dept. of Homeland Security regarding LNG safety.

Puget Island Hazard Zone Diagram. 2007. (FHZ_Puget_Island.) Figure demonstrating extreme proximity of Puget Island and its hundreds of residents to Bradwood LNG project.

Dr. Jerry Havens Comments Regarding Bradwood LNG Terminal. 2007. (Havens_Comments.) Dr. Jerry Havens, Director of the Chemical Hazards Research Center at University of Arkansas, articulates his opinion of the short-comings of FERC analyses regarding Bradwood LNG.

Astoria Thermal Hazard Zone Diagram. 2007. (FHZ_Astoria2). Figure demonstrating extreme proximity of Astoria and its hundreds of residents to Bradwood LNG project tanker vessel path.

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Columbia River Intertribal Fish Commission (CRITFC) Comments Re: Bradwood Landing LNG Terminal and Pipeline. Dec. 2007. (CRITFC_Comments). Our comments reference those of CRITFC and its experts.

Gustanski, Julia. 2007. Economic Impacts of Bradwood LNG Terminal. (LNG_Gustanski). Dr. Julia Gustanski, phd economist, gives an opinion about the future economic impact of the Bradwood project.

Gustanski, Julia. 2007. Peer Review of Bradwood Landing Economic Impact Analysis. (Gustanski_Comments) Dr. Gustanski provides comments on Bradwood's assertion of positive economic impacts of the project.

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Rhodes, 2007. Summary of Review of FERC Biological Assessment and Essential Fish Habitat Assessment for Bradwood Landing LNG Terminal. Report to Columbia River Intertribal Fish Commission. (Report_Rhodes). John Rhodes, phd hydrology expert, criticizes Bradwood's characterization of impacts to salmon and salmon habitat.

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Havens Report to Fall River 4-5-05 on vapor cloud exclusion zones used by FERC. Marinelink.com, Linde Group to Supply for LNG Tankers. May 14, 2007 <http://www.marinelink.com/Story/Linde+Group+to+Supply+for+LNG+Tankers-207124.html>

Collection of LNG tanker insulation risk docs.

Dr. Jerry Havens documents on LNG safety compilation paper.

Gas Research Institute's Falcon Series Data Report, 1987 LNG Vapor Barrier Verification Field Trials.

Excerpts from FERC EIS for Weaver Cove LNG project.

Paper and power point from J. Havens, T. Spicer. "Error in FERC environmental impact statement determinations of LNG vapor cloud exclusion zones: failure to account for air mixing in vapor impoundments."

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Santa Barbara Environmental Defense Center comments on DEIR for BHP Bilton Cabrillo Port LNG terminal. May 11, 2006.

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Columbia Riverkeeper – Portland Office
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CERTIFICATE OF SERVICE

I certify that on the 21st day of December, 2007, I electronically filed the original document, **Comments on Draft Environmental Impact Statement, Bradwood Landing Project, FERC/EIS-0214D, Docket Nos. CP06-365-000, CP06-366-000** plus the exhibit attachments listed at the end of that document on behalf of Intervenor Columbia Riverkeeper et al with:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

I further certify that on the 21st day of December, 2007, I served one copy of **Comments on Draft Environmental Impact Statement, Bradwood Landing Project, FERC/EIS-0214D, Docket Nos. CP06-365-000, CP06-366-000** on behalf of Intervenor Columbia Riverkeeper et al via electronic mail on all parties listed on the office service list compiled by the Secretary in this proceeding. I served the exhibit attachments on a CD to all parties via first class mail. For those parties for which service is not specified at an electronic address, I served one copy of **Comments on Draft Environmental Impact Statement, Bradwood Landing Project, FERC/EIS-0214D, Docket Nos. CP06-365-000, CP06-366-000** and the exhibit attachments on a CD via first class mail.

DATED this 21st day of July 2007.

Brett VandenHeuvel
for
R. Scott Jerger
Of Attorneys for Intervenor

Attachments to the Columbia Riverkeeper Letter (CO11)

Copies of these attachments are available for viewing by the public on the FERC's Internet web page at www.ferc.gov, through the eLibrary link, by selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range. The accession number for this document is 20071222-5001.

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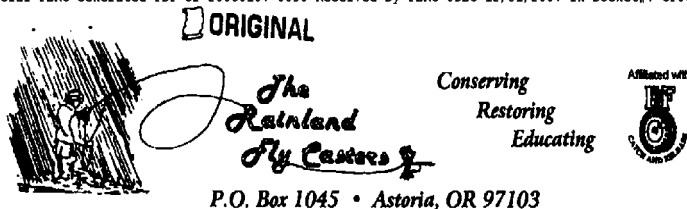
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The Rainland Fly Casters is a 501(c)(3) of the Internal Revenue Code. Gifts are tax deductible to the full extent of the law.

December 21, 2007

Kimberly D. Bose, Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street NE, Room 1A
Washington, D.C. 20426

RE: Bradwood Landing Draft Environment Impact Statement Review
Docket No. CP06-365-000; CP06-366-000

Dear Secretary Bose:

The Rainland Fly Casters club, of Astoria, Oregon would like to submit the following input regarding the proposed Bradwood Landing LNG plant on the lower Columbia River. Our club, located in the lower Columbia River region and comprised of over 50 members, is dedicated the sport of fly fishing, but also to the conservation of fisheries resources and the education of people about these resources and the associated stream health issues which support our fisheries resource. Listed below are some of the questions and concerns we have, from a fisheries conservation viewpoint, about the proposed LNG plant and associated gas pipelines:

- CO12-1 • The LNG company claims that our region would gain 60 jobs from the operation of this plant. The document should estimate how many jobs might be impacted by a major spill of fuel oil from one of the transport ships as well as disruption with boat anglers and other users in the minimum 500 yard moving safety/security zone around all LNG transport ships. Much of our lower Columbia's economy is dependent on commercial fishing, recreational fishing, crabbing and tourism
- CO12-2 • The liability issue for a major fuel oil pollution incident caused by an LNG ship board accident or incident needs clarification. In the possible event of a major pollution incident, there should be a requirement for sufficient bonding and insurance for clean-up and damage compensation by both the shipper and facility operator.
- CO12-3 • Northern Star has advertised its commitment to a \$50 million Salmon Enhancement Project for the lower Columbia. This commitment is entirely voluntary, with no contractual obligation for Northern Star or its successors to actually spend funds for salmon enhancement. Therefore, we have serious doubts as to whether any salmon enhancement will actually take place. We recommend this funding be clearly obligated for mitigation that still need to be identified for major biological problems on the river, forest and tributary streams.
- CO12-4 • Other concerns include dredging the river bottom to create ship berthing and maneuvering areas at the plant. The accompanying overland pipeline from the LNG

Companies and Organizations 12

CO12-1 We do not believe that any jobs would be lost as a result of an unlikely spill of oil or fuel from LNG carriers in transit in the waterway to the proposed Bradwood Landing LNG terminal. As discussed in the revised section 4.3.2.2, fuel on each carrier is protected by the vessel's double hull. Furthermore, each LNG carrier would maintain a SOPEP as required by international convention. The SOPEP would comply with MARPOL [marine pollution] 73/78 Consolidated Edition 2002 Annex 1 Regulation 26, which requires every oil tanker of 150 tons gross and above, and every vessel of 400 tons gross and above to carry an approved SOPEP. All LNG carriers would also be required to comply with state spill prevention and contingency plans, including the applicable requirements in Chapter 317-40 of the Washington Administrative Code – Bunkering Operations. As discussed in section 4.7.1.4, the project should not have significant impacts on commercial or recreational fishing or tourism.

CO12-2 See our response to comment FA2-35.

CO12-3 See our response to comment FA4-12.

CO12-4 Potential impacts on aquatic resources (including salmonids) due to dredging are discussed in section 4.5.2.1. Potential impacts on aquatic resources (including salmonids) due to construction of the pipeline waterbody crossings and unstable slopes are discussed in sections 4.5.3.1. In addition, NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan provides a detailed description of construction methods, potential impacts on aquatic species and habitat, mitigation, and monitoring. This plan was filed with the FERC on December 21, 2007 and is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e. CP06-365), and putting in the proper date range.

The adequacy of compensatory mitigation for project impacts is addressed in the response to comment FA2-10.

K-756

CO12-4
cont'd

plant toward gas markets will also have impacts on fish spawning and rearing areas in the major streams the pipeline will cross. These detrimental effects on stream crossings and landslide areas need to be identified, fully mitigated and closely monitored for this project to pass any kind of environmental muster.

CO12-5

In closing, The Rainland Fly Casters feel that the proposed project can cause detrimental effects on our local fisheries resources beyond those identified in the document and feel that these potential effects should be thoroughly identified and mitigated. We recommend exploring alternative LNG facility sites that are more compatible with the Columbia estuary. Receiving facilities for LNG ships are perhaps best located off-shore where major accidents or incidents cannot damage the extremely valuable estuary. Pipeline routes used by the project should be located where they best protect the forest and streams. We believe a better job can be done in finding a site for these facilities.

Thank you for the opportunity to comment.

Sincerely,

Tom Scoggins

Tom Scoggins, President

cc. File

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CO12-5 Alternative locations, including offshore, are discussed in section 3.0.

ORIGINAL

The National Grange

Of the Order of Patrons of Husbandry

Building Communities



December 19, 2007

Magalie Roman Salas, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington, DC 20426

Re: Docket Nos. CP06-365-000; CP06-366-000; CP06-376-000; CP06-377-000
Northern Star Energy LLC, Bradwood Landing LLC, Natural Gas Import terminal
facilities and associated facilities in Bradwood, Clatsop County, Oregon

Dear Secretary Salas,

CO13-1 The National Grange urges the Federal Energy Regulatory Commission (FERC) to develop and strengthen regulations regarding the siting of Liquefied Natural Gas (LNG) terminals and to consider the overall economic impact on any region being considered before any LNG site is approved. This policy is also supported by the Washington State Grange, which adopted similar statewide policy urging FERC to deny the Northern Star Natural Gas application to construct an LNG terminal at Bradwood Landing and an associated 34 mile high-pressure pipeline through a portion of Washington State.

The National Grange of the Order of Patrons of Husbandry (National Grange) is the oldest general farm and rural public interest organization in the United States of America. Founded in 1867, the National Grange has been representing the interests of family farmers and rural citizens of the United States for 140 years. Today the National Grange represents individual farmers and rural Americans affiliated with more than 3000 local, county and state Grange chapters in rural communities across the United States including chapters in the states of Washington and Oregon.

CO13-2 The primary concern of the Washington State Grange and the National Grange with the Bradwood Landing option is the danger associated with the movement of large LNG vessels through the bar at the mouth of the Columbia River and the narrow channels upstream to the site. The potential hazards and disruption caused by this traffic to other shipping on the river are great, particularly the movement of agricultural commodities from existing facilities further upstream.

CO13-3 Additionally, the proposed terminal and pipeline threatens public safety and security in the Lower Columbia River area for local citizens. Finally the proposed terminal creates a threat to the critical salmon habitat in the Columbia River Estuary.

CO13-4

CO13-5 The National Grange urges the FERC to carefully weigh safety issues, river traffic concerns, potential pollution, habitat impacts, and the comments and recommendations of the Coast Guard about the potential problems associated with the additional traffic when siting any LNG terminal facilities. Until FERC takes positive action to strengthen regulations regarding the siting of Liquefied Natural Gas (LNG) terminals and to consider the overall economic impact on any region being considered before any LNG site is approved, we urge you to disapprove the

1616 H Street N.W., Washington, D.C. 20006 • 1-888-447-2643 • www.NationalGrange.org

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- CO13-1 The FERC considers the current regulatory framework for reviewing applications for LNG facilities to be sound. Our regulations at 18 CFR 380.12(h) require a report on socioeconomic impacts to be filed by proponents of LNG facilities. The EIS includes an analysis of socioeconomic impacts in section 4.8. The Commission's Order will contain a more fully developed discussion of economics and need for this project.
- CO13-2 Section 4.11.5 includes discussions of shipping safety. This section includes discussions of the potential hazards and disruption that could occur on the other shipping activities on the river. As discussed in section 4.8.1.7, we believe that the Bradwood Landing would not have significant adverse impacts on other commercial shipping traffic on the lower Columbia River.
- CO13-3 See our response to comment PM6-20. Safety is addressed in section 4.11.
- CO13-4 Sections 4.5 and 4.6 address impacts on designated critical habitat for salmon within the Columbia River. As stated in section 4.6.3, the FERC would not allow construction to begin until after we have concluded formal consultation with the FWS and NMFS.
- CO13-5 The EIS address safety, river traffic, air quality, and impacts on habitats. The Coast Guard is a cooperating agency in the production of the EIS.

K-758

Northern Star Natural Gas application to construct an LNG terminal at Bradwood Landing. Thank you for your consideration in this matter.

Sincerely,



Lenny Watson, Legislative Director
National Grange of the Order of Patrons of Husbandry

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ORIGINAL

Willapa Hills Audubon Society

P.O. Box 399, Longview, WA 98632-7255
Gloria G. MacKenzie, Director at Large
ggmack@qhwa.net

December 21, 2007

VIA Federal Express

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Subject: Opposition Comments
Docket Nos. CP06-365 and 366, 376, 377
NorthernStar Bradwood Landing LNG Project

Dear Secretary Bose,

Thank you for the opportunity to submit comments regarding the proposed project.

Enclosed please find an Original and two Copies of each,
with the 2nd copy marked Attention: Gas Branch 3, PJ11.3:

32 letters of opposition from those who didn't have a chance to testify at a FERC Hearing

19 letters of opposition from those who did testify and waited to have their comments posted on the FERC website. Thank you for posting these on the FERC website.

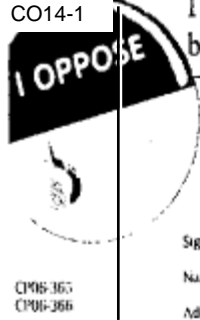
Sincerely,

Gloria G. MacKenzie,
Director at Large
Willapa Hills Audubon Society

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K-760

CO14-1



I didn't have a chance to attend the FERC hearings
but I wish to voice my opposition.

The proposed NorthernStar Natural Gas project is
the **WRONG PROJECT**, in the **WRONG PLACE**, at the
WRONG TIME.

I sign this card to register my opposition to the Bradwood Landing LNG Terminal/Pipeline

Signed

Name:

Address:

Janet Stonecipher
JANET Stonecipher
2911 NE 15000 Rd Yonahville, OR 97148

Companies and Organizations

14

CO14-1 Comment noted.

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The attached comment letter was also submitted by the following:

Laura Frick
Patricia Milobexler
David Lane
Sarah Lane
Roger Martin
Lloyd K. Mabit
Illegible
Patricia Lane
Richard Lance
Anna Ostvander
Charles D. Straughan
Robert Clark
Rachel Westlund
Guy Dobyas
Elliott Chelfetz
Lindy Shelton
Timothy Shipp
Illegible
Greg Jacob
Richard F. Till
Toni Spence
Ryan Hunter
Diana Yates
Joe Knight
Broken Feather
Heidi Pannke
Erik Swenson
Illegible
Ann Haroun
Thomas Wolf
Robert Kirschner, Jr.

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Columbia Riverkeeper – Portland Office
917 SW Oak Street, Suite 414
Portland, OR 97205
Phone: (503) 224-3240
www.columbiariverkeeper.org

April 24, 2008

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

RE: Comments Regarding Significant New Environmental Issues for Bradwood LNG Proposal, Docket Nos. CPO6-365-000 and CPO6-366-000.

Ms Bose,

We submit these comments on the Draft Environmental Impact Statement ("DEIS") Badwood Landing Project ("Bradwood"), FERC/EIS-0214D, Docket Nos. CP06-365-000, CP06-366-000, on behalf of the following organizations: Columbia Riverkeeper; Columbia River Business Association; Rivervision; Wahkiakum Friends of the River; Landowners and Citizens for a Safe Community; Oregon Chapter Sierra Club; Willapa Hills Audubon Society; Oregon Citizens Against the Pipeline; Friends of Living Oregon Waters; Coalition; Northwest Environmental Defense Center; Willamette Riverkeeper; Rosemere Neighborhood Association; Audubon Society of Portland; Oregon Council Trout Unlimited; Native Fish Society; Citizens for a Clean Columbia Wenatchee; Columbia River Fishermen's Protective Union; Northwest Guides and Anglers; Oregon Wild; and Energy Options (collectively, "the Coalition"). The Coalition includes a broad, local and regional spectrum of business, environmental, safety, and property interests. Each organization has members who would be harmed by LNG terminal.

These comments are timely and in response to new information that has been issued by FERC and the applicant since the completion of the DEIS and the closure of the public comment period on that document. Significant new information has been submitted to FERC by NorthernStar that significantly changes the nature of the environmental impacts of the project. We request that FERC consider the following comments in light of this new information that was not included in the DEIS.

I. FERC must circulate a new DEIS

CO15-1 First and foremost, we reiterate our request that FERC issue a supplemental DEIS for public comment because the current DEIS is wholly inadequate in evaluating the impacts of the project. Our previous comments have described how the DEIS contains major factual errors, fails to address substantial changes to the project, fails to address reasonable alternatives, ignores the Palomar Pipeline as a connected action, and fails to evaluate significant economic, social, and environmental consequences. Recently, information has been released that clearly indicates

CO15-1 We disagree. The draft EIS complied with the requirements of the NEPA; therefore, it will not be reissued. Although minor modifications have been made to the proposed action since the issuance of the draft EIS, the project itself has not substantially changed.

K-763

CO15-1
cont'd

changes in the project design—changes that neither FERC nor the applicant have evaluated and that fundamentally alter the nature of the project's environmental impacts. FERC's regulations require FERC to supplement the inadequate DEIS, and circulate the supplement draft for public comment. 40 C.F.R. § 1502.9(c).

Since the completion of the Bradwood LNG Draft Environmental Impact Statement, significant new information has been released regarding the potential design and impacts of the Bradwood LNG terminal and the Bradwood pipeline. Bradwood is reworking its project and seeking changes in discussions with FERC and other agencies. Bradwood plans to change these major project components¹:

- Incoming LNG tankers will no longer be likely to use screened ballast and cooling water intakes. Hence, tankers will take in 20-50 million gallons of Columbia River water with each visit, also drawing in threatened and endangered salmon.²
- The pipeline route is expected to change. NorthernStar has, itself, acknowledged many alterations of the route are underway. These changes could significantly alter the nature of the environmental, public safety, and economic impacts of the project.
- Dredge spoils will now be placed entirely on the Bradwood site – it appears that deposition at Wahkiakum County will not occur.
- The regasification scheme may be altered to allow open-loop regasification. This system will draw in up to 190 million gallons each day, again threatening harm to Columbia River salmon. It will also greatly increase the amount of effluent from the site treated with anti-biofouling chemicals.

These changes raise public safety, economic, and environmental issues that require an opportunity for public review and comment. Bradwood clearly intends to defer announcement of some alterations to the project and its impacts until after the Final EIS, according to new information since the DEIS comment period closed.³ Additionally, recent public statements by Bradwood fail to acknowledge these changes, causing confusion among affected community members, other agencies, and intervenors. FERC cannot allow Bradwood to significantly alter its project after the closure of the DEIS comment period, undermining the public's ability to understand and raise pertinent issues. Because it is not appropriate to move forward until the project is clearly described, and because the public has been misled regarding the nature and impacts of the project, it is now necessary for FERC to re-issue the DEIS or provide a supplemental EIS and provide an opportunity for public comment on new information.

A supplemental EIS is required when new information significantly transforms the nature of environmental issues. Changes to the design and new information about the impacts of the project raise serious issues that could increase drastically the magnitude of impacts on water quality, salmon and salmon habitat, and other environmental and economic resources. Project changes – particularly the combination of introducing open-loop regasification, cooling water

¹ FERC March 4 memo containing notes from a January 24 Conference Call between FERC, the National Marine Fisheries Service (NMFS), and NorthernStar.

² Response of NorthernStar Energy LLC and Bradwood Landing LLC to the FERC Staff's Recommended Mitigation Measure 24 in the DEIS. Letter dated April 8, 2008.

³ FERC March 4 memo containing notes from a January 24 Conference Call between FERC, the National Marine Fisheries Service (NMFS), and NorthernStar. Page 2.

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CO15-1 discharge, and unscreened ballast/cooling water intake – must be reviewed in a thorough, transparent public process with adequate opportunity for public input.
cont'd

II. Ballast and Cooling Water Withdrawals and Discharges Threaten Harm to Listed Salmon

CO15-2 FERC has not analyzed the potential impact of unscreened ballast water withdrawals.

The DEIS prepared by FERC for the Bradwood proposal currently assumes that all incoming LNG tankers will use screened ballast and cooling water intakes. FERC staff make this recommendation for avoiding and minimizing impacts from ballast and cooling water intake and discharge:

Prior to beginning initial site preparation at the LNG terminal, NorthernStar shall prepare a plan, for review and written approval of the Director of OEP, which outlines how NorthernStar would ensure that only LNG ships that are retrofitted to use the screened water supply at the berth are allowed to unload cargo at the Bradwood Landing LNG terminal. The plan shall include a method for notifying FERC in advance of an LNG ship's initial call to the terminal and verify that it has been retrofitted to utilize NorthernStar's screened water intake system for taking on water from the Columbia River for ballast and engine cooling.⁴

CRK and others questioned whether NorthernStar truly intended to abide by this provision, despite their claims that the above measure was practicable and would be included in their plans for terminal operation. Because mitigation measures must be reasonably likely to occur, and because NEPA requires a rational analysis of the likelihood for success of these measures, CRK and others challenged FERC to give further analysis of the ballast water issue and consider the potential for unscreened water withdrawals. The DEIS failed to do so, and CRK and others are unable to raise all pertinent issues about the impacts of ballast and cooling water withdrawals because the DEIS has not fully disclosed how – if ever – the screened intake system would be used and how it would impact salmon. NorthernStar's requested changes in its April 8 letter to FERC only exacerbate this problem and leave both FERC and the public unsure about the likelihood of the screened intake system being used and having any efficacy whatsoever.

The January 24th Conference Call between NMFS and FERC highlights a persistent problem with the Bradwood project: the design and expected impacts of the project are continually shifting. Because of this, multiple State and local agencies dealing with the project are operating under false assumptions regarding the project's design and impacts. Notes from the January 24 Conference Call between NMFS and FERC clearly indicate that ballast and cooling water withdrawals may go unscreened, introducing the likelihood that 20 to 50 million gallons per ship would be withdrawn, thus entraining and impinging threatened and endangered salmon:

"NorthernStar stated that due to changes in market conditions, it may be necessary to revise the proposed method of water intake for ballast and engine cooling water, if revisions to the proposed water intakes for ballast and engine cooling are formally filed, the effects analysis portion of the BA will be revised accordingly. NorthernStar stated that they will continue to offer incentive based contractual agreements for vessels to use

⁴ DEIS, p. 4-145.

CO15-2 After our issuance of the draft EIS, NorthernStar indicated that not all LNG carriers may be retrofitted to connect to the proposed ballast and cooling water supply system. Therefore, our analysis and discussion of potential impacts on water quality and aquatic resources (which includes salmonids) in sections 4.3.2.2 and 4.5.2.1 has been revised. We conducted additional analysis of entrainment and water quality impacts at the wharf without the use of the filtered water supply system and NMFS-approved screens. Due to the potential impacts on sensitive aquatic resources at the terminal, we are recommending that the Commission Order include a condition to require that NorthernStar develop a plan to deliver screened water to LNG carriers at the terminal. We are also recommending that NorthernStar conduct post-installation tests of all intake screens at the terminal, and develop a monitoring and reporting program to assess the efficacy of the screened water supply system at minimizing entrainment and impingement. In addition, we are recommending that NorthernStar develop performance standards for water quality impacts associated with LNG carrier discharges of cooling water at the wharf. We will conduct additional detailed analyses of the screened water supply system and the performance standards in our revised BA and EFH Assessment.

CO15-2
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the screened water intakes for ballast and engine cooling; however, they are not confident all vessels will be retrofitted to do so. Thus, NorthernStar is developing quantitative performance-based measures that are to be met for entrainment and impingement of juvenile salmonids as well as temperature impacts. The NMFS asked whether NorthernStar still planned to provide an incentive for vessels to accommodate the screened ballast/engine cooling water system. NorthernStar said it would still offer incentives, and would offer quantitative performance measures to be met regarding entrainment and temperature impacts. Because the pumps would potentially not be continually operating for either the re-vaporization process or to provide ballast/cooling water, the NMFS asked whether additional operation and maintenance measures would be required (e.g., run pump and discharge water periodically, physically clean screens periodically). NorthernStar indicated they would have to look into it further, but would include operational and maintenance practices in the proposed action and effects analysis.⁵ (emphasis added)

NorthernStar details its lack of confidence regarding incoming vessels' willingness to use screened ballast water intakes in a response letter to the DEIS dated April 8, 2008. It would be reasonable for FERC to conclude, based on that letter, that ballast and cooling water withdrawals will occur entirely without use of the screened system. NorthernStar admits in an April 16 letter that contract incentives may be inadequate for securing retrofitted tankers able to use the new system and asks FERC to allow unscreened ballast water intake. In that letter, NorthernStar argues that it is not reasonable to assume that incoming LNG tankers will use exclusively the screened intake system, even after five years. The April 16 letter states, "the spot LNG Carriers and the substitute LNG Carriers would not be modified to receive the filtered water, even after five years."⁶

The problem NorthernStar describes is only likely to grow worse as the LNG market becomes more high-priced and volatile in the coming years.⁷ Spot cargoes are likely to increase, limiting or even eliminating the potential for tankers to use the screened ballast water intake. The high price of LNG globally will make it even more unlikely that incoming LNG tankers will specifically retrofit to serve the Bradwood site. If FERC does not require screened ballast intakes, it is highly unlikely that market conditions will shift so that incoming tankers used the designed intake system.⁸ With global prices topping \$20/mmBtu, Bradwood's ability to attract any cargoes will be diminished—not to mention cargoes with special retrofitted ballast water intakes—and its project will not likely use the screened intake system at all. As a result, and as we noted in our initial DEIS comments submitted in December 2007, FERC must analyze impacts from ballast and cooling water withdrawals in the very likely case that incoming ships do not use NorthernStar's intake system.

Although FERC is required to take a "hard look" at the environmental impacts of the project, FERC's DEIS does not evaluate the impact on listed fish species of 125-plus LNG vessel calls per year, each withdrawing up to 50 million gallons of ballast and cooling water. The project could cause severe harm to fish from entrainment and impingement as well as with heated cooling water discharges. On page 4-145, 4-209 (Table 4.6.2.1) and elsewhere

⁵ January 24 Conference Call notes, p. 3.

⁶ April 16 letter responding to DEIS comments. Applicants Responses to Comments on the DEIS regarding Marine Matters. Page 2, responding to EPA comment.

⁷ Davis, Anne and Russel Gold. 18 April 2008. Wall Street Journal. Surge in Natural-Gas Price Stoked by New Global Trade "http://online.wsj.com/article/SB120847521878424735.html?mod=hips_us_whats_news."

⁸ Id.

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CO15-2
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throughout the DEIS, FERC's assessment of the project's impacts hinges on incoming LNG tankers using the screened intake system. As we noted in our comments, the impacts of the screened intakes are not clearly described, and the fish screen design for ballast and cooling intake is inadequately detailed. The potential for this system to be bypassed by every incoming LNG tanker adds to the inadequacy of the DEIS analysis and precludes FERC and the public from making a reasoned judgment about the impacts of the project on federally listed salmon.

In its April 8 letter to FERC, NorthernStar states that it is not asking FERC to abdicate its responsibilities under NEPA, but that is precisely what FERC would be doing by allowing the project to move forward without circulating a new DEIS or supplemental DEIS. FERC has no basis for allowing Bradwood to go forward with the project under Bradwood's suggested new language for Mitigation Measure 24. The DEIS simply does not disclose impacts on salmon from billions of gallons of ballast water intake each year.

FERC Should Not Delay Consideration Of Ballast and Cooling Water Impacts to Salmon

In both its April 8 letter to FERC requesting that its ballast water mitigation requirement be re-written and in its April 16 response to DEIS comments, NorthernStar suggests that it would be appropriate for FERC to defer detailed consideration of the impacts of the Bradwood project until after NOAA issues a BA. NorthernStar argues that, "The biological assessment will take a more detailed and in depth look at the impacts of the project to salmonids and other endangered species. This detail is more properly presented in the BA rather than the FEIS."⁹ By following NorthernStar's logic, FERC would willfully ignore a huge potential impact to salmon from ballast and cooling water withdrawal and cooling water discharge. The DEIS is required to present the best available science regarding impacts to salmon, and up until these recent submissions by Bradwood, FERC has largely accepted the argument that mitigation measures would significantly reduce or eliminate entrainment and impingement of fish.

Regardless of what NOAA concludes, FERC has a responsibility to present the public with a thorough, reasonable analysis of the project's impacts. The current DEIS simply does not consider the impacts of billions of gallons of unscreened water withdrawals at Bradwood. FERC cannot defer its analysis to the BA. NorthernStar's own inability to produce a consistent project description has stalled NOAA's review of the project, and the DEIS should be re-issued so that both FERC and NOAA are reviewing projects that either use or do not use screened ballast and cooling water intakes. The "informal consultation" with NOAA requested by NorthernStar on the ballast and cooling water issue would not preclude FERC's responsibility to fully address all environmental impacts of the project.

Based on extensive public and agency comment casting doubt on the efficacy on NorthernStar's ballast water screening system, FERC was well aware that the system was dubious. Yet, FERC's DEIS, which assumed the ballast screening system would function as promised, did not analyze impacts of unscreened ballast water. FERC's assumption was wrong. FERC now has two choices: one, continue to require screened ballast water for all ships, as described in the DEIS; or, two, release a new DEIS that describes the impact on aquatic species without any ballast intake mitigation.

⁹ April 16 letter responding to DEIS comments. Applicants Responses to Comments on the DEIS regarding Marine Matters. Page 1, responding to USDI comment.

CO15-2 Bradwood's Proposal Does Not Protect Salmon

cont'd

Bradwood claims in its April 8 letter that the "proposed on-site water system coupled with the performance standards are protective of listed salmon." This is a baseless assertion, one completely unsupported by analysis in the DEIS. Bradwood now proposes "performance-based measures" that do not appear in the DEIS. This fundamental alteration of the proposed terminal operations requires a fresh analysis, a new opportunity for public comment, and a new DEIS from FERC. Ballast water withdrawals using the screened system are clearly not "reasonably certain to occur", by Bradwood's own admission. The performance standards do not appear to have any guarantee of actually protecting salmon, and Bradwood has provided no analysis to FERC that supports the conclusion that unscreened ballast and cooling water withdrawals would do anything other than harm listed salmon.

Bradwood's April 8 letter to FERC cites the Ninth Circuit's decision to remand NMFS' biological opinion and absurdly asserts that the project would be consistent with that decision. The re-written condition provides no assurance that any screened intakes would occur and calls for the Applicant to consult "informally, as appropriate" with NOAA in development of proposed mitigation measures. The result of "informal" consultation with NOAA would be Bradwood submitting a plan *after* issuance of a Biological Opinion and FERC FEIS and Decision. Bradwood is essentially asking both agencies and the public to trust Bradwood to develop a plan that will encourage use of the screened water intake system. However, as Bradwood itself notes in its April 8 letter and notes from the January 24 conference call, contract incentives may be inadequate for promoting use of the system. Bradwood's April 16 response to DEIS comments goes even further, and states that even after five years of operation, the facility may not have incoming LNG tankers capable of using the screened intake system.¹⁰

Again, FERC's DEIS does not even ponder the issue of massive unscreened withdrawals for ballast and cooling water, much less give thorough consideration of these altered avoidance and mitigation "performance measures." The project now poses an even more severe threat to listed salmon species, and without re-issuing the DEIS, any FERC decision on this issue would be arbitrary and capricious. FERC cannot delay consideration of this issue and accept Bradwood's false assertion that the new measures would be protective of listed salmon. To do so would go far beyond "reasoned deference" to NOAA and instead constitute blatant disregard for NEPA and FERC's responsibility to disclose the project's design and impacts. Under NEPA, the DEIS must fully disclose potential direct, indirect, and cumulative impacts to listed species.

FERC must refuse the Applicant's request that FERC issue a site certificate for the facility without a full understanding of this issue. Neither NorthernStar nor FERC has provided any assurance that the project will be protective of salmon, with or without screened water intakes. The unwillingness of incoming LNG tankers to use the screened system only increases harm to salmon, and there is no assurance that future planning will significantly increase the likelihood of tankers' using screened intakes. Bradwood's proposed alteration to the ballast mitigation measure would leave no opportunity for the public to respond to the impacts of the project and make the ballast water screening requirement ineffective. As a result, Bradwood's April 8 letter and requested changes

¹⁰ April 16 letter responding to DEIS comments. Applicants Responses to Comments on the DEIS regarding Marine Matters. Page 2, responding to EPA comment.

CO15-2
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fundamentally alter the nature of the project's impacts. FERC must re-issue the DEIS with a thorough analysis of the ballast water issue assuming that all ballast and cooling water will be withdrawn without the screened system, a distinctly real possibility according to Bradwood's April letter.

Additionally, FERC should re-iterate and clarify that all incoming LNG tankers must use the screened system. Otherwise, the mitigation measure will have no realistic value in preventing harm to salmon. It is reasonable and prudent for FERC to recommend measures that are protective of listed salmon. While we question whether the ballast water screens would be as effective as NorthernStar and FERC has claimed, they will be completely ineffective if, as NorthernStar suggests, LNG tankers are unwilling to use them. Without using screened intake, the potential for entrainment is enormous and not avoided in any way. In fact, the synergistic effect of potentially releasing cooled water from open-loop regasification in the immediate proximity of the unscreened ballast and cooling water intake on LNG vessels could enhance the likelihood of entrainment. FERC does not have to wait for NOAA; rather, it can use its site certification process to require that NorthernStar use the screened intake system that the company led everyone to believe would be effective, practical, and used by all incoming tankers.

Bradwood Has Recently Stated that Ballast Water Intake Would Be Screened

While Bradwood has attempted to characterize the current DEIS language requiring use of screened ballast and cooling water intake as a "misunderstanding" with FERC, recent NorthernStar statements have represented that its screened intake system would be used by all incoming tankers. Bradwood stated in Mid-March: "Ballast water withdrawal *will be done* through screened intakes to avoid entrapping fish and other mid-water column organisms"¹¹ (emphasis added). The above statement, written by Bradwood itself, indicates that FERC and the public have not misinterpreted Bradwood's previous project descriptions, and that screened ballast water intake has been represented by Bradwood as an expected, uniform practice by all incoming LNG tankers. In the statement above, Bradwood states that the intake "*will be done*" – rather than *could* be done – through screened intakes. Over the past year, Bradwood has repeatedly characterized its ballast water system as likely to be used by incoming LNG tankers. Clearly this is no longer the case.

Columbia Riverkeeper and others questioned this assumption at the outset of local, state, and the FERC application process, but NorthernStar continually asserted that its ships would use the screened ballast water intake system. Furthermore, many documents submitted by NorthernStar – including the original Biological Assessment, Resource Reports, and multiple State and local applications, indicate that Bradwood, "changed project design to provide screened water to ships at dock for cooling engines and filling ballast tanks, thus avoiding entrainment impacts to juvenile fish (including listed salmon)."¹² Again, NorthernStar bases the impact assessment of its project on salmonids on the huge, and now invalid, assumption that entrainment impacts will be "avoided."¹³ FERC has similarly assumed in the DEIS that fish would be protected from impingement and entrainment and has not fully assessed the impact of unscreened ballast water intakes. By implying in recent statements that its project is avoiding

¹¹ Land Use Application Findings submitted to Clatsop County by Bradwood. March 14, 2008. page 38.

¹² Ibid, page 42.

¹³ CZMA Certification application submitted by NorthernStar. October 2007.

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CO15-2
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entrainment impacts, Bradwood is fostering the impression that all incoming tankers will use its screened intake at the very time that it is requesting FERC to allow incoming tankers to bypass the screened water intake system.

Finally, the screened ballast and cooling water intake is integral to the design and impact assessment for the Bradwood project—not only to avoid screened ballast water intake, but also to avoid the discharge of cooling water by combining ballast and cooling water systems. CRK and others questioned the plausibility of this scheme, but statements from Bradwood within the past several weeks clearly indicate that the screened intake system constituted a major assumption informing the impact assessment on water quality and salmon:

Bradwood Landing's proposal to **supply screened ballast and cooling water** to LNG carriers berthed at the facility will eliminate or nearly eliminate the need for the carriers to discharge cooling water while berthed at the terminal. A carrier will first use the water that it receives from the terminal in its cooling system and then will discharge the water to its ballast tanks. If the ballast tanks fill before the carrier leaves the berth, the water in the ballast tanks will be recirculated through the cooling system to avoid the need to discharge cooling water to the river.¹⁴

Table 4.3.1-1 on page 4-53 of the DEIS represents a similar understanding of the impacts of the project, and omits consideration of significant cooling water discharges. NorthernStar continues to reinforce the notion that both water withdrawals and discharges will be modified by the screened water system, and that tankers will be re-circulating cooling water for ballast. In light of information released in recent memos and NorthernStar's April 8 response letter to FERC, these recent public statements by NorthernStar appear to be inaccurate and deliberately misleading. The public, FERC, and other agencies have no assurance that any ballast water withdrawals will occur using the screened system and with re-circulating ballast.

By altering ballast and cooling water intake plans, Bradwood significantly transforms the nature and scope of impacts to salmon and their habitat in the Columbia River. Bradwood continues to allow other agencies to operate under the assumption that ballast will be fully screened, capitalizing on the confusion of its ever-changing project design. FERC must comply with NEPA by giving a clear project description and fully disclosing the environmental impacts of the project. FERC and local and State agencies accurately interpreted Bradwood's previous project description, and Bradwood's recent statements correspond to FERC's original understanding of the project design—that *all* tankers would use screened ballast intakes as indicated in Mitigation Measure 24 as currently written.

III. Pipeline Route To Be Significantly Altered Since DEIS

CO15-3

NorthernStar is not only altering plans for terminal operations, but it continues to make changes to its proposed sendout pipeline. According to a recent Willamette Week article,

"Charles Deister, a spokesman for NorthStar (sic), sighed deeply when he heard about WW's post. 'There's much more to it than that,' he says. Deister explains that the current map of the pipeline route is still temporary—already undergoing nearly

¹⁴ Ibid, page 278.

CO15-3 The pipeline route has not changed since the release of the draft EIS.

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CO15-3
cont'd

60 adjustments based on individual properties. "We are taking in local input," he says.¹⁵

While it is appropriate for NorthernStar to take in local input, the public has not had a sufficient opportunity to review NorthernStar's route, and NorthernStar continues to provide potentially affected landowners with contradictory statements and information regarding the routing of the pipeline. Publicly, NorthernStar has both stated that its route is unchanged, and (above) that many route alterations are already underway.

Specifically, subsequent to November FERC hearings on the DEIS, NorthernStar has provided landowners with contradictory information regarding the route of the pipeline and location of the Columbia River HDD and drill sites on both sides of the Columbia River. Verbal conversations and email communications between Gary Coppedge and members of the Mill Falls Estates Homeowners Association in Cowlitz County have indicated that the pipeline route is not determined. Verbal and email communications regarding the Columbia River HDD indicate that NorthernStar may alter its plans, but like its proposed changes to the regasification scheme, NorthernStar intends to wait until after issuance of an FEIS to make accurate route information available.¹⁶ Coppedge personally told several Mill Creek area landowners that the pipeline route and drill site were uncertain, even since the issuance of the DEIS.

In contrast to its statements to potentially affected landowners, NorthernStar's April 16 letter to FERC states that the drill site and pipeline route have not changed since submission of its Resource Report 1 and FERC application. Testimony submitted by members of the public indicates that Coppedge has repeatedly stated that the pipeline route in the vicinity of the Columbia River HDD may be changing. As a result, NorthernStar's recent public statements and personal communications with landowners are contradictory, to say the least. The NEPA process requires a clear description of the project and its impacts, and the DEIS does not achieve this task, as CRK and others noted in their comments. Given NorthernStar's intention to alter the project's design and route, NorthernStar's problem of providing inadequate and inconsistent information regarding the route and impacts of its pipeline has only worsened since issuance of the DEIS and closure of the comment period.

Additionally, NorthernStar continues to fail to provide added geotechnical information required to determine the realistic environmental impact of its project. The revised Geohazards report identifies the Columbia River HDD and other areas as potentially problematic, and any change (even a change that NorthernStar might characterize as "minor") could significantly alter the environmental impacts of the project.

IV. Dredge Disposal Plans Are Altered and Unclear:

CO15-4

Bradwood now proposes to deposit all 700,000 cubic yards of dredged material on the Bradwood site. The impact analyses on which the Bradwood application rests – particularly the Bradwood BA and the Army Corps Alternatives analysis – do not fully evaluate the potential impact of placing all 700,000 cubic yards on a site with only 420,000 cubic yards capacity. According to pages 1-2 from the notes of the January 24 Conference Call between NMFS and FERC,

¹⁵ (Willamette Week. "Clatsop County preps for referendum on gas pipeline." March 24, 2008.)

¹⁶ Email communication from Gary Coppedge to landowner in Mill Falls Estates.

CO15-4 Section 3.1.9.2 of the draft EIS acknowledged that one upland placement alternative for dredged material would be to use the Bradwood Landing LNG terminal site for the entire 700,000 cubic yards of dredged material. We further discuss this and analyze the potential impacts of that action in the final EIS.

CO15-4
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"Because capacity at the Wahkiakum County Sand Pit cannot be assured, NorthernStar is proposing to place all dredged materials at the LNG terminal site...NorthernStar has not proposed the location(s) for placement of materials from maintenance dredging, but stated that the LNG terminal site would not be used."¹⁷

The notes from this call indicate that NMFS has expressed significant questions and concerns with potential changes in the project's impacts to the Estuary from placing 700,000 cubic yards on the site. Currently, the supporting impact analysis do not evaluate the following issues according to NMFS:

"NMFS reminded NorthernStar that revising their proposed action would require them to revise their effects analysis, and posed several examples for NorthernStar's consideration. What effect would increasing the berm height have on vegetation management around the perimeter? Would increasing the overburden on site increase contaminant migration risk? Would increased soil stabilization require an increase in water withdrawals for vibroflotation?"¹⁸

The DEIS is inadequate in evaluating the impacts of dredge disposal, and the lack of clarity on this issue prevents the public from commenting meaningfully on the impacts of the project. FERC must resolve this issue, provide a clear project description, and provide the public with an opportunity to comment on the impacts of the project.

Even as it intends to dump all 700,000 cubic yards on the Bradwood site, NorthernStar has made recent statements that indicate that the Bradwood site's capacity is limited to 420,000 cubic yards, that Wahkiakum County is still a viable disposal site, and that Bradwood has plans for maintenance dredging disposal sites.

The volume of dredge material identified for Bradwood in the CREST plan is 420,000 cubic yards. This volume will be exceeded on the site. The remainder of the material will either be disposed of on site or, as some federal agencies have indicated they would prefer, disposed of in water. Maintenance dredging disposal sites have been identified.¹⁹

Bradwood's statements are contradictory, and NOAA raises significant issues that are not addressed in the DEIS. Bradwood continues to make statements in other permit processes that indicate that Wahkiakum County may be used for dredge disposal for both turning basin and maintenance dredge operations.²⁰ Yet, recent statements to FERC indicate that the dredge disposal issue is completely unresolved. These issues significantly change the nature of the project's environmental impacts, and the DEIS must be revised and re-issued to reflect Bradwood's true intentions for dredge disposal. The DEIS does not currently include adequate information to address issues raised by NOAA, Wahkiakum County residents, and other local and state agencies who are being actively misled by Bradwood to believe that Wahkiakum County is a viable disposal site.

¹⁷ January 24 Conference Call notes, p. 1-2.

¹⁸ *Ibid.* p. 2.

¹⁹ Clatsop County Land Use Application. Proposed findings. March 2008. p. 37.

²⁰ Clatsop County Land Use Application, Oregon DLCD CZMA Consistency Certification Application, and U.S. Army Corps 404 Application, including Attachment P - Alternatives analysis.

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CO15-4 and that Bradwood has adequate capacity to potentially receive all 700,000 cubic yards of dredging for the turning basin.
cont'd

V. Project May Be Altered to Incorporate Open-Loop Regasification:

CO15-5 NorthernStar has recently proposed for the first time to use an open-loop gasification system. On average, an open-loop system will withdraw between 75 and 195 million gallons per day.²¹ This huge and potentially destructive change to the project design would require the withdrawal of additional billions of gallons of water per year for terminal operations. Furthermore, Bradwood intends to wait until after FERC issues its FEIS to make this significant change to its terminal design. Yet, Bradwood is already planning to build screens for water intakes that will be twice their original size in order to facilitate open-loop regasification.

"NorthernStar clarified that the screen design accommodates 10,000 gpm (previously 5,500 gpm) to allow for the SCV design to be supplemented by an open-loop revaporization process. This modification to the revaporization process was originally introduced to the NMFS during the December 12, 2007 conference call. NorthernStar confirmed that during a January 23, 2008 meeting with the NMFS that it intends to delay a request for a modified revaporization design until after FERC certification of the current proposal. NMFS asked if they still planned to install screens sized for the open-loop system. NorthernStar said they would."²²

Hence, the use of open-loop regasification is reasonably foreseeable because the applicant is designing the intake pipes to accommodate the open-loop design. The impacts of open-loop should have been analyzed as an alternative design for the project. It is inappropriate for FERC to allow NorthernStar to defer consideration of a change of this magnitude until after issuance of the FEIS, even as Bradwood begins to design its project around use of an open-loop system.

The DEIS omits any consideration of this potentially massive water withdrawal. Table 4.3.1-1 on Page 4-53 of the DEIS provides a summary of water withdrawals and discharges, and it includes no information about the potential for open-loop regasification. FERC must take a "hard look" at the environmental impacts of the project and thoroughly disclose the project's design and impacts. Issuance of an FEIS would be extremely inappropriate without clarifying the design and impacts of an open-loop design. There is currently no mention of open-loop design in Resource Reports, the application, or the DEIS – yet NorthernStar is considering using this type of regasification scheme and re-sizing intake screens to fit this open-loop configuration.

The potential use of an open-loop system is an extremely significant change to the project design, akin to the abandonment of required screened ballast water withdrawals in its significantly deleterious impacts to salmon. Use of an open-loop regasification in combination with unscreened ballast and cooling water intakes on the part of LNG tankers will create a new, significant hazard to salmon and salmon habitat. Open-loop systems present a huge hazard to juvenile fish as well as any eggs or larvae in the

²¹ Presentation by Jeff Rester, Gulf States Marine Fisheries Commission. "LNG in the Gulf of Mexico". 2007.

²² Notes from Jan. 24 Conference Call between FERC, NOAA, and NorthernStar. Page 2.

CO15-5 The vaporization system has not changed since the release of the draft EIS. NorthernStar currently proposes to use SCVs, not open racks, to gasify the LNG. Therefore, discussion of the potential impacts associated with using open rack technology is not included in the final EIS.

CO15-5
cont'd

immediate area of the project. Even if Bradwood only uses an open-loop regasification system for 20 percent of its regasification, the new project would involve between 5.5 and 14 billion gallons per year of additional water withdrawals over the current SCV design.

All of the water circulated through the open-loop system could potentially be chemically treated to prevent damage to equipment. In other open-loop designs, sodium hypochlorite has been used.²³ The DEIS does not consider the impact to the Columbia River estuary and federally protected salmon species of the terminal discharging up to 14 billion gallons of chemically treated water. The DEIS repeatedly discusses the use of submerged combustion vaporizers (SCVs) for regasifying LNG with no discussion whatsoever of the potential for open-loop design. It would be a complete abrogation of its NEPA responsibilities for FERC to allow NorthernStar to move forward with its project while it re-sizes project elements such as intake screens and fails to assess the chemically treated discharges from open-loop regasification.

Open-loop regasification, even if only employed partially or during certain times of the year, would substantially change the project's expected impacts. FERC is required to disclose fully impacts to the environment from the Bradwood project, and clearly has failed to do so. Most importantly, the DEIS fails to consider the synergistic effects of open-loop regasification and unscreened ballast water withdrawal. Because open-loop designs produce cold water discharges, the open-loop design risks creating attractive cold water refugia in the immediate proximity of ballast and cooling water intakes that could be lethal to juvenile salmonids. Bradwood is asking FERC to allow LNG tankers to bypass its screened water intakes even as it considers creating cold-water habitat in the same area. FERC's DEIS does not evaluate this combination of effects that could occur from proposed changes to the project's design, and FERC cannot issue an FEIS without first allowing the public to review the project's design and its environmental impacts in a new public comment period. Additionally, as we noted above, discharge from the water-intensive open-loop system could be attractively cold but still laden with chemicals that would further harm threatened and endangered fish species and Columbia River water quality. FERC cannot ignore these issues in the DEIS and must consider these potential impacts of the project.

FERC cannot move forward with permitting the project without first understanding the nature and impact of the modification to allow for open-loop regasification of LNG and giving the public a meaningful opportunity for comment on this matter. Bradwood should not be allowed to move forward with one site design while clearly intending to amend this design later in the FERC process. This "bait and switch" tactic will leave the public and other state and local agencies unable to fully evaluate the project as a whole for compliance with all pertinent laws.

VI. Conclusion:

FERC should consider these issues as critical pertinent new information in the issue of the Bradwood LNG terminal. Bradwood has repeatedly hidden from the public its true intentions regarding the final design of its project, and the applicant must be forced to be completely transparent about its project design before any agency can even

²³ Ibid, p.10.

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begin to evaluate the direct, indirect, and cumulative impacts of the project as a whole. Other state and local agencies are blindly moving forward when new information submitted to FERC (but not to other agencies) very clearly shows that the project description they have reviewed is no longer relevant, and that the applicant intends to wait until after FERC approval to make major changes to the design of its project.

FERC, as the lead permitting agency, has a responsibility to provide a clear project description and impact analysis. The public and other agencies cannot make reasonable judgments about the project's consistency with applicable law until the applicant clarifies key issues such as impacts to salmon from unscreened ballast and cooling water intake, pipeline route alterations, open-loop regasification, and altered dredge disposal plans. Columbia Riverkeeper and others cannot meaningfully comment on the project if the design continually changes. Currently, the DEIS comment period has closed and did not afford CRK and other parties an adequate opportunity to comment on key impacts of the project. Indeed, CRK, state and local agencies, and other members of the public cannot comment on a project that they do not understand. FERC must re-issue the DEIS or produce a supplemental DEIS that clarifies these issues and augments the analysis of social, environmental, economic, and public safety impacts from the project's revised terminal and pipeline design.

Sincerely,



Brett VandenHeuvel
Attorney, Columbia Riverkeeper

Dan Serres
Staff, Columbia Riverkeeper



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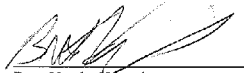
CERTIFICATE OF SERVICE

I certify that on the 24th day of April, 2008, I electronically filed the original document **Comments Regarding Significant New Environmental Issues for Bradwood LNG Proposal, Docket Nos. CPO6-365-000 and CPO6-366-000**, on behalf of Intervenor Columbia Riverkeeper et al with:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

I further certify that on the 24th day of April, 2008, I served one copy of **Comments Regarding Significant New Environmental Issues for Bradwood LNG Proposal, Docket Nos. CPO6-365-000 and CPO6-366-000** on behalf of Intervenor Columbia Riverkeeper et al via electronic mail on all parties listed on the official service list compiled by the Secretary in this proceeding. For those parties for which service is not specified at an electronic address, I served one copy of **Comments Regarding Significant New Environmental Issues for Bradwood LNG Proposal, Docket Nos. CPO6-365-000 and CPO6-366-000** via first class mail.

DATED this 24th day of April 2008.


Brett VandenHeuvel
for
R. Scott Jerger
Of Attorneys for Intervenor

Re Docket No: CP06-365-000

The following is being submitted with attachments through efile as previously procedurally recommended by Mark Hershfield with regard to the Bradwood Landing LNG Terminal Project, Docket No. CP06-365:

Mark Hershfield
Special Assistant/Counsel
Office of External Affairs
Federal Energy Regulatory Commission
(202) 502-8597

IND1-1

After review of the Docket No CP06-365 impact statement Section 4 – Environmental Analysis, and Section 5 - Conclusions and Recommendations, we do not see consideration in those sections for potential shoreline reduction risk (sea level rise) from climate change as it could potentially impact the project this century. (The exact words "sea level rise", "climate change", and "shoreline reduction" were not found in a search of those specific sections, only the words "shoreline erosion" was found as it relates to the impact of increased vessel traffic on such erosion, which is not a climate change risk); accordingly (and from this impact statement review only), it would not appear that potential climate change driven sea level rise risk environmental factors were considered by staff in this approval recommendation to the FERC Commissioners.

However, it was noted in the impact statement in Section 4.1.1 that "elevations from the Coast Range extend from sea level...", confirming our mapping that follows of some areas with elevations from 0 to 3 feet that are potentially at risk from shoreline reduction from climate change this century (in addition, we have mapped potential sea level rise risk to areas around Bradwood that indicate that certain surrounding areas and their transportation infra-structure to/from Bradwood are at risk – for example the Burlington Northern Santa Fe Railroad line which runs along the Columbia River, which may also be a factor in this project, and if so should be considered as to its potential environmental impact from the project).

IND1-2

We did not observe any analysis of major "storm surge" risk in Section 4 (such as is referenced in the Report to the Oregon Department of Land Conservation and Development, June 2000, using the terminology "extreme waves" and "extreme tides" with possible unidentified "climate factors"- http://www.oregon.gov/LCD/OCMP/docs/Publications/Extreme_WavesTide_rpt.pdf); however, to the extent that some storm surge impact appears possible in this area of the Columbia River ("the projected 100 year wave heights now range from 14.1 meters for the Columbia River buoy" – the buoy is offshore from the Columbia River according to the report), this impact appears to not have been considered or analyzed in this case, nor in the context of its compounded effect with any potential sea level rise risk (those words do not appear in this section).

Given the above points, it is unclear that potential impacts from climate change driven shoreline reduction, and any compounded effect from extreme tides driven by storm surge, may not potentially cause material environmental consequences from this project.

Individuals

1

IND1-1

The lifetime of the project is 40 years. Climate change, including associated sea level rise, over that period is not expected to have a significant impact on the project. As described in section 2.4.1.1, the LNG terminal would be at an elevation of 20 feet above mean sea level. The PWRR tracks that currently pass through the LNG terminal site may be used for transporting materials during construction of the project and a portion would be realigned to accommodate the terminal. The railroad would not otherwise be associated with the project.

IND1-2

An assessment of risks from flooding, tsunamis, and seiches is discussed in section 4.1.3.3 for the LNG terminal and in 4.1.4.3 for the pipeline. The extreme waves and tides along the coast as discussed in the referenced paper would not have an adverse impact on the LNG terminal site located at CRM 38 or on the pipeline facilities.

K-777

To: Federal Energy Regulatory Commission
Attn: Kimberly D. Bose, Secretary
888 First Street NE, Room 1A
Washington D.C. 20426

ORIGINAL

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2007 OCT -9 P 4: 58

October 1, 2007

Re: Docket # CP06-365-000
Bradwood Landing LNG Receiving Terminal

FERC:

IND2-1

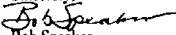
The proposed Bradwood Landing LNG Receiving Terminal will provide immeasurable benefits to the region and country and should be approved. The project meets all federal and local regulatory requirements. It will provide an essential, efficient, non-polluting source of energy.

The facility will create needed competition in the energy market which will help stabilize energy costs and provide economic relief for industrial and residential consumers. Energy costs in the region have been driven up by inadequate supply and have resulted in increased production costs in the region's key aircraft, steel, natural resource and other industries.

The project meets all environmental standards and will provide energy in a manner that creates far less CO₂ and other greenhouse gasses than other energy alternatives.

I urge you to approve this project.

Sincerely,


Bob Speaker
2960 NW Marshall Dr.
Corvallis, OR 97330

Individuals

2

IND2-1 Comment noted.

K-778

ORIGINAL

COMMENT ON FILING - Submission #1
FERC draft Environmental Impact Statement
OEP/DG2E/Gas3
Bradwood Landing LLC
NorthernStar Energy LLC
Docket No. CP06-365-000, CP06-366, et al

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REGULATORY CENTER

27 September 2007

By: James N. Reed
P.O. Box 648
184 Columbia Street
Cathlamet, Washington 98612
jnreed48@hotmail.com

I attempted to submit this material electronically but the FERC website could not confirm my user address.

SUMMARY OF SITE SUITABILITY

In my judgment, the apparent overall unsuitability of the Bradwood Landing site for LNG operations should suggest that FERC perform a broader and more comprehensive analysis of the proposal to assure itself that FERC has made a good faith effort to uncover all unintended consequences of the NorthernStar proposed LNG terminal at Bradwood Landing, which appears to be an implicit charge in the introduction in Section 3 of the draft Environmental Impact Statement. The site unsuitability is not limited to issues on the environmental impact but also on the operational suitability of the site. The lack of nearby response infrastructure, operational support and the narrow response lanes make safety and operability more problematic. These issues may be exacerbated by technical and financial limitations of the operator. It is well to remember that the fine operational and safety record of the LNG industry was achieved in settings significantly different from that of the Bradwood Landing site.

OVERVIEW OF FERC DRAFT ENVIRONMENTAL IMPACT STATEMENT

As a general comment, the Draft Environmental Impact Statement prepared by FERC, et al is a reasonably comprehensive document designed to serve as a first draft of a roadmap to advance the Bradwood Landing proposal through the regulatory process. It consists of a checklist of issues and proposed mitigations rather than being an overall evaluation of whether the Bradwood site is, in sum, a

Individuals

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K-779

K-780

positive addition to the Pacific Northwest and the specific impacts that it will effect. It does not rise, in my opinion to the level of an "Environmental Impact Statement", as intended in national and international legislation. Perhaps this is an over-reliance on a narrow interpretation of the word "environmental" in the designation of the report. Nevertheless, acknowledging this limitation and the need for comments for procedural integrity, several additional investigations are warranted by omissions or insufficient investigations in the document. An action list is provided, for your convenience, at the end of these comments, my first submission from my first review of the draft EIS. I may make additional submissions as I continue to review the document.

IND3-1 While I have no particular expertise regarding specific Columbia River conditions, it strikes me that this report is deficient in identifying specific environmental impacts. Try as I may, I cannot find an actual assessment of the environmental impact of the use, for example, of salmonoid exclusion screens (e.g., what percentage of salmonoids are actually killed by use of these screens when drawing in the projected volumes of river water). The Bonneville Dam, for example, has determined that 85% of salmonoids can survive passage through their turbines at their operating rates. Why NorthernStar or its consultants cannot determine an actual kill rate and environmental impact for this issue (and many others) baffles me. The draft EIS mentions several mitigation techniques but does not opine on such techniques' efficacy. This omission would not be acceptable for submission to authorities in the United Kingdom or in Russia. I cannot understand why an EIS with these deficiencies would be acceptable in the United States.

Personal Observation

IND3-2 One section I have never seen in an Environmental Impact Statement and I've always had a nagging question of why, is: "how many people will die during the construction of this project?" During a meeting of senior managers for the beginning of a platform development in the U.K. North Sea, the construction manager observed that one third of the managers sitting around the table (9) would be dead by the time the platform was commissioned. As it turned out, 2 died and one had a heart attack that resulted in his leaving the project. I would think that industrial OSHA statistics are sufficiently advanced to answer this question and any questions regarding expected lost time accidents over the operating life of a project. This has always seemed to me to be an "impact."

Note: Various sections of the draft EIS do not always contain all of the information provided within the titled section of the subject relevant to its conclusions. Pertinent information may be contained in other sections of the document. When this information was not readily accessible or uncovered, it is possible that the following comments might make one or more unwarranted

Individuals

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IND3-1 The use of a NMFS-approved screen (e.g., those meeting the screening design criteria including size, bar spacing, sweeping velocities) is not expected to result in any entrainment or impingement of salmonids; however, it is possible that some entrainment and impingement may occur. The degree to which entrainment and impingement occurs is both site- and situationally specific and will be addressed through formal consultation with the NMFS.

IND3-2 NorthernStar has committed to construct and operate the project in accordance with OSHA and other health and safety standards. As such, work-related deaths or serious accidents are very unlikely to occur.

assertions as to fact or completeness. It should also be noted that while I agree with many statements in the draft EIS, a failure to make a comment does not imply that I agree with them or do not believe that further study is necessary. An example is offshore loading under "Alternatives". While I agree with the conclusions, there are details in the draft EIS that are not warranted based on the state of the industry technology.

SPECIFIC COMMENTS BY SECTION

Section 2.8.2.1 Corrosion Protection and Detection System

Pipeline Monitoring

IND3-3

The draft Environmental Impact Statement makes a passing reference to "The interior of the pipe would be periodically monitored for corrosion using internal in-line pigging technology." This is much too vague a statement. I assume that FERC anticipates the use of "intelligent pigs" to monitor wall thickness. If so, FERC should state so plus their frequency. The mitigation provided by the use of intelligent pigs is significantly different for pig runs every 100 years as opposed to every 5 years. This is not a detail left to future operational discussions. Landowners along the pipeline right-of-way need to have a definitive schedule requirement for their own right-of-way agreements to safeguard their own interests. FERC should also require that any wall thickness reduction that results in an operating pressure below the most stringent construction classification anywhere along the pipeline route (presumably Class 3) be repaired within one year or the gas deliveries be ceased. If not, then FERC should be required to investigate the environmental effects of catastrophic pipeline failure (since pipelines leak). This is not a description of the flame; it is a description of the consequences of the flame (a metaphor).

Section 3.1 FERC Alternatives

Economic Feasibility

IND3-4

Section 3 is the only section I could find that attempted to address the overall feasibility of the NorthernStar proposal, albeit indirectly, and FERC's responsibility therefor. In addressing other locations or facilities which might be "technically and economically feasible, reasonable, and practical", FERC implicitly admits that these criteria should be considered in the approval of the NorthernStar proposal. Unfortunately, the bulk of the draft EIS in other sections addresses mitigation techniques associated with a narrow range of technical issues that are only one consideration in the project's feasibility. It does not address the overall feasibility of the project, which is of paramount importance in the approval process. I can

Individuals

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IND3-3

As discussed in section 4.11.9.1, 49 CFR Part 192 addresses natural gas pipeline safety issues, including requirements for the frequency of pipeline inspections.

IND3-4

The FERC staff did analyze the feasibility of the proposed Bradwood Landing Project. This is mostly reflected in section 4.11 (Safety and Reliability) which discusses our review of the engineering design for the facility. Project need is briefly summarized in section 1.1. The Commission will more fully consider need in its Order for this project. Under section 3 of the NGA, NorthernStar does not have to reveal economic data such as the sources of its LNG from overseas producers, or its potential customers. NorthernStar is at total financial risk for this project. It is the policy of the FERC to allow the market to decide which authorized LNG terminals are built and put into service. (See also our responses to comments PM2-29, PM2-39, and FA3-14).

K-781

K-782

IND3-4
cont'd

assure you that neither FERC nor the public is well served by a marginal or uneconomic facility being placed on the Columbia River. Besides the questionable abilities of NorthernStar to deliver on the project due to internal financial and technical limitations, the project appears flawed on the basis of international LNG commercial experience and on the basis of the flawed assumption of energy interchange

International LNG Commercial Conditions

IND3-5

Except for instances of published technical studies or accidents described in the literature, the overall draft EIS is unusually United States-centric, omitting much of the operational, commercial and environmental experience in the Pacific Rim where the bulk of the LNG trade actually takes place and from where NorthernStar intends to access its LNG. The international references to U.S. experience are generally limited to the Atlantic LNG trade which is a different trade than that of the Pacific Rim. There are profound differences in the economic availability and contractual terms between the Atlantic and Pacific trades. It is problematic whether NorthernStar LLC in its current configuration could attract continuous shipments of LNG in the volumes proposed inasmuch as Pacific Rim LNG projects sell on a long-term take-or-pay basis. It is the Atlantic trade (augmented very rarely from Australia) which is opening up to merchant suppliers and buyers, and which will have the surplus tankers needed to service a spot market. This would suggest that Bradwood Landing could be an underutilized LNG terminal; a condition that (i) any FERC inspections of the maintenance of U.S. terminals in past years would suggest is undesirable and (ii) does not justify the large footprint and impact of the LNG terminal. The question then arises whether this terminal should be approved if commercial conditions resulted in annual LNG deliveries of 1 to 2 million tonnes or less. It is axiomatic that marginally economic or uneconomic facilities receive the lowest level of maintenance expenditures. This is true even in economic developments if they are experiencing economic decline. One only needs to reflect on the pipeline operations of British Petroleum on the North Slope of Alaska to confirm this self-evident behavior.

Financial Capability

IND3-6

If one examines the supply arrangements in the Pacific Rim currently in place and being negotiated, long-term commitments to financially secure buyers are required. The type of financial strength required to secure a 1 BCF/d stream of gas requires something in the order of \$40 billion over 20 years (fixed). In none of NorthernStar SEC filings can I detect the plan to establish this level of financial stability.

Individuals

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IND3-5 A discussion of international LNG commerce is outside of the scope of this EIS, which is focused on the specific environmental impacts associated with the proposed Bradwood Landing Project. The purpose of this EIS is to address U.S. laws (like the NEPA) and regulations. All of the existing LNG import terminals in the United States have periods when their capacities are not fully utilized and yet they remain economically viable. We do not consider the footprint of the Bradwood Landing LNG terminal to be large. In fact, it is smaller in size than many operating or proposed LNG terminals in the United States. In section 3.1.6 we considered alternative LNG terminal designs and layouts, and found that the current footprint made sense considering the economic and engineering objectives of NorthernStar. The Commission will consider need, engineering design, and feasibility in its project Order. See also our response to comment IND3-4.

IND3-6 See our responses to comments IND3-4 and IND3-5.

K-783

Tanker Suitability

IND3-7 Should NorthernStar be able to attract a spot market delivery, FERC should be able to address the availability and suitability of the LNG tankers that would be available for that trade. Generally speaking, I would expect that these would be much older tankers released from former commitments under contracts with Alaska, Indonesia Arun and other older projects. These are likely the tankers currently not deemed suitable for trade into Osaka or Tokyo Bays.

Terminal Sharing Agreements

IND3-8 The recent experience of multiple users negotiating TSRs or terminal sharing agreements (also known as TUAs or terminal use agreements) demonstrates the high probability of the need for a third storage tank at the Bradwood Landing site, especially if there is a mixture of long-term and spot deliveries and if NorthernStar could attract the level of LNG deliveries proposed. Besides the need for flexibility under the terms of different sales and purchase agreements, different compositions of LNG from different sources exacerbates the gas quality question. The ultimate approval of the permit should be based on a three-tank configuration.

International LNG Experience of Energy Interchange

IND3-9 The size of international LNG projects has led virtually all projects of the magnitude of the Bradwood Landing project to be between dedicated suppliers and users. LNG gas is not interchangeable with regular sources and regular uses of natural gas without, at minimum, mixing to obtain a suitable properties such as the Wobbe Index. The pricing and contractual terms of LNG source gas in the Pacific Rim are not the same as conventional sources of natural gas in the United States. Pacific Rim LNG contracts are generally based on an "S" curve of crude cocktails (imported to the purchasing country) with floor and ceiling thresholds. These curves have always averaged well in excess of U.S. gas prices. To compete for resources from the Pacific Rim, therefore, the most likely result is that Bradwood LNG-source gas will be more expensive than domestic U.S. supplies of gas for two reasons. First, a long-term U.S. contract will likely need to be competitive with other long-term Pacific Rim contracts and by that fact alone long-term gas prices will be higher than U.S. domestic gas. LNG-sourced gas will operate like a monopolistic niche within the gas usage of the Pacific Northwest that is opened to LNG. Pricing of new sources of domestic supply will also likely be influenced (upwardly) in the presence of a LNG gas floor price in the market. Other supplies of LNG-sourced gas, not subject to long-term commitments (i.e., spot cargoes), would normally be a minor component. Historical spot prices, however,

Individuals

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IND3-7 See our responses to comments CO12-1, IND3-4, and IND3-5.

IND3-8 NorthernStar's current proposal is for two LNG storage tanks. However, we acknowledge that there may be a future need to expand the terminal by adding a third storage tank, and discuss this in section 3.1.6.2. See our response to comment IND3-26.

IND3-9 NorthernStar believes its project can offer a new source of natural gas through imported LNG that could be competitive with domestic supplies. See our responses to comments IND3-4 and IND3-5.

IND3-9
cont'd

have generally been higher than regular supplies for a number of structural reasons within the market.

Experience of the international Pacific Rim trade would suggest that Bradwood Landing is introducing a permanent non-competitive supply of gas to the Pacific Northwest, which would more likely be an energy price-driver (upward, as experienced in Japan, Korea, and Taiwan), leading to an overall more expensive slate of most other energy supplies. LNG might be beneficial for a relatively restricted group of high volume gas users isolated from the local energy market, but not as a general supplier of energy to the broad Pacific Northwest market. This happens to be an attractive but not yet compelling aspect of the Port Westward proposal.

Section 3.1.3 Alternatives (Proposed West Coast Alternatives LNG Import Terminals)

Port Westward

IND3-10

While not personally convinced of the suitability of an LNG terminal located so far upriver for operational reasons, Port Westward appears, by FERC's own discussion in this section (their contradictory conclusion on page 5-18 notwithstanding), to contain the elements of a superior siting for an LNG terminal by virtue of its positive improvements in the environment (water temperature) and a uniquely defined set of users (which negates the economic disadvantages of generalized use of LNG). This assessment is in contrast to FERC's assessment that Bradwood Landing's negative impact, which can only be mitigated to the degree it can be brought under legally acceptable levels of distress. It is difficult to understand how FERC, which has now taken on the much wider responsibility of representing all stakeholders in the permitting decision, could not favor Port Westward and would not demand that preference be given to advancing the Port Westward site unless a study demonstrates that two LNG terminals is optimum for the Columbia River or that Bradwood Landing is a superior site.

Section 3.1.5 Alternatives (Regional LNG Import Terminal Site Alternatives)

International LNG Technical Experience

IND3-11

It is surprising that very little discussion exists with respect to international siting of LNG terminals regarding whether Bradwood Landing is "technically ... feasible, reasonable, and practical." It would seem that the use of "proven technology" includes proven site selection criteria that addresses the optimum feasibility of the project. An examination of operations at a range of international LNG terminals would identify strengths and weaknesses of site selections. Instead, the bulk of the

Individuals

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IND3-10

As indicated in section 3.1.3.4, the Port Westward alternative LNG terminal location does have some environmental advantages. However, it also has some disadvantages, and is not clearly environmentally superior to the Bradwood Landing Project. (See our response to LA3-14.) No project sponsor has come forward to submit an application to the FERC for an LNG import terminal at Port Westward. The FERC assesses each proposed LNG terminal site independently based on environmental factors. We do not choose between locations, and independently review each proposal on its own merits. See also our responses to comments PM2-29 and FA3-14.

IND3-11

We do not agree that including international LNG import terminals in our discussion of regional site alternatives is appropriate. Other LNG terminals in the United States have capacities similar to the Bradwood Landing Project. For example: Freeport 6.7 billions of cubic feet equivalent (Bcfe) storage, 1.5 Bcfd sendout; Cheniere Sabine Pass 10.1 Bcfe storage, 2.6 Bcfd sendout; Lake Charles 9.0 Bcfe storage, 1.8 Bcfd sendout; Elba Island 7.3 Bcfe storage, 1.2 Bcfd sendout; Cove Point 7.8 Bcfe storage, 1.0 Bcfd sendout; Distrigas – Everett terminal 3.4 Bcfe storage, 715 MMcfd sendout. The FERC has considerable experience in the review of onshore LNG import terminals. A number of LNG import terminals have been operating in the United States since the 1970s. See also our responses to comments SA1-15, IND3-4, and IND3-5.

K-785

IND3-11
cont'd

analysis appears to be concentrated on the sparse experience of U.S. LNG terminals in very limited operations. U.S. terminals have not experienced the problems and limitations they will face when stretched to their operating limits, the time when design and siting decisions reveal their consequences. NorthernStar LLC is proposing a significant nameplate capacity for its Bradwood Landing facility, an actual operational rate not experienced in the United States. One should not assume that Bradwood Landing can achieve the levels of safety and efficiency experienced in the LNG industry if site decisions are significantly different than those upon which the industry safety experience is based.

Puget Sound Suitability

IND3-12

The lessons learned from international operations should be deeply intertwined in the discussion of alternative sites for LNG terminals in the Pacific Northwest. If one were looking at models of efficient and safe operations, for example, Puget Sound would obviously be one consideration by virtue of its similarity to the LNG terminals that exhibit the high levels of safety and efficiency achieved in the industry. The discussion of Puget Sound is the only one within the draft EIS that I feel is duplicitous (as opposed to merely "sloppy" or vague). The draft EIS disposes of Puget Sound by setting up the "straw men" of Cherry Point and Port Angeles, disposing of them with references to local government restrictions, and writing off the entire Puget Sound area as a result. This is not sound analysis. An examination of large LNG terminals in Japan or Korea, which offer the most robust operating footprint, would be more useful in examining sites within Puget Sound. The FERC draft EIS is wholly deficient in this portion of its analysis.

Section 4.1.3 Geology (LNG Terminal)

Shoreline Erosion

IND3-13

Shoreline erosion is discussed on pages 4-15 and 4-16. It is a curious mix of discussions of the erosion effects on the shoreline of the LNG terminal and on the nearby islands, most notably Puget Island. Unless due merely to awkward drafting, it appears from the study data supplied that Puget Island faces a potentially severe erosion problem notwithstanding the summary conclusion that no general erosion problem exists. If one takes the statements at face value, tugboats may be, during turning operations, within 1000 feet of Puget Island with their screws directly facing the island, a condition characterized as the most severe erosion situation. This conclusion is dodged (or missed) within the draft EIS by changing the subject indicating that the LNG terminal on the opposite shore will not be at risk of erosion during this situation. Erosion along the southwestern stretch of Puget Island is well known and documented by the Army Corp

Individuals

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IND3-12 The purpose of assessing sites in Puget Sound was to look at some potential LNG import terminal alternatives in the Pacific Northwest. Our analysis in section 3.1.5.3 outlined constraints at Cherry Point and Port Angeles, and explained our reasons for not evaluating them further. Alternative terminals in Japan or Korea could obviously not meet the objectives of the Bradwood Landing Project.

IND3-13 See our response to comment PM3-18.

K-786

IND3-13
cont'd

of Engineers. The large bar on the northwestern point of the island could likely be altered by its proximity to the turning basin. The effects on the shoreline of Puget Island require addressing, particularly as *the entire island is protected by dikes*. As you are, no doubt, aware, the Wahkiakum County Commissioners recently decreed an emergency for the repair of the Steamboat Slough dike, just downstream of the proposed Bradwood Landing LNG terminal. Presumably, dike conditions will require investigation all around the vicinity of Bradwood Landing.

Cathodic Protection

IND3-14

In the soil analysis section (pg. 4-17), it is asserted, "Mitigation measures for corrosion protection will not be required for this site" while, at the same time, cathodic protection is contemplated for the pipeline (Section 4.1.4). Besides the apparent conflict of those statements, the pipeline proposal might affect the LNG facility. There are a number of locations worldwide where the imposition of an impressed cathodic protection system for a pipeline has resulted in nearby facilities becoming sacrificial anodes to the pipeline. In my most recent operations experience, this occurred in Tunisia in the vicinity of the Transmediterranean Gas Pipeline from North Africa to Italy. While some provision for facility cathodic protection may be contained elsewhere in the draft EIS, it is not provided for within the most obvious sections. Nor can I find the effects of an impressed current on the number of water wells along the pipeline route.

Section 4.3.2 Water Resources

Discharge Water Composition

IND3-15

There is a discussion of the requirement for neutralization of condensate water on page 4-77. The separation of the waters from the SCV baths (displaced by makeup water) and the condensate water is unclear and suggests that the two are mixed and discharged into the Columbia River after neutralization from a pH of 5.7. Presumably, the process is a neutralization of carbonic acid (introduced from the combustion vapours). With the process uncertain, I cannot determine whether neutralization is to be performed by the addition of alkaline chemicals, which would presumably add an identifiable component to the discharge water. Since critical pipe metals are submerged in the SCV bath (upon which the presence of oxygen would act as a corrosion accelerator), it is unclear whether Northern Star plans to address oxygen removal by deaeration, reliance on alkaline chemicals or by addition of oxygen scavengers (such as sodium sulfite) or all three. The latter two would, of course, add another component to the discharge water. Northern Star or FERC should be able to identify a discharge stream volume and its components beyond a vague identification of a total dissolved solids number. Note: in the

Individuals

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IND3-14 As indicated in section 4.11.9.2, a cathodic protection system has been required on all pipelines installed after July 1971, regardless of soil type. See also our response to CO7-3.

IND3-15 As described in section 2.1.3.5, during normal operations, the SCVs would generate about 160 gpm of condensate water. Excess water produced by the SCVs would pass to an overflow effluent pit where the pH of the water would be neutralized with alkaline chemicals. Table 4.3.2-4, which shows dissolved metals and other constituents in the SCV discharge from two existing LNG facilities, has been added to the final EIS.

IND3-15 | Clatsop County submission, Northern Star indicated that the TDS would
cont'd | be about 10 times that of the Columbia River water.

Section 4.8.2 Socioeconomics

Property Values

IND3-16 | While not a compelling argument for or against the siting of an LNG
terminal at Bradwood Landing, the analysis of property values performed
in the draft EIS is laughable. I would characterize this section as merely
"sloppy." Using a generic 1993 study from Argonne or a review of housing
values surrounding the Portland LNG peak-shaving facility is so flawed as
to raise the question whether other sections received equally rigorous
attention. FERC does not provide the source of the data on housing
prices but there are a number of professional real estate consultants that
can assess the effects on property values from the site-specific conditions,
including the replacement of a rural pristine view within one mile by an
industrial facility emitting light and noise. NorthernStar's previous effort to
characterize the effects of past dredging efforts (in effect, the formation of
a beach) as equivalent to a large industrial facility, as regards nearby
property values, is equally laughable. Based on cursory examinations of
the volatility of real estate markets, it would not be surprising to find
negative effects of 25% or more. It would be preferable to not even
address property values than to introduce such defective speculation to
this document.

Section 4.10.2 Air Quality and Noise

Noise Data

IND3-17 | The table (pg.4-392) listing the noise levels of various items of equipment
is deficient by its omission of the noise level frequency distribution of SCV
(submerged combustion vaporizers). Instead, a one-meter value of 118
dBA was used "somehow" in the study. Without knowing the boundary
conditions used in the Scantech software, it is impossible to know whether
the calculation for noise propagation is even technically sound. I would
assume, at minimum, that the calculation will use transmission across
water with wind aid. This calculation methodology is still unacceptable for
two reasons. One, it uses sound levels determined during ideal running
conditions and does not consider transient conditions (which are generally
where maximum noise levels are experienced). Two, it is within FERC's
capability to simply go out and measure sound levels from these burners
already in place (when in use and when not in use) to validate the
methodology. High fuel rate fired vessels are normally quite noisy within
the sensitive frequency ranges. Data missing from the draft EIS should be
re-evaluated and corrected.

Individuals

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IND3-16 | The 1993 study, by independent scholars, published in a juried learned
professional journal, provides the most appropriate analysis of the potential
effects on property values of facilities similar to the one proposed by
NorthernStar. The impact that an industrial facility may have on the value
of a tract of land depends on many factors, including the size of the tract,
the values of adjacent properties, the presence of other utilities, the current
value of the land, and the current land use. Each potential purchaser has
different criteria and differing capabilities to purchase land.

IND3-17 | The noise modeling was completed utilizing a conservative methodology
where all equipment is operating at the same time. In practice, the overall
noise contribution to the environment should be less than what was
predicted. The transmission of noise across the water was set up in the
model to be a perfectly reflective surface with no noise attenuation.

K-788

Empirical Noise Data and Site Conditions

IND3-18 I am generally surprised by the lack of empirical information on noise in the draft EIS. As stated, it should be fairly easy to take noise measurements from various operational procedures at one or more LNG terminals (and peak shaving facilities) and then made adjustments for mechanical differences between terminal designs. Noise mitigation using empirical data was utilized by Sempra/Shell to validate their designs for Baja California and it is inexplicable why the same techniques cannot be used for Bradwood Landing by FERC.

It is also surprising that FERC does not appear to correct the misinformation provided in earlier NorthernStar submissions where they state no special conditions exist for the propagation of noise. A cursory examination of the site would demonstrate that Bradwood Landing is being proposed in an amphitheatre-like setting facing a high transmission plain. Transmission of noise northeast across the water directly towards the residences on Puget Island must be a special concern, especially from sources generating 118 dBA or more.

Section 4.11.5 Hazards

Exclusion Zones and Pool Propagation

IND3-19 The use of the Scandia study is probably justified by the actual experience of the terrorist attack on the U.S.S. Cole, which would be a reasonable assessment of risk within the small exclusion zones proposed by the Coast Guard. It would be interesting to have the Coast Guard confirm whether the U.S. Navy agrees with the Coast Guard as to the safe exclusion zone of the U.S.S. Cole for purposes of evaluating the risk level (even though the specific response from the Navy may be confidential). It is acknowledged in the draft EIS that a pool fire would have significant thermal effects within a radius of 1640 feet (Zone 1), as discussed on page 4-426. The calculation of this radius does not seem to take into account the current on the Columbia River, which might make containment of the pool fire within this single radial dimension more problematic. It seems more likely that any pool fire on the Columbia River would string out and become more elongated along the Oregon shoreline. Under these conditions, the proximity of a large fuel source, in the form of woodlands, exacerbates the hazard to the area. The ignition of the shoreline forest under various wind conditions should be evaluated before this new ignition source is added to the lower Columbia River. The spread of a forest fire is also an environmental impact apparently not addressed in this draft.

Individuals

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IND3-18 The LNG facility should not provide any reflective sound from the south rock cliff due to the facility location being shielded from the rock cliff. In addition, the sloping hills behind the proposed LNG terminal are not vertical rock cliffs, are foliated and would tend to absorb noise, potentially reflect noise upward and not reflect the noise laterally east across the open water.

IND3-19 Currents could potentially transport the pool farther away from the spill. However, it would also be more likely that the waves would break up the pool into multiple, irregular shaped pools. If a pool fire were to be elongated along the Oregon shoreline, the distance to the thermal hazard levels with respect to the shoreline would be decreased. Although there are no models that currently account for spread action due to waves or currents, FERC staff believes that the methods used for determining thermal radiation and vapor dispersion zones uses the best available methods and in the areas of uncertainty, uses conservative assumptions.

K-789

ACTION ITEMS

- | | |
|---------|---|
| IND3-20 | 1. Determine a required frequency for the use of "intelligent pigs" to monitor pipeline wall thickness. |
| IND3-21 | 2. Perform a feasibility study on NorthernStar's ability to obtain LNG sufficient to supply 1 BCF/d from the Pacific Rim: such study to consider how much LNG would be available from current suppliers or those suppliers with approved Plans of Development under spot market conditions and under traditional take-or-pay arrangements. |
| IND3-22 | 3. Perform a feasibility study to determine whether NorthernStar has the financial resources to contract for proposed volumes of LNG and to post necessary construction bonds and other obligations. |
| IND3-23 | 4. Determine whether NorthernStar can economically sustain its obligations if deliveries do not live up to their expectations and instead fall in the order of 1 to 2 million tonnes of LNG per annum. |
| IND3-24 | 5. Determine whether NorthernStar has sufficient inhouse technical capability to direct EPC contractors (engineering, procurement and construction). |
| IND3-25 | 6. Determine the availability of surplus tankers and their age/design criteria for suitability of use in Columbia River traffic. |
| IND3-26 | 7. Determine the effect of a third storage tank on site at Bradwood Landing. |
| IND3-27 | 8. Perform an economic analysis on the effect of LNG importation on the price of competing energy supplies; such study to include the contractual differences between energy sources of supply and the distortions created by the contractual conditions of Pacific Rim LNG SPAs (sale and purchase contracts) from which the LNG would be obtained. |
| IND3-28 | 9. Perform a study comparing the benefits of an LNG terminal at Port Westward with those benefits of an LNG terminal at Bradwood Landing; such study should also determine the effect of two LNG terminals on the Columbia River (if Port Westward would go forward) or conversely, one LNG terminal twice the size of the currently proposed Bradwood Landing (if the import rates of both Bradwood and Port Westward were justified). |
| IND3-29 | 10. Perform a study of resource requirements and general impacts for LNG terminals located in Tokyo Bay or Osaka, Japan. Review the operation of a similarly sized LNG terminal in Niigata, Japan. |
| IND3-30 | 11. Perform a study of the siting of an LNG terminal in Puget Sound, Washington. |
| IND3-31 | 12. The Army Corp of Engineers should perform a study of the condition of dikes on or around Puget Island and also perform a study of the erosion of shoreline along Puget Island directly or indirectly (e.g., changes in passage clearance assumed by marine traffic while an LNG tanker is berthed) associated with marine activities of the proposed Bradwood Landing LNG terminal. |
| IND3-32 | 13. Perform a cathodic protection study for the Bradwood Landing site assuming cathodic protection of the pipeline. |

Individuals

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| IND3-20 | As discussed in section 4.11.9.1, pipeline monitoring frequency is dictated by 49 CFR Part 192. |
| IND3-21 | See our responses to comments PM2-39, IND3-4, and IND3-5. |
| IND3-22 | See our response to comment IND3-21. NorthernStar has committed to Clatsop County that it would provide financial assurances in the form of a surety bond or letter of credit for an amount appropriate to cover the reasonable costs of decommission the facility. |
| IND3-23 | See our response to comment IND3-21 . |
| IND3-24 | See our response to PM6-64. The FERC staff will monitor construction of the facilities. |
| IND3-25 | LNG tankers would need to meet the relevant maritime and Coast Guard requirements to access the river and terminal. |
| IND3-26 | NorthernStar's application specifies two LNG storage tanks and we have analyzed the project with that number of tanks. If the project is authorized and a third tank is proposed at a future date, a separate application and environmental analysis would be required. |
| IND3-27 | See our responses to comments CO8-2 and IND3-21. |
| IND3-28 | See our response to comment IND3-10. |
| IND3-29 | See our response to comment IND3-11. |
| IND3-30 | See our response to comment to IND3-12. |
| IND3-31 | See our response to comment PM3-18. |
| IND3-32 | See our response to comment IND3-14. |

- IND3-33 | 14. Determine the average and peak volume and component analysis for water discharge into the Columbia River.
- IND3-34 | 15. Re-perform a real estate study of the effect of the siting on property values on Puget Island, Wahkiakum County and Clatsop County.
- IND3-35 | 16. Critique, review, validate and verify noise studies for operations of an LNG terminal at Bradwood Landing.
- IND3-36 | 17. Determine the actual kill rate for the use of exclusion screens on salmonoid population densities experienced in the Clifton Channel.
- IND3-37 | 18. Confirm with the U.S. Navy their estimate of an appropriate exclusion zone for terrorist attacks utilizing their experiences especially those of the U.S.S. Cole.
- IND3-38 | 19. Redefine the dimensions of a pool fire, taking into account river current, and determine the ignition front for a shoreline forest fire. Evaluate forest fire propagation considering rosetta diagram for wind conditions. Evaluate forest-fighting capabilities of responders.

Your close attention to these and future comments is appreciated.

Individuals

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- IND3-33 | The volume of SCV condensate discharge would be 160 gpm. See *Mixing Zone Analysis for Bradwood Landing Point Source Discharges – NorthernStar Natural Gas* in comment A4 for components. Directions for accessing NorthernStar's Mixing Zone Analysis for Bradwood Landing Point Source Discharges – NorthernStar Natural Gas via the eLibrary can be found in the response to comment FA1-14.
- IND3-34 | See our response to comment IND3-16.
- IND3-35 | The noise values provided and modeling completed are consistent with noise evaluations completed for other LNG terminals.
- IND3-36 | See our response to comment IND3-1.
- IND3-37 | As part of the waterway suitability review process, criteria developed by Sandia, which looked at external terrorist attacks including the attack on the USS Cole was used to define the outer limits of the Zones of Concern.
- IND3-38 | See our response to comment IND3-19.

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2007 OCT 22 P 3:29
FEDERAL ENERGY
REGULATORY COMMISSION

October 13, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000 Bradwood Landing

Dear Commissioners,

I wanted to write and let you know of my complete support of Bradwood Landing and to encourage you to vote in favor of their project on the Columbia River.

IND4-1 The company will be creating more areas for environmental enhancement to make up for the space they'll be using along the river. They have pledged to do whatever they can to ensure minimal impacts to the river and wilderness area surrounding the facility.

Since that area is already zoned marine industrial, it is an ideal place for an LNG facility, much more appropriate than Warrenton.

I hope that once you have heard all of the testimony and looked at the facts, you will realize that there is no reason NOT to approve Bradwood Landing.

Thank you,



Anita Amick
2 Nimitz Drive #4
Astoria, OR 97103

Individuals

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IND4-1 Comment noted.

K-791

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FEDERAL ENERGY
REGULATORY COMMISSION

October 12, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000

Dear Commissioners,

IND5-1

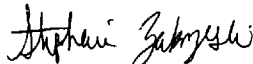
I support our environment and I support the Bradwood Landing LNG project. I believe you should too because it will help move our state away from dependence on coal (we use over 40% for electricity) and it will help power local companies with a fuel that is much cleaner. Additionally, as someone who supports 'green' energy, new natural gas will act as a good backup for these new energy sources such as wind or wave power. If the wind stops, then Clatsop County's natural gas can help power industry around the state.

Many people are using NIMBY arguments against this plant, yet they have no solutions to our state's energy needs. LNG is a popular solution globally and one that has a safe track record. Additionally, the site of this plant, at the location of an old timber mill, will keep a tradition of industry going in Clatsop County. New and clean energy, plus new jobs, equals a good solution for Clatsop County. This plant will also help make Clatsop County a leader in solving this state's energy issues.

I know you will make the right choice, and vote to approve the Bradwood Landing LNG project.

Thank you for your time.

Sincerely,



Stephanie Zakrzewski
671 Florence #3
Astoria, Oregon 97103

Individuals

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IND5-1

Comment noted.

K-792

October 13, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000 Bradwood Landing

Dear Commissioners,

I am writing today to express my support for the Bradwood Landing terminal. I believe that this project would benefit our region in many ways, not only in jobs and tax revenue, but with an ongoing steady supply of natural gas for consumers and local industries.

You will be reviewing information and hearing testimony from many people in November, and we all appreciate the time and thoroughness of that your commission is devoting to getting the facts and hearing the people. Many of those that will come to speak will be opposed to the project and will tell you horror stories, most of which I'm sure you are used to hearing. The majority of their claims are based on misinformation and emotion, and I am certain that you will be able to look past those claims.

The area of Bradwood is already zoned for industrial use, and wouldn't be suitable for anything else because it is primarily dredge spoils from decades ago. The plant itself is not unattractive, and the company has pledged to do everything possible to minimize noise and light, so as not to disrupt the peaceful way of life for Puget Island residents.

I hope that once you have reviewed the information and heard testimony in November, you will approve their permit. We need this industry in the Pacific Northwest, and I can think of no better location for it.

Thank you for your time,



Kim Heinesh
2 Nimitz Drive #2
Astoria, OR 97103

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SECRETARY
2007 OCT 22 P 3 28
FEDERAL ENERGY
REGULATORY COMMISSION

Individuals

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IND6-1

IND6-1 Comment noted.

K-793

John & Christine Hulon
92269 Svensen Market Road
Astoria, OR 97103

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OFFICE OF THE
SECRETARY

October 16, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

2007 OCT 23 P 4: 35

FEDERAL ENERGY
REGULATORY COMMISSION

Re: Docket CP06-365-000

Dear Commissioners,

IND7-1

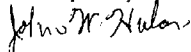
Please accept this letter of support for the Bradwood Landing facility. As long time residents of Svensen, we understand the need for securing a steady supply of natural gas for our future, and having investigated this industry, are comfortable with the excellent safety record worldwide.

There are many issues involved, but the company has pledged to make the impacts to the land and river as minor as possible - and when called for, they plan to do even more than would be required to compensate.

There is nothing more suitable to that location than an industrial facility. We've seen people comment that it would be beautiful place for a resort - and yes, that is a beautiful part of the river. Considering, however, that the usable portion of property is old dredge spoils, obviously it wouldn't be feasible to use it for anything recreational.

Please look at both sides, and consider the facts rather than the emotional arguments that some people will throw out there. When the facts are presented, we are confident that you will agree unanimously in favor of Bradwood Landing.

Thank you for your time,



John & Christine Hulon

Individuals

7

IND7-1

Comment noted.

K-794

ORIGINAL

October 16, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

FILED
OFFICE OF THE
SECRETARY
2007 OCT 22 P 2:55
FEDERAL ENERGY
REGULATORY COMMISSION

Re: Docket CP06-365-000 Bradwood Landing

Dear Commissioners,

Please accept this letter of testimony in support of the proposed Bradwood Landing LNG facility on the Columbia River in Clatsop County, Oregon. As a contractor with over 25 years of experience in the heating & cooling industry, I feel that my opinion of any industrial project carries the weight of my experience.

IND8-1

Please approve this facility and related pipeline. Like any utility that has been put in place, this is a gas pipeline that will be constructed to strict industry standards, even going beyond industry standards with more welding than required and a state of the art "smart pig" monitoring system to ensure the pipeline once build will remain safe.

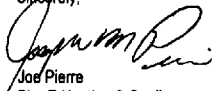
NW Natural will build the pipeline; they are the experts their field and have provided gas service to this area for many years, safely. The pipeline will serve Wauna Mill, and in doing so will keep the cost of the paper products they make affordable and the mill production sustainable. Other industries along the pipeline route, such as Longview Fibre and Georgia Pacific will also be able to purchase gas directly.

It has been shown that LNG is safe, and the industry has an enviable safety record over the last 50 years. Bradwood is the right place due to its remote location and its existing status as a marine industrial area. It will also provide dozens of family wage jobs, something that is much needed in our County, not only at the facility itself but in supporting business.

Lastly, the extensive environmental mitigation that will be done by the company during and after construction, even more than is required, should show that this company intends on protecting our fish and wildlife during and after construction.

Please carefully review the facts and once done, I'm sure you will find this project meets all requirements and just makes sense. I am certain that you will do the right thing and approve Bradwood Landing.

Sincerely,



Joe Pierre
Pier E Heating & Cooling
5 North Hwy 101, #350
Warrenton, OR 97146

Individuals

8

IND8-1

Comment noted.

K-795

ORIGINAL

FILED
OFFICE OF THE
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2007 OCT 22 P 2:56
FEDERAL ENERGY
REGULATORY COMMISSION

October 15, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000

Dear Ms. Bose and Commissioners,

Please accept this letter of testimony in support of the proposed Bradwood Landing LNG facility. Although I cannot attend the hearings in November, I wanted to make sure you were aware of my support.

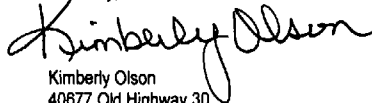
IND9-1

Our region, the Pacific NW, needs this company, not only for the stable energy supply they will provide, but for the tax revenues, jobs, and other services that will exist because they are here. They have shown that they will be a conscientious corporate entity in the region, and when comparing their project to the others, I can only say that I would support Bradwood Landing. The location is appropriate.

I hope you are not swayed by well meaning folks who say this project will ruin the Columbia River. Bradwood Landing has made fish protection and enhancement of wildlife habitat a part of their design. They are doing more to enhance the River than any other environmental group or government agency has been able to accomplish in years.

I know you will take time to carefully review all the facts, and having done that will determine this project is in the right place, for the right reasons. I encourage your approval of Bradwood Landing.

Sincerely,



Kimberly Olson
40877 Old Highway 30
Astoria, OR 97103

Individuals

9

IND9-1

The EIS documents the reasons behind our findings. Our conclusions are based on information provided by NorthernStar; analyses and site visits by Commission staff; and literature research and reviews of scientific and independent studies. NorthernStar has proposed, or we have required, measures that we believe would appropriately and reasonably avoid, minimize, or mitigate environmental impacts resulting from construction and operation of the proposed project.

K-796

October 14, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000

Dear Commissioners,

Please accept this letter of testimony in support of the proposed Bradwood Landing LNG facility.

Although I will be unable to attend the hearings in November, I wanted to make sure you were aware of my support. Your approval of the Bradwood Landing is needed so that our region can be assured of a steady supply of natural gas for the future, and to help our state begin to wean itself from more harmful fuels.

Please don't be swayed by people wearing red shirts and their Anti-LNG slogans. They have killed enough trees with their pages of letters full of misinformation about LNG and the affect Bradwood Landing would have on the Columbia River. The Coast Guard, Bar Pilots, River Pilots and Commercial Fisherman have been all involved in the discussions on river safety and transit, to be sure everyone has input. Review the facts and discount the lies. LNG can safely transit the river while accommodating other river users.

Once you have reviewed all the facts, I'm certain you will determine that Bradwood Landing is the perfect location for the terminal, and will approve their project.

Thank you for your time.


Susan Marshall
Emerald Heights Apartments LLC
1 Emerald Drive
Astoria, OR 97103

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SECRETARY

2007 OCT 22 P 2:57

FEDERAL ENERGY
REGULATORY COMMISSION

Individuals

10

IND10-1

IND10-1 Comment noted.

K-797

ORIGINAL

October 12, 2007

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SECRETARY

Mary Casper
308 Bond Street
Astoria, OR 97103

2007 OCT 22 P 2:59

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

FEDERAL ENERGY
REGULATORY COMMISSION

Re: Docket CP06-365-000

Dear Secretary Bose and Commissioners:

I am writing in favor of the Bradwood Landing LNG Receiving terminal and pipeline that is proposed for the Columbia River near Astoria, Oregon.

IND11-1

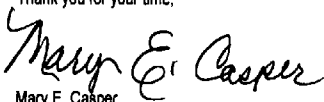
In looking at the various locations proposed around our region, the one at Bradwood is, in my opinion, the only logical place to have a receiving terminal. It is more remote, and would require a shorter pipeline than the other projects.

Additionally, it appears to me that the gas from the other projects will be slated for the California market, which is something many people are saying about Bradwood also but is not true. The gas that will come into Bradwood Landing will serve Oregon and Washington consumers as well as many industries. It seems to me that if we are importing gas to our state, it should be used in our state!

Please vote to approve this project. It is important to so many of us, to have this new industry that will give so much to the County over the years it will be here. It is a good thing, please don't let the nay-sayers affect your decision with the misinformation they will throw around.

I have faith that you will all do the right thing and allow the facts of the matter to help you make your decision.

Thank you for your time,


Mary E. Casper

Individuals

11

IND11-1 Comment noted.

K-798

OPIC
116

October 12, 2007

2007 OCT 22 P 3:00

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000

Re: Bradwood Landing

Dear Commissioners,

I am writing to make you aware of my support for Bradwood Landing, and my hopes that you approve their proposed LNG Receiving terminal on the Columbia River in Clatsop County, Oregon.

IND12-1 I have been involved for many years with Salmon recovery programs, so I can see the benefits that the Salmon Enhancement Initiative, along with Bradwood's other mitigation measures will have on our river and salmon.

Over the course of their approval process, NorthernStar Natural Gas has shown that they would be an environmentally responsible and economically active partner in our community.

I know that as a Commission, you will weigh the facts, and I am certain that you will agree this project is right for the location and region.

Regards,



John Veenendaal
91471 Highway 202
Astoria, OR 97103

Individuals

12

IND12-1 The SEI is described in 4.6.2.2.

K-799

October 12, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000

Dear Commission,

Please accept this letter of testimony in support of the proposed Bradwood Landing LNG facility.

IND13-1

I believe that the Planning Commission's decision to vote against the recommendation of their staff proved that when shown the extent to which NorthernStar Natural Gas is willing to work with the County on solutions to any problems, the decision needs to be a resounding "yes".

I hope you are not swayed by well meaning folks who purport that this project will ruin the Columbia River. Bradwood Landing has made fish protection and enhancement of wildlife habitat a part of their design. They are doing more to enhance the River than any other environmental group or government agency has been able to accomplish in years.

I know you will take time to carefully review all the facts, findings and having done that will determine this project is in the right place, for the right reasons, and should be approved.

Sincerely,



Connie Veenendaal
91471 Highway 202
Astoria, OR 97103

Individuals

13

IND13-1 Comment noted.

K-800

ORIGINAL

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2007 OCT 22 P 3:01
FEDERAL ENERGY
REGULATORY COMMISSION

October 16, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000 Bradwood Landing

Dear Ms. Bose and Commissioners,

IND14-1

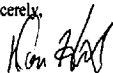
As a member of IBEW Local 48 in Oregon and a resident of Svensen, I would like to voice my support for the Bradwood Landing LNG terminal in Clatsop County. As a union electrician, construction projects like these are what keep our family wage jobs in our region. Livable wages means keeping food on our tables and allows us to buy homes in the area.

Not only that, the addition of LNG will help keep Northwest companies producing products for the world. These companies rely on affordable sources of energy and electricity to make their goods and to keep people employed. Adding new natural gas to the region will help my union brothers and sisters at forest products plants, aircraft parts factories, and in manufacturing jobs around the Northwest.

Lastly, the company has shown their dedication to work with the environmental impacts that will be created by their construction and operation, by designating protected wetland areas, as well as working with local fishermen to ensure their livelihoods will not be impacted.

Please approve the Bradwood Landing LNG terminal. Union workers bring a better quality of life to Clatsop County and the addition of LNG will help keep union workers on the job and encourage additional new and very valuable industry to our region.

Sincerely,



Don Hanseth
92455A Simonsen Road
Astoria, OR 97103

Individuals

14

IND14-1 Comment noted.

K-801

ChrisLynn Taylor

671 Florence #1 Astoria, OR 97103

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2007 OCT 22 P 3:31

FEDERAL ENERGY
REGULATORY COMMISSION

October 12, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000

Dear Commissioners,

I have lived in Astoria most of my life and am a respected educator. I wanted to write and add my voice to those writing in support of Bradwood Landing.

Most of the reasons I hear in opposition to this facility are based on misinformation and fear. I realize it is fear of the unknown, but I really wish those people would bother to get the facts, and to look at those facts with maturity and an open mind.

IND15-1 | The purpose of this letter is not to bash the opposition, however, but is to encourage you to approve Bradwood Landing based on the our need for clean energy and its appropriate location.

I know that as a commission, you will review all the facts carefully, and I'm confident that once done, you will agree with your staffs recommendation to approve Bradwood Landing.

I know the opposition is very vocal, but I am certain that the majority of citizens support Bradwood Landing. I hope that you will not give in to the pressure from the vocal minority.

Thank you for your time,



ChrisLynn Taylor
671 Florence #1
Astoria, OR 97103

Individuals

15

IND15-1 Comment noted.

K-802

ORIGINAL

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2007 OCT 22 P 3:30

FEDERAL ENERGY
REGULATORY COMMISSION

October 12, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000

Dear Commission,

I am a resident of Svensen, a small community east of Astoria, about 10 miles from the site where Bradwood Landing wishes to build a liquefied natural gas receiving terminal. I am strongly in favor of this project not only for the stable supply of energy it will provide our region, but because of the company itself.

The site where they would like to build this facility has historically been used for industrial use. I'm certain that if the lumber mill hadn't gone out of business and left, and if the timber industry was still booming, the town of Bradwood would still be there and the mill still in operation.

The company has consistently gone above and beyond in what has been a very lengthy permitting process, which shows that they are serious about causing as little impact as possible to the area, along with replacing the land they are using with 10 times the area in new wetlands and protected wildlife areas.

Please approve the Bradwood Landing LNG facility.

Sincerely,



Brian McCollister
92312 Svensen Market Road
Astoria, OR 97103

Individuals

16

IND16-1

IND16-1 Comment noted.

K-803

ORIGINAL

October 15, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000

Dear County Commissioners

FILED
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2007 OCT 24 P 2:35
FEDERAL ENERGY
REGULATORY COMMISSION

IND17-1

The future of Clatsop County's economic development is in your hands. Support economic development for Clatsop County, by approving Bradwood Landing.

1. Timber revenue is drying up
2. Hydro power is going up
3. No new industries, our children must live elsewhere to survive,
4. Our children are our future.

We cannot put our eggs in one basket, that being tourism. It does not make sense to look at our future without industry and an industry that will enforce a drug free workplace is a plus to our community. Bradwood Landing will have skilled workers who with families will add value to our community. The company is dedicated to provide necessary classes to people who wish to learn these skills, and even if enough locals don't wish to enhance their futures, new people with new jobs bring value added investment in our future.

Please approve Bradwood Landing, put it back to work. With Federal tax dollars from timber revenue ending soon, Bradwood Landing is the right project for the times. It also brings ancillary benefits to jobs such as more tug operators, Stevedore services, more fire, life and safety positions, and it opens the doors for the Clatsop Community College to develop more skilled labor programs on the West Coast. There are many, many related economic benefits to an industrial use. There are many local benefits for other businesses, not to mention the tax benefits, especially for the Knappa School District.

The benefits and balance of mitigation were designed to allow projects to be approved, and Bradwood Landing will be doing far more than required to offset any environmental impacts. Do your part to make our future the future for our children. Please approve Bradwood Landing.

Respectfully yours,



Robert & Judy Pounders
200 Nehalem, #9
Astoria, OR 97103

Individuals

17

IND17-1 Comment noted.

K-804

ORIGINAL

2007 OCT 24 P 2:35
FEDERAL ENERGY
REGULATORY COMMISSION

October 16, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket #CP06-365-000

Dear Commissioners:

IND18-1

Why would Northern Star Natural Gas want to site a liquefied natural gas terminal in Clatsop County? It's simple, because our region is growing!

That growth means industry, and where there's industry there are energy needs. Northern Star is proposing an import facility at Bradwood Landing, because it's close to the market it wants to serve, while still being remote.

The Bradwood site is close to existing pipelines and will require minimal building to connect to local suppliers. It makes good business sense to centralize distribution in a way that limits transit needs and helps you connect to your customers. Locating in Oregon, specifically Clatsop County, allows Northern Star to do exactly that.

In addition, I have been impressed with the extent to which Northern Star is mitigating any environmental impacts for the terminal or pipeline, even the river itself.

Please approve Bradwood Landing, they will make a huge positive difference in the future of our region, both environmentally and economically.

Sincerely,



Ken Reid
92885 Simonsen
Astoria, OR 97103

Individuals

18

IND18-1 Comment noted.

K-805

ORIGINAL

2007 OCT 25 P 2:36
OFFICE OF THE
SECRETARY
FEDERAL ENERGY REGULATORY
COMMISSION

October 19, 2007

To: Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: "Comment on Filing", Reference Docket No. CP06-365-000, Bradwood Landing Project

Dear members of the FERC Committee:

It is with great disappointment and concern that I write this comment and rebuttal to the conclusions raised by the DEIS regarding the Bradwood Landing Project.

IND19-1

To me, it is a given that people who have deep roots in an area would know their area intimately. I believe the residents of the lower Columbia River when they say that the impact of an LNG depot would be significant to the land and river that they know so well on an everyday basis. Common sense alone decries an LNG project on the river. No salmon recovery program, for instance, could withstand the impact of the LNG industry (with its depot and tanker traffic) on the Columbia River. It just doesn't jibe with reason or reality. The LNG industry cannot be a "one size fits all" deal, especially in this case. This type of industry just doesn't fit on the Columbia River, quite literally. I believe that it is the responsibility of your agency to reassess the DEIS's conclusion that the impact would be minor, even with the so-called mitigations. In other words, how can you be so sure that the impacts would be minor? I do not possess a scientific degree but I know the river and the islands and the estuaries very well and I completely disagree with your findings that the impact would be limited. Again, can you be so sure of your findings that you can take that risk as well as allow the residents of the area to take an even greater risk? Please consider these comments in deliberating changes to the DEIS. Thank you.

Jessie Jones

Tenasillahe Island native
jjones@library.ucsb.edu
P.O. Box 31003
Santa Barbara, CA 93130
(805-893-2584)

Individuals

19

IND19-1

As described in section 5.1, we have determined that construction and operation of the Bradwood Landing Project has the potential for limited significant environmental impacts. However, we have proposed measures to mitigate such impacts. Our conclusion is based on information provided by NorthernStar; analyses and site visits by Commission staff; literature research; alternatives analyses; comments from federal, state, and local agencies; and input from public groups and individual citizens. As part of our review, we developed measures that we believe would appropriately and reasonably avoid, minimize, or mitigate environmental impacts resulting from construction and operation of the proposed project. As such, we recommend that our mitigation measures be attached as conditions to any authorization issued by the Commission. Furthermore, the FERC would not allow construction to proceed until after we have concluded formal consultation with the FWS and NMFS.

K-806

ORIGINAL

OFFICE OF THE
SECRETARY

2007 OCT 30 P 2:53

REGULATORY COMMISSION

October 14, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000

Dear Commissioners,

We wish to advise you of our support of the Bradwood Landing project, and why you should vote for approval of their permit.

IND20-1

We need this industry here, and this particular project will not only help with our future energy needs as our supply of gas decreases from other areas, but it will ensure supply to local industries that depend on natural gas to operate without taking that gas away from homes.

The increase in County Tax revenue because of this project will make a huge difference to many agencies that depend on it, as well as helping to improve the Knappa School District. In addition, the navigational improvements will benefit every industry on the Columbia River. Lastly, the environmental mitigation that the company will undertake, will help the health of our Salmon and our river in general, by giving back 10 times what they are taking in the way of habitat.

We know you will carefully review and discuss every aspect of this project. Don't be swayed by the nay-sayers and NIMBYs. If that was the criteria of an approval, how could ANY industry ever be built? This project is a benefit to our community and should be approved.

Respectfully yours,

Patricia Whiteside

Milton & Patti Whiteside
92234 Svensen Market Road
Astoria, OR 97103

Individuals

20

IND20-1 Comment noted.

K-807

October 12, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426

Re: Docket CP06-365-000

Dear Commission,

I wanted to let you know that I fully support the proposed Bradwood Landing LNG receiving terminal, and hope that you will approve their project.

IND21-1

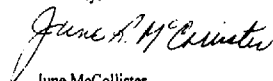
Bradwood has always been a Marine Industrial area, and the current zoning needs to be changed in order to accommodate larger ships. Also, since the land there is made up of primarily dredge spoils, there could be no possibility of it ever being anything BUT industrial.

In designing the facility, Bradwood Landing has gone through extensive design changes to minimize any impacts to the river and the land. They have shown that they are environmentally responsible and really DO care about our river and wildlife.

In other words, this company has jumped through hoops at every turn trying to satisfy everyone – most of the mitigation measures they will undertake are far and above what would be required, and that willingness to make things better should reflect positively. I have no doubt that they will continue to be a conscientious member of our community, both economically and environmentally.

I know that you will receive many comments from people stating that this facility will ruin the river and that we don't need the gas. Most of those statements will be false, fueled by emotion and from people against any kind of development. I am confident, however, that you as a committee will review the facts and not take every comment you see as the truth, and will ultimately approve this project.

Sincerely,



June McCollister
92312 Svensen Market Road
Astoria, OR 97103

ORIGINAL

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OCT 12 2007
FEDERAL ENERGY
REGULATORY COMMISSION

Individuals

21

IND21-1 Comment noted.

K-808

ORIGINAL

October 22, 2007

TO: Federal Energy Regulatory Commission
FROM: Carolyn Eady
 78380 Hwy. 202
 Seaside, OR 97138
 (503) 755-2817
SUBJECT: Comments Regarding the Draft Environmental Impact Statement -
 Bradwood Landing (FERC Docket Nos. CP06-365-000 et al.)

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 SECRETARY

2007 OCT 30 P 2:54

FEDERAL ENERGY
 REGULATORY COMMISSION

This response to the Draft Environmental Impact Statement (DEIS) for the Proposed Bradwood LNG facility and pipeline is in three sections: 1) Air Quality; 2) Seismic Issues; and 3) Operational and Security Concerns. Having had a scientific background, I have tried to be objective in analyzing these data. Given the volume of material in the public record, I cannot be completely sure I have the latest version of every report and table. Nevertheless, I think the issues I raise are serious and deserving of your attention.

I. AIR QUALITY

I have reviewed Section 4.10 Air Quality and Noise in the Bradwood draft EIS. Specifically, I have tried to trace the data cited in several tables back to the original source document submitted by Northern Star (NS) to determine if the data reported in the DEIS is based on accurate assumptions and complete data. As a result of this process, I have several questions and concerns.

A. Data and Assumptions: I have tracked the emission data and assumptions used for LNG carriers, tugs and security vessels in DEIS Table 4.10.1-4 (p.4-370) with the corresponding data in Resource Report (RR) 9.

Assist Tugs: The data for the Assist tugs do not match anything I have been able to locate. (See Attachment A for the three different versions of tug emission data: DEIS Table 4.10.1-4, RR Table 9.1-11 and RR 9 Table 9A-17.) I am concerned about this because I believe the earlier RR tables seriously understated tug emissions. The RR 9 tables assumed 1) only one tug would accompany the LNG carrier up the river to the terminal¹, whereas, the Coast Guard requires two in good weather and three when extreme wind and weather require it (Waterway Suitability Report – WSR, 2/28/07, p. 3); 2) the tugs would only accompany the carrier for 1.3 or 2.5 hours, whereas, it will take the carrier 3.7 hours to go from the jetty to the berth (Note: On page 3, the WSR states that the tugs should join the vessel “as soon as it is safe to do so.”); 3) show zero emissions for the tugs while the carrier is unloading, even though the Coast

¹ Table 4.10.1-4 assumes 2 assist tugs, but the volume of emissions reported is only about 20% higher than the earlier Tables that assumed only 1 assist tug.

Individuals

22

K-809

IND22-1

IND22-1 See our responses to comments FA3-5 and FA3-6.

IND22-1
cont'd

Guard requires three tugs² to remain on standby to assist with emergency departure procedures³; and, finally, 4) show 18 hours for the hotelling process, even though all other references in this application refer to a 24 hour unloading period.⁴ I assume FERC will agree that when emissions are tallied for the assist tugs while the carrier is hotelling, *they should be tallied for the full 24 hour period.*

- Have the emissions for the tugs in Table 4.10.1-4 been corrected for each of the erroneous assumptions described above. If not, what assumptions did NS use in producing the data used for this Table?

IND22-2

LNG Carrier: Emissions reported for the carrier's generator during the hotelling period (RR 9 Table 9.1-10, Attachment B), are also based on an 18 hour unloading process with zero emissions for the other 6 hours. There were zero emissions reported for the main engine during the entire 24 hour period

- Why are the carrier emissions for the hotelling process only calculated for 18 hours? If the carrier is berthed for 24 hours, the engine must be running during that entire period, even if the unloading is completed sooner. (See below)

IND22-3

NS Report "Response to Staff Environmental Information Requests", 09/07/06, discusses at some length why it is impractical to cool-down and shut down the carrier's steam boilers while dockside for cargo unloading. It states:

Typically, one of two of the ship's boilers will remain on line in order to provide steam for the ship's turbogenerators (steam turbines operating as prime movers for the ship's generators) as well as maintain ready steam for the immediate engagement of the ship's main propulsion turbine, if needed. ...In addition, placing the LNG carrier in the position of conducting cargo transfer operations without reasonable access to propulsive power gives rise to potential safety issues by narrowing the LNG carrier's catalogue of response options and its ability to appropriately respond to emergent situations.(p. 20)

Clearly, the carrier main engine is running during the entire time it is dockside.

- Why are no emissions reported for the carrier's main engine during the hotelling process?

² Three tugs are required to remain on standby during unloading (WSA report, p. 3) not one as described by NS in the Initial Biological Assessment (p. 28).

³ A Coast Guard representative in Portland told me that, depending on the type of engine, the tug engines would be required to be idled or to be started regularly.

⁴ This assumption was carried over to the April 2006 modeling report, which states "24 hour emission rate is based on 18 hours of operation with 6 hours of no emissions." (Table 3, Footnote 4)

Individuals

22

IND22-2 See our responses to comments FA3-5 and FA3-6.

IND22-3 See our responses to comments FA3-5 and FA3-6.

IND22-4

Finally, I traced the SO₂ emissions for the carrier generator while hotelling that were used in the AAQS Dispersion modeling study, Table 1, April 12, 2006, p.2, to the SO₂ data reported in Resource Report 9 in Table 9.1-10. (Attachment C) The modeling study used a figure for SO₂ that is about one-half the value in Resource Report 9.

- What data or assumptions did NS use to generate the lower SO₂ number reported in the AAQS Report, Table 1?

Security Vessel: I am not aware of any source documents for the security vessel emissions cited in Table 4.10.1-4 (Attachment A)

- Are the source documents for security vessel emissions available to the public? What assumptions were used in estimating these emissions?

IND22-5

B. Concerns: After examining the emission data reported by NS for the proposed Bradwood LNG operation, I am very concerned that they did not give an accurate or complete picture of the volume of emissions that this operation will introduce into the lower Columbia River area:

- As described above, I lack confidence in the assumptions used by NS in compiling the emission data submitted to the various agencies and to the public. Likewise, I lack confidence that the modeling studies were based on correct data. With one or two exceptions, NS's assumptions underestimated the magnitude of the air pollution that will be caused by this operation.

For example, I find it ludicrous that they would assume that three tugs will be required by the Coast Guard for security reasons to be on standby for 24 hours in close proximity to the carrier while it is unloading, but not generate any emissions during the entire period. (It remains to be seen if any emissions were estimated for the security vessel.) In addition, why would NS use 18 hours when computing generator emissions during carrier hotelling and report no emissions for the main engine? I don't understand why they cut back on the number of hours the tugs will accompany the carrier up the river.

- Even if the emission data submitted by NS were accurate, complete and based on valid assumptions, I think the way the data are reported in the DEIS make it very difficult for the public to fully grasp the impact this operation will have on the quality of the air in this region, as well as the magnitude of greenhouse gases that will be emitted. I am also concerned that most of the public have no idea how fragmented and complex the state and federal regulations of emissions really are.

Individuals

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IND22-4 See our responses to comments FA3-5 and FA3-6.

IND22-5 See our responses to comments FA3-5 and FA3-6.

IND22-6

For example, most people do not know that for every ton of CO emitted, there will be 100 tons of CO₂ emitted, a greenhouse gas that is a major contributor to global warming, but currently not a federally regulated pollutant. Even without any of the corrections I have suggested earlier in this memo, using the formula that one ton of CO equals 100 tons of CO₂, this project would create 69.7 tons of CO₂ per year. [Note: The Oregon Department of Energy has asked NS to voluntarily comply with the CO₂ standards for non-generating energy facilities. To date, NS has not indicated whether they will comply with the ODE request. (DEIS p. 4-382)]

IND22-7

I am also sure that most people do not realize that state and federal regulatory standards for emissions are quite different. For example, it is stated in Table 4.10.1-6 that the terminal will emit 122.6 tons/year (tpy) of NO; in RR 9 Table 9.1-10 it is stated that the ship generators will emit 130 tpy of NO while hotelling. Each value separately exceeds Oregon standards⁵, but not the federal standards. These two emissions were combined in a modeling study requested by ODEQ; no such requirement that they be combined exists at the federal level. I personally do not understand why these emissions are not combined: they are both part of the "terminal operation" while the ship is "hotelling", i.e. the carrier is no longer mobile; it is physically and electronically part of the terminal, transferring a hazardous substance from one part of the terminal to another under the control of terminal employees.⁶

- If the annual NO emissions for the carriers while hotelling and the terminal are combined, the total NO emissions would be over 250 tpy and the operation would be subject to the additional regulations and review of the federal Clean Air Act.

Conclusion: I believe the questions and issues I have raised above are important because both Oregon residents and Oregon agencies are entitled to a complete and accurate picture of the air pollution impact of the proposed Bradwood facility.

IND22-8

I assume if FERC finds that air emissions have been underreported, it will ensure that all affected tables are corrected and, if necessary, new modeling studies are completed.

⁵ NS will be required to obtain a Title V operating permit from Oregon because the Potential to Emit (PTE) will be greater than 100 tons per year for certain regulated air pollutants. (RR 9 Sec 3, p.14)

⁶ See Resource Report 1, p. 10 for discussion of the terminal control technology.

Individuals

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IND22-6 See our response to comment PM5-1.

IND22-7 The Bradwood Landing project is required to comply with all applicable air quality regulations including applying for and obtaining necessary air permits/authorizations. Section 4.10.1 of the EIS documents these requirements.

IND22-8 Section 4.10.1 of the EIS has been updated, as needed, to reflect revised emissions estimates and air quality impacts for the project.

2. SEISMIC CONSIDERATIONS

Because of its proposed location, the Bradwood Landing facility will have a whole set of added risks and complexities that other LNG facilities do not have to cope with. While the DEIS rightfully acknowledges that the proposed terminal site is classified as a "High" hazard area relative to earthquake potential and soil liquefaction (DEIS p. 4-11), and numerous mitigation measures are proposed, I still have many concerns. Chief among them are the following:

A. Key statements in the DEIS reveal a lack of in-depth knowledge of this area:

- The DEIS statement (p. 4-11) about the "lack of historical seismicity in the Pacific Northwest with regard to Cascadian Subduction Zone events to assist in bracketing earthquake recurrence", reveals a glaring lack of knowledge⁷ of the geological research in the Northwest over the past 20 years and what it has revealed about the seismic history of this area

Many people in Clatsop County can tell you the exact date of the last subduction earthquake to hit this area – it was January 26, 1700 – 307 years ago. This was recorded in Japan as a result of a tsunami that hit their shores after this huge quake on the west coast of North America. This has been confirmed by the detailed studies that have been conducted since the early 90's of core samples in estuaries showing the subsidence and flooding by tsunamis and the measurement of the tree rings from trees that died in these events. (See Attachment D for a few articles that give more details.) Basically, we now know that huge subduction earthquakes are a regular event all along the west coast of North America; their approximate dates have been identified going back thousands of years. They occur on average every 300-500 years, but can happen within 100 years.

- "The likelihood of fire in the surrounding forests is unlikely given the amount of rain in the area."

While it is true this area does have a lot of rain, June through September is typically very dry. The Department of Forestry routinely imposes County-wide open burning bans during this period and requires that all logging operations follow strict safety precautions. As you may know, the Tillamook Forest fires that occurred in the 30's and 40's destroyed several hundred thousand acres of forestland; the Tillamook Forest has not fully recovered 70 years later.

⁷ Under Section 4.1, Regional Geological Setting (p. 4-2 etc.) I found no mention of the extensive, well-known earthquake history of this area.

Individuals

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IND22-9

IND22-9

See our response to comment PM6-18.

IND22-10

IND22-10

Appropriate portions of the EIS have been revised. While we acknowledge that forest fires in the region have happened in the past, in this EIS we are analyzing whether the project could cause such a wild fire. We believe that with the mitigation measures to be implemented by NorthernStar, and the conditions of the Coast Guard WSR, a spill from an LNG carrier and resulting pool fire is highly unlikely.

IND22-11

B. Because the seismic history of the area has not been acknowledged, the DEIS understates the frequency and hence the risk of a subduction earthquake on the site and along the pipeline.

In a site-specific hazard analysis, URS (2006a) indicated a peak horizontal bedrock acceleration of 0.36 gravity with a 2% probability of exceedance in 50 years (i.e. a 2,475 year return period). (p.4-11) This does not seem to agree with recent geological research in the area documenting an average recurrence of every 300-500 years. Recalling that it has been 307 years since the last major subduction quake in Oregon, a local geologist estimates that there is a 15 to 20% chance of a major subduction earthquake occurring in the next 50 years, not the 2% chance stated in the DEIS. (p.4-11) (See Appendix E) Considering the consequences, a one in five chance of this type of quake during the next 50 years, I think the risk of an LNG facility at the Bradwood site is unacceptable.

IND22-12

C. The severe consequences of a serious failure at the terminal or along the pipeline are not acknowledged.

The fact that the facility and pipeline would be in a rural area, does not mean the damages would not be catastrophic in terms of life and property. Victims could include people in recreation or commercial vessels on the Columbia River, people in their homes⁸, or small communities like Westport⁹, people on nearby roads or working on their farms or employees of the Wauna mill. If there is a forest fire, the environmental and economic losses would also be devastating, especially after an earthquake, when normal firefighting resources would be unable to respond.

- A major forest fire caused by an unexpected event either at the terminal or along the pipeline, could wipe out the state and commercial forest industry in Clatsop County (currently worth billions of dollars in assets) that is considered one of the most productive places in the world for growing trees; it is the bedrock of the County's economy.

I recently heard an earthquake expert state that many of the deaths and damages associated with earthquakes occur *after* the earthquake due to pipeline

⁸ Eleven homes are within 50 feet of the pipeline right-of-way. (ES-4)

⁹ This would also include the County's current Westport boat ramp. (See Attachment F for a map showing the pipeline in relation to the boat ramp and the community of Westport.)

¹⁰ A recent document by NS in response to local concern about potential fires caused by the LNG operation stated: "We also know there is no credible event on our facility that could cause a forest fire." And "In the unlikely event of a forest fire, Bradwood will...call for assistance from mutual aid network and enlist the aid of state resources." (p.9-10)

Individuals

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IND22-11

The recurrence interval refers to the peak horizontal bedrock acceleration that would occur at the site, not to the average recurrence interval of subduction zone earthquakes in the Pacific Northwest. Please see *Final Report, Seismic Hazard Analysis for LNG Import Terminal, Bradwood, Oregon* by URS Corporation, 2006, available on the FERC's eLibrary, for a detailed discussion of the seismic analysis for the Bradwood Landing LNG terminal. This document is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e., CP06-365), and putting in the proper date range. Additional details regarding the "design earthquakes" are presented in section 4.1.3.3.

IND22-12

Although there is a risk of a pipeline rupture due to various causes, the risk to any individual along the pipeline risk is minimal.

IND22-12

cont'd

ruptures and the subsequent fires. The devastating consequences of these ruptures are documented in a study prepared for the Gas Research Institute by C-FER Technologies, October 2000, entitled "A Model for Sizing High Consequence Areas Associated with Natural Gas Pipelines." The author devised a simple and defensible approach to sizing the ground area affected by a worst-case ignited rupture of a high pressure natural gas pipeline. The key variables are the pipeline diameter and its operating pressure. He tested his formula against the area affected in actual ruptures in North America. These are summarized in a Table 3.1 on page 14. (Attachment G) This Table describes each incident, the number of deaths and injury, the property damage, the maximum burn distance from the pipeline and the pipeline diameter and pressure.

- This report concluded that larger diameter lines operating under 600 to 1200 psi (as would be the case with the 36 inch Bradwood pipeline in Oregon) would have a hazard area¹¹ radius of over 1,100 feet. When one examines the proposed pipeline route, the consequences of one or more line failures during a massive earthquake becomes evident. This is magnified by the fact that the pipeline route will cross 31 potential landslide areas. (p. 4-20)

D. Often the data presented are confusing or not at all reassuring.

IND22-13

USGS (2006a) has indicated that the project is in an area likely to experience peak horizontal bedrock accelerations of between 0.4 and 0.5 gravity (g). The engineering firm hired by NS to do the seismic hazard analysis came up with 0.37 g and recommended that Safe Shutdown Earthquake (SSE) design with a peak bedrock acceleration of 0.4 g. (DEIS 4-11)

- How do you reconcile the difference in gravity levels between USGS and the URS firm? Is designing for a level 9 earthquake really conservative given the 9.2 level in Alaska in 1964 and 9.5 level in Chile in 1960?

IND22-14

When discussing the geological risks associated with the pipeline, the following statement was made:

- Southern California has not experienced a major pipeline rupture during the past 61 years. (p. 4-22):

¹¹ The author defines this as the area within which both the extent of property damage and the chance of serious or fatal injury would be expected to be significant. (p.9)

Individuals

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IND22-13

The peak horizontal bedrock acceleration estimates from the USGS reference are based on regional maps while the URS values are based on a site-specific seismic hazard analysis. Given that consideration, the numbers agree reasonably well. The seismic analysis prepared for the Bradwood Landing LNG terminal was site-specific rather than being done for a facility located in Alaska or Chile.

IND22-14

The SoCal study was cited to illustrate the fact that pipelines are ductile in nature and not prone to failure during earthquakes. Southern California is a seismically active area with a large number of gas pipelines and so is an appropriate area for such a study.

IND22-14

I do not consider this statement at all reassuring. California has experienced strong Level 7 earthquakes during this period, but it has not experienced a massive level 9 earthquake. Since a Level 9 subduction earthquake is dozens of times stronger than a Level 7 earthquake, the above statement proves nothing.¹²

- A more reassuring statement would be that an LNG facility and/or high pressure 36" natural gas pipelines survived intact after a major subduction earthquake, such as Alaska's 1964 Level 9.2 earthquake or Peru's 1960 Level 9.5 earthquake. Lacking that reassurance, I think this area is being asked to bear an unacceptable level of risk.

IND22-15

The geological consultant, URS (2006a) estimated that,

- In the vicinity of the LNG terminal site, an earthquake with a magnitude of 7.0 or greater could cause the surface to rupture. As such, deep seated faults could potentially exist in the project area without showing visible signs of faulting or deformation at the ground surface." (p. 4-9)

Later it is stated that a reconnaissance of the site by URS revealed no evidence of ground rupture or faulting. They concluded, "The potential for ground rupture at the Bradwood Landing site is negligible." (p. 4-11) I find these statements confusing.

- Given the first statement above, what type of "reconnaissance" did URS do that allowed them to determine the potential for ground rupture was negligible?

IND22-16

I was most disturbed by the section on the pipeline and the descriptions of the multiple risks identified, including subsidence and liquefaction identified all along the Columbia River and the many streams and boughs it crosses, plus 31 potential landslide areas in Washington and 2 in Oregon. Many of these risks were dismissed with statements like, "They will monitor strain in the pipe and movement of the surrounding soil." *These strain gauges will not help if all the strain happens during 3-5 minutes of a major earthquake.*

Given the geological reality of this area, I found the following statements frightening:

¹² A scientist who has studied the earthquake history at Sasebo, stated that the 7.1 earthquake that hit San Francisco in October 1989 would "look like a friendly nudge," compared to the giant earthquakes experienced in the Northwest over the last several thousand years. It would pack 30 times the energy." (Daily Astorian, 3/20/90)

Individuals

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IND22-15

As described in section 4.1.3.3, URS (2006a) found no evidence of active surface faults within 1 mile of the proposed LNG terminal site based on 1) review of relevant literature; 2) examination of aerial photographs; 3) review of boring logs and cross sections; and 4) site reconnaissance. Site reconnaissance would involve in-field observation for indications of lateral or vertical ground displacement.

IND22-16

Landslides may occur in areas that have certain conditions leading to unstable slopes. Earthquakes can trigger landslides in those areas. We have identified areas of potential landslides and potential mitigation measures in section 4.1.4.3. Also see the response to comment LA7-25.

IND22-16

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"Given that the proposed pipeline route does not cross any active faults, earthquakes and associated seismic risk are not anticipated to have a significant impact on the proposed pipeline." (DEIS p. 4-22)

General mass movement policy 2 (i.e. Clatsop County's) is not applicable because the pipeline is not within a mass movement hazard area. (NS's Pipeline Narrative in Support of the Application, p.81, 02/07)

Given the fact there are more than 31 potential landslide areas along the pipeline route, plus long stretches subject to subsidence and liquefaction, common sense tells me you don't need active faults to have serious risks from a massive earthquake. I found nothing in the report about the compounding effect of subduction earthquakes in areas already prone to slides.

Conclusion: If the Bradwood operation is approved, this installation will have profound implications on the life and security of area residents. It appears to me that this facility is being funded and engineered by people who do not live in or have an in-depth knowledge of this area. It is shocking to me that neither the NS reports or the DEIS report reference the last 20 years of geological research along the West Coast!

Given the extensive records of major subduction earthquakes in this area over the past two thousand years, we now know they strike on an average of every 300-500 years. Those of us who live in this beautiful area know that a quake like the one that hit Indonesia 2 years ago could strike here at any time. Because we live with this natural risk (while taking many precautions to minimize the damages and risks) does not mean we want to live with a huge man-made risk that could devastate those portions of the County not devastated by an earthquake and the ensuing tsunami along the coast.

It does not reassure me that FERC will require a high level of oversight of all aspects of the terminal design and construction. Unless FERC acknowledges recent geological research, your entire report lacks credibility.

A good beginning in restoring credibility would be if you would answer the following question:

Individuals

IND22-17

- Is there any LNG facility anywhere in the world that is operating this close to a subduction zone¹³ and with a high pressure 36" pipeline that will have major sections located in estuaries and in soils and terrains subject to landslides, liquefaction and subsidence? If so, have these sites actually experienced a subduction type earthquake? If so, what were the results? If not, does that mean Bradwood will be the first LNG facility with this combination of risks?

Even if world-class engineers have staked their reputation on the integrity of the storage tanks and other critical terminal structures in the event of a level 9 earthquake, are they equally sure that all connections can withstand violent earth movement for 3-5 minutes? Remember the Challenger rocket had a disastrous explosion due to the failure of a simple O-ring

3. OPERATIONAL AND SECURITY ISSUES

IND22-18

Filtered Water Supply System: FERC has recommended that NS explain how they will ensure that all LNG carriers that deliver to Bradwood will have the appropriate connections to use the filtered water system. These modifications will cost \$250,000 to \$850,000 per ship. (NS's Responses to Staff Environmental Info. Requests, 09/07/06, p.18) It is unclear to me whether the ships that are modified will still be able to deliver LNG to other facilities. With a supplier's market that exists today, it is also difficult to imagine what type of incentive it would take to convince an owner to make these changes. However, *the filtered water system is absolutely essential to prevent entrainment and impingement of endangered fish¹⁴ in the 20 – 50 millions of gallons of water that will be drawn from the Columbia River for each carrier. If only a small percentage of carriers actually make the necessary modifications, it will change the whole environmental impact of the project.*

- Given the importance of this issue, I urge FERC to do more than just "recommend" that NS explain how it would allow only modified carriers to deliver LNG to the facility. (ES-3) FERC should not approve the Bradwood application until it receives a satisfactory explanation of how the filtered water system will be fully implemented, utilized and monitored¹⁵.

Extreme Weather: According to an Oregon Department of Forestry document, there have been 5 major floods in western Oregon over the past 150 years:

¹³ Several scientists contend that the two plates are actually locked under the Coast Range in Oregon. This would mean more violent shaking in this area as well as in the Portland area. (Appendix D)

¹⁴ The Columbia Estuary is used as a migration corridor by all juvenile anadromous salmonids as they move from fresh to salt water.

¹⁵ Monitoring is especially important, since this system has never been tested.

Individuals

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IND22-17

LNG facilities are operating in Indonesia, Japan, and Alaska. The Bradwood Landing LNG facility is designed for the tectonic setting in which it is located. Also see our response to comment SA1-4.

IND22-18

See our response to comment PM1-31.

- IND22-19 1861, 1890, 1948, 1964 and 1996. These usually happen in winter and may include heavy snow as occurred in 1964 and 1996. Attached are several clippings from The Daily Astorian (Attachment H) that describe the 1964 flood. Among the highlights were:
- Severe flooding along the Columbia River including Svenson and Brownsmead.
 - The Coast Guard's closing of the Columbia River for several days due to debris and navigational aides being knocked out; thirteen ships were held up along the Astoria waterfront.
 - Snow was reported at 32 inches atop the Clatskanie hill on Hwy. 30. Twelve inches fell at Bradley Park in 12 hours.
 - Two men drowned when the car in which they were riding plunged off Wooden Dike Road near Hwy. 30 into the Columbia River Slough.
- This weather history raises several concerns:
- Will the Bradwood facility be able to cope with a flood that includes large amounts of snow?
- IND22-20 • Will it be able to function safely for several days without road access for staff and supplies?
- IND22-21 • Will it have special equipment to promptly handle the hazards on Clifton Road that are associated with cold weather?
- IND22-22 • Have the engineers who are working on the pipeline fully taken into account the amount of weighting that must be done to prevent the pipeline floating up in flooded soils? Will weighted pipes be stronger or more brittle when subject to a violent earthquake?
- IND22-23 **Security in Remote Areas:** The proposed Bradwood facility would be located 38 miles upriver along a shipping channel that is often quite narrow and next to long stretches of uninhabited, remote land on one or both sides of the river. I know there will be a new camera system installed along the river, but I do not understand how this system will help with security along the shore. Most of these rural areas either have small police forces or none. Many stretches have no roads. If the County sheriff is expected to patrol these areas, a much expanded force will consume much of the increased taxes expected.

Individuals

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- IND22-19 The Bradwood Landing LNG terminal would be well above the flood plain (see section 4.1) and its operation would not be adversely affected by snow.
- IND22-20 See our response to comment PM1-1. NorthernStar is currently in the process of developing an ERP which contains contingencies for weather-related events.
- IND22-21 Clatsop County would maintain Clifton Road.
- IND22-22 As discussed in section 4.3.1.4, the pipe would be coated with a minimum of 4 inches of concrete in areas of shallow groundwater to mitigate buoyancy. During an earthquake, the pipe itself would remain ductile, although the concrete might suffer cracking. This would not compromise the integrity of the pipe.
- IND22-23 The Coast Guard has determined that the Columbia River would be safe for LNG marine traffic with the conditions described in the WSR (see section 4.11.5.5 and Appendix H). Security details classified as SSI are not available to the public.

IND22-23

cont'd

- How can any police force or any combination of security forces provide security along the entire 38-mile shoreline of the Columbia River traversed by the LNG carrier?¹⁸

IND22-24

I also have not found any mention of the security issues associated with the Astoria Bridge that connects Oregon and Washington. Each carrier must pass under this busy link between the states.

IND22-25

- Do LNG carriers pass under any bridges in the East. How do they prevent terrorist's attacks from them? Have they ever been closed to the public during a higher security alert level?

Another area of concern is the uninhabited Tenasillahe Island, part of the Lewis and Clark National Wildlife Refuge, located just 0.7 mile north of the terminal; it is currently open to the public by boat 24 hours a day.

- Will security measures be taken to restrict public access to this island?

IND22-26

I am also concerned about the Clifton Channel, adjacent to the terminal that is heavily used by fisherman and recreationists.

- What is to prevent some seemingly harmless fishing boat from suddenly veering off and attacking a carrier while it is unloading? This is how the S.S. Cole was attacked in the far east.
- At the other extreme, what will prevent an overreaction by security personnel if these are just reckless teenagers "fooling around," or an innocent fisherman not paying attention?

Conclusion: One gets the impression that from NS's perspective, money is the answer to all problems. In the three issues outlined above, I do not think it is.

IND22-27

- I think NS will have a very difficult task of getting ship owners to modify their vessels for \$350,000 to \$850,000 so they can use the filtered water system at Bradwood, even with the best of incentives.

IND22-28

- Have they even begun to think of how to maintain a safe and secure operation in the face of the extreme weather I described?

IND22-29

- No amount of "sharing of increased security costs" or an increase in tax revenue will be enough to provide security along the remote and rugged 38 mile shoreline of the Columbia River.

¹⁸ In 2004, a Homeland Security official, Pamela Turner, wrote the following to U.S. Rep. Markey of Massachusetts: "There is no economically feasible engineering or design solution that could mitigate the consequences of a large scale LNG release on the vessel's hull."

Individuals

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IND22-24 See our response to comment PM6-97.

IND22-25 Public access to Tenasillahe Island would not be restricted. The 200-yard safety and security zone around the LNG vessels while docked at the LNG terminal would not affect the river adjacent to Tenasillahe Island.

IND22-26 See our response to comment IND22-23.

IND22-27 See our response to comment PM1-31.

IND22-28 See our response to comment IND22-20.

IND22-29 See our response to comment IND22-23.

Recommendation: I am not trying to be an alarmist, but a realist. We all know that any facility as technically complex as an LNG facility will have many things go wrong during its 50 year life span. This facility, however, will have a whole additional layer of risks. Because of the unique characteristics of this area, I feel compelled to raise realistic scenarios and questions that people who do not know this area might never think of. To simply respond by saying, "the risk is very low," is not very comforting when you actually live here, *especially when you add up the variety, unusual nature and seriousness of these risks.*

Given the proposed location of the Bradwood facility in an area that is

- flood-prone,
- slide prone,
- environmentally sensitive,
- high risk for major category 9 earthquakes, and
- virtually impossible to defend from a terrorist attack,

there must be a better alternative!¹⁷ The people of the lower Columbia River are being asked to bear an unreasonable amount of risk and environmental degradation.

I appreciate the opportunity to comment on the proposed Bradwood facility and look forward to your response.

Sincerely,



Carolyn Eady
79380 Hwy. 202
Seaside, OR 97138
(503) 755-2617

CC: Clatsop County Board of Commissioners
County Manager, Scott Derickson
U.S. Representative David Wu
Oregon Senator Betsy Johnson
Oregon Governor Theodore Kulongoski

¹⁷ Have you really considered 1) the fact that Canada is stepping up its production capacity, including LNG terminals so as to retain its position as a major U.S. provider of natural gas; 2) California will soon be served by a new pipeline from Mexico, and 3) there have to be new initiatives to reduce fossil fuel consumption if we are to have any chance of reducing global warming?

Individuals

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K-821

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U.S. Senator Ronald Wyden
Oregon Department of Energy, Michael Grainey, Director
Oregon Department of Environmental Quality David Collier, Mgr. Air Qual.
Oregon Department of Geology and Mineral Industries, Vicki McConnell,
Dir. & State Geologist

Individuals

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K-822

CP06-365-000

ORIGINAL



Comment Form: FERC Bradwood Landing LNG DEIS

Please use this form to provide written comments on the FERC Bradwood Landing LNG Project Draft Environmental Impact Statement. Cowlitz County is collecting comments on the FERC Bradwood Landing LNG DEIS to add to its own review of the DEIS. As the Lead Agency for SEPA, Cowlitz County is carefully reviewing the DEIS to ensure it meets the needs of SEPA and represents the best environmental decision. To be most effective, comments should refer to specific sections, text or exhibits within the DEIS.

Name: DARWIN SMITH	Date: 10-25-07
Address: 125 Coalmine Rd Kelso, WA 98626	
1. What do you see as the major impacts of the Bradwood Landing LNG project and pipeline? HAZARD: TO FISH INDUSTRY & COMMUNITIES ALONG SHIP ROUTE SHIPPING DELAYS OF GOODS FROM ID, OR, WA, FAR INLAND. PIPELINE IN UNSTABLE FLOOD PLAIN ON W. SIDE - BORING UNDER COL. R. AND POSSIBLE BROOK OUT. TAKING OF PRIVATE PROPERTY THAT CAN BE USED AS THEY WISH. OWNER TO BE DICTATED TO AS TO THE USE OF THEIR OWN PROPERTY. STILL PAYING PROPERTY TAX. LARGE HIGH PRESSURE LNG GOING TO A SMALLER LINE THAT HAS FAILED AT LOW PRESSURE.	
2. Does the DEIS provide an accurate description of impacts? If not, what specifically should be changed or improved? ALL THIS WILL REQUIRE A NEW AND LARGER LINE TO BE INSTALLED ALONG THE PRESENT PIPELINE. (AN ISSUE THAT HASN'T BEEN BROUGHT UP BY THEM). ALL THIS FOR GAS HEADED FOR CALIFORNIA, A STATE THAT WOULDN'T ALLOW A TERMINAL ON THEIR COAST.	

~ OVER ~

Individuals

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- IND23-1 The Coast Guard has determined that the Columbia River would be suitable for LNG marine traffic with the conditions described in the WSR (see section 4.11.5.5 and Appendix H). Hazards along the waterway for LNG marine traffic and mitigation are discussed in section 4.11.5.
- IND23-2 As discussed in section 4.8.1.7, no significant delays to shipping would occur as a result of the LNG marine traffic.
- IND23-3 As described in section 4.1.4.3, the pipeline would not be affected by flooding that occurs in floodplains because it would be buried at least 4 feet deep and concrete coating would be used to mitigate buoyancy. HDD methods would be used for crossing the Columbia River to avoid impacts on the river. While the potential exists for a frac-out to occur, a contingency plan would be in place to handle such an occurrence and the impacts would be temporary.
- IND23-4 NorthernStar would compensate the landowner for use of the land needed for the pipeline right-of-way, including damage to property during construction, loss of use during construction, and loss of renewable and nonrenewable or other resources (see section 4.8.3.3). See our response to comment PM2-4.
- IND23-5 The Bradwood Landing pipeline would transport natural gas, not LNG. The pipeline would be 36 inches in diameter up to the PGE Beaver Power Plant interconnect, at which point it would decrease to 30 inches because of the reduced volume of gas being carried after the Wauna Mill, Northwest Natural, and Beaver Power Plant interconnects. The 30-inch-diameter pipeline would interconnect with the 30-inch-diameter, high pressure Williams Northwest pipeline.
- IND23-6 The Bradwood Landing pipeline would be slightly more than 36 miles long from the terminal to an interconnection with the existing Williams Northwest system. This sendout pipeline is analyzed in the EIS.
- IND23-7 NorthernStar contends that the vast majority of the natural gas sent out from its terminal would be transported to markets in the Pacific Northwest, not California. See our response to comment PM1-23.

K-823



Comment Form: FERC Bradwood Landing LNG DEIS

3. What kind of mitigation do you think should be provided for the impacts of the project?

Stop The project!

4. Please provide any other comments here:

IND23-8

this gas is not for WA, or OR. it is headed for California - the most support for job is just a short period of time the hazards are forever.

IND23-9

few job will be for the overage person as they will bring in personal of their choice to run the terminal

~~ Thank You ~~

Individuals

23

IND23-8

See our response to comment IND23-7.

IND23-9

As indicated in section 4.8.2.4, NorthernStar plans to hire and train local residents for operation of the LNG terminal, which would require 65 permanent employees. An additional 40 personnel would be hired by local tugboat companies to support tug operations for the LNG vessels.

K-824

Individuals

24



Comment Form: FERC Bradwood Landing LNG DEIS

Please use this form to provide written comments on the FERC Bradwood Landing LNG Project Draft Environmental Impact Statement. Cowlitz County is collecting comments on the FERC Bradwood Landing LNG DEIS to add to its own review of the DEIS. As the Lead Agency for SEPA, Cowlitz County is carefully reviewing the DEIS to ensure it meets the needs of SEPA and represents the best environmental decision. To be most effective, comments should refer to specific sections, text or exhibits within the DEIS.

Name: LEO K KESLER JR	Date: 10-28-07
Address: 6607 HAZEL DELL RD CASTLE ROCK WA 98611	
IND24-1	1. What do you see as the major impacts of the Bradwood Landing LNG project and pipeline? DREDGING THAT MUCH OF OUR RIVER CAN NOT BE GOOD FROM THE FISH HABITAT. THE SAFETY OF OUR PEOPLE WOULD BE PUT AT HIGH RISK. STEELING THE LAND OF PRIVATE OWNERS FOR A PROJECT THAT IS BEING BUILT ON ANCHANT LAND SLODES, UNSTABLE LANDS, TERRORIST ATTACKS IMPORTING LNG FROM OTHER COUNTRIES IS GOING TO MAKE THEM RICH + US EXPLODE.
IND24-2	2. Does the DEIS provide an accurate description of impacts? If not, what specifically should be changed or improved? IF YOU GO UP ALLEN BRAS ROAD 1/4 MILE LOOK TO THE RIGHT THE KB LINE HAS BEEN BUILT ON UNSTABLE GROUND GARY ALLAN HAS HAD TO HAVE HIS HOUSE MOVED THE PIPE HAD TO BE INSTALLED ON TOP OF THE GROUND IF YOU LOOK AT IT NOW IT HAS SHIFTED & LOOKS LIKE A SNAKE IT IS GOING TO BREAK YOU MUST SEE IT. THE WILLIAMS LINE HAS FAILED ALREADY I WITNESSED IT. THESE LINES ARE ALREADY UNSAFE IF YOU PLUMB IN A BIGGER HIGH PRESSURE LINE YOU ARE JUST ASKING FOR TROUBLE. THIS COMMUNITY DOES NOT NEED OR WANT THIS PROBLEM. THIS IS NOT A SMALL PROJECT THIS IS A HUGE DREDGE 700,000 CUBIC YARDS THIS WOULD FILL 70,000 10 CUBIC YARD DUMP TRUCKS WHICH IF LINED UP WOULD STRETCH FROM LONGVIEW TO THE CALIFORNIA/OREGON BORDER
IND24-3	

~ OVER ~

- IND24-1 Impacts on fish habitat and mitigation associated with dredging of the maneuvering basin are discussed in sections 4.5 and 4.6. Risks to human safety posed by the project would be mitigated as described in section 4.11.
- IND24-2 Although the Bradwood Landing pipeline would be collocated with the KB pipeline where possible to minimize environmental impacts, NorthernStar would not install the Bradwood Landing pipeline in areas of unstable ground without adequate mitigation. Also see our response to comment LA7-25.
- IND24-3 We believe that the Bradwood Landing LNG terminal can take in all of the material dredged from the turning basin. That material would be conveyed by hydraulic dredge slurry pipeline, and not carried in trucks.


K-825

Individuals

24

K-826

ORIGINAL



Comment Form:
FERC Bradwood Landing LNG DEIS

3. What kind of mitigation do you think should be provided for the impacts of the project?

IND24-4 THIS PROJECT IS A HUGE MISTAKE. THIS PROJECT NEEDS TO BE STOPPED BEFORE A LOT OF PEOPLE GET HURT IN MANY WAYS THE LOSS OF THEIR LAND SAFETY, FISH HABITAT, THE WHAT IF QUESTION STAND OUT WHAT IF SOMETHING GOES WRONG THE ODDS MAY BE GREATER THAN WE THINK TERRORISTS ARE NOT GOING TO JUST STOP THIS WOULD BE A VERY EASY TARGET FOR A PERSON WANTING TO HARM THE USA. PLEASE HELP ME STOP THIS PROJECT!

4. Please provide any other comments here:

IND24-5 NORTHSTAR IS CURRENTLY RUNNING A RADIO AD THAT SAYS BRADWOOD LANDING IS GOOD FOR THE COMMUNITY & GOOD FOR THE COLUMBIA RIVER THIS IS A LIE THEY HAVE TOLD MANY. THE PEOPLE WHO WANT THIS PROJECT ARE THE PEOPLE WHO STAND TO MAKE MONEY THE UNION'S, NORTHSTAR ETC. THE PEOPLE WHO DON'T WANT IT ARE THE PEOPLE WHO STAND TO LOSE THEIR SAFETY, LAND, FISHING, BOATING, PEACE OF MIND. I OWN MULTIPLE BUSINESSES IN CLALLAM CO. I OWN 45 ACRES NORTHSTAR WANT TO PUT THEIR PIPE RIGHT THROUGH MY NEW BUILDING SITE & WITHIN 400 FEET OF MY CURRENT HOME I DON'T WANT TO RAISE MY CHILDREN & GRANDCHILDREN IN THE ENVIRONMENT THEY ARE PROPOSING. PLEASE STOP NORTHSTAR!

-- Thank You --

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 OFFICE OF THE
 SECRETARY
 FEDERAL ENERGY
 REGULATORY COMMISSION
 MAY -5 P 3:14

IND24-4 See our response to comment IND24-1.

IND24-5 As described in sections 4.7.1.4 and 4.8.1.7, the project would not have a significant impact on commercial and recreational fishing and boating. No one would lose their land. See response to CO8-6 and IND23-4. Safety is addressed in section 4.11. NorthernStar was unable to find plans for your new building site filed with county public records.

ORIGINAL

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OFFICE OF THE
SECRETARY

Jim Santee
42162 Bagley Lane
Astoria, OR 97103
503.458.6429

2007 NOV -7 P 3:06

October 31, 2007

Federal Energy Regulatory Commission
Attn: Kimberly D. Bose, Secretary
888 First Street NE, Room 1A
Washington, DC 20426
Reference Docket #CP06-365-000

Dear Sirs:

I would like to offer my comments on the Bradwood Landing LNG project (Clatsop County Oregon). I have organized this submission under topics, beginning with a "Comment Summary".

Comment Summary

I have reviewed the Bradwood EIS submission and found nothing of major concern that could not be corrected or mitigated through value oriented engineering and well thought out site management policies. The Bradwood LNG project could bring significant economic value to Clatsop County and neighboring communities. In the long run Bradwood could stabilize our regional supply of natural gas. I share the concern of many opponents of the Bradwood project about the over reliance on carbon based fuels. However the carbon based fuel controversy is well outside of the Bradwood scope of work and should be addressed in another venue unrelated to the Bradwood project. If the Bradwood LNG project meets all established standards, I would like to see this project continue on a forward basis.

Public Process

It is my sincere hope that the Bradwood LNG public process be open, forthright, well thought out, and all in encompassing AND free of Nazi salutes, fabricated data, threats, 1960's Berkeley California protest street theatre, and selfish motivations. I have been greatly disturbed at the antics of the anti-LNG protesters. What truly good input that could have been provided by the anti-LNG faction was drowned out by the silly circus like atmosphere that they and their supporters instigated. A very disturbing observation is that some of the media outlets have taken Bradwood Landing and regulatory comments out of context to fuel scare headlines in the local and statewide media. Where the media could have helped balance out the public discussion, it turned into a propaganda organ of the anti-LNG faction and tainted the process.

I have asked some of the anti-LNG protesters the following question: "If you were addressing the graduating class of our local high schools, what career advice would you give the graduating seniors if they wanted to remain in our community, and be able to buy a home, attend college, obtain well paying employment with transferable skills, and have the good life just like you do? Then I quickly follow on with: What if these kids did not want to clean toilets, flip burgers, wait tables, be a probation officer or drug abuse counselor, or work the green chain at the local mill?" The response has been a classic case of anger management. In fact the anti-LNG group has no desire for any jobs, economic opportunity, or even a hint of opportunity. They already have their nest egg, many are retired, many have made their fortune elsewhere, and most of all, don't have

Individuals

25

IND25-1

IND25-1

Comment noted.

K-827

Individuals

25

IND25-1

cont'd

kids who would like to remain near their own families. Even though Clatsop County has experienced job growth in recent years, nearly all the job gains have been in the service sector. What our region needs is economic opportunity with upward mobility and transferable skills. The Bradwood LNG project could set this in motion. The associated LNG marine terminal and tugboat support personnel could have a far greater positive job impact than the actual LNG storage facility. The Bradwood project is a win-win for average person.

Marine Navigation and Shipping Impact

There has been quite a bit of controversy over the impact of shipping LNG on the Columbia River. The navigation and security regulations that are part of the Coast Guard rules are clear and concise as to how the vessel is to be operated on the Columbia River. Even though the cargo (LNG) has a bearing on security requirements, the size of the vessel determines the actual navigation and operation of the vessel. In the future as general cargo vessels become even larger, even stricter navigation rules and safety zones will apply to all vessels on the Columbia River. When the Navy Rose Festival Fleet parades up the Columbia River to Portland, wide safety zones are in effect similar to the proposed LNG tanker zones. Large ocean going passenger cruise ships that stop in Astoria or cruise up the river to Portland all have safety and security zones around these vessels as well. I don't see a problem with safety zones – they are in place for safety!

To fully understand safety zones on another level, I would like to cite these examples: The FAA has strict regulations relating to ground taxiing, flight path separation, and navigation of all aircraft. It is demanded that small private aircraft stay away from larger commercial aircraft that cannot safely change course or altitude. The aviation routing system keeps small private planes several miles away from jumbo jets for well defined safety reasons. Continuing on this thread: When you drive a car common sense dictates that you stay away from heavily burdened semi-trucks and you give way when they turn or change lanes. It would be absolutely absurd and stupid for a VW to challenge a loaded cement truck just like as it would be equally risky trying to land a small plane directly across the approach pattern of a 747, or a fisherman in a dingy "standing his ground" in mid channel with a tanker bearing down and unable to maneuver from the center of the navigation channel. Common sense and brains need to come into play when driving, flying or boating. In recent years it has become easier to protest and blame others than it is to use common sense.

Oregon has a private boat operator licensing and education program that requires boat operators to attend boating education classes and passing a final examination. In essence, if you operate a private watercraft in Oregon you need the boating safety card which indicates you know the USCG navigation rules and how to avoid collisions and accidents. The classroom instruction goes into quite a bit of detail about the marine Rules of the Road, safe boat handling, emergency situations, Notice to Mariners, and communicating with other vessels. If a person has no idea of how to safely and legally operate watercraft, maybe they don't belong on the water in the first place.

The Columbia River has been a traditional transportation corridor for every type of vessel and cargo combination for nearly 200 years. Why deny LNG carriers the right to use the Columbia River when there are barges of chlorine, ammonia, gasoline, and propane regularly transit the

Individuals

25

IND25-1
cont'd

same route? Directly adjacent to the river on the shoreline are rail lines that carry the same or similar cargoes through dozens of small towns and rural communities. U.S. Highway 30 parallels the Columbia River and there is significant traffic of hazardous chemicals and petroleum products. During WWII, the first atom bomb that was dropped on Japan was shipped out of a Navy munitions depot a short distance from Bradwood.

Land Use

Oregon has very stringent land use zoning laws to prevent urban sprawl and contain development. One factor in determining current land use zoning is prior use. If the land was used in past for industrial or commercial use, then in all likelihood this use can carry forward – even if the land has not been used in recent years. The Bradwood LNG terminal falls in this category. The land was used a lumber mill and marine terminal in past years. Near by is the Wauna Paper mill which is currently a heavy industrial pulp and paper processing facility with a cogeneration power plant and marine terminal. The history and nearby industrial use clearly indicate the appropriate use of the Bradwood site would extend to LNG.

A related land use issue is adding more property that is zoned for industrial use to the core Bradwood terminal site. Oregon land use regulations allow up or down zoning of adjacent or contiguous property. It is a rather simple procedure that Clatsop County and other local entities have done numerous times in recent years.

Transmission Line Right of Way

Rightfully there is concern about the proposed high pressure gas pipeline and the eminent domain powers of utilities. Oregon is crisscrossed with Bonneville Power Administration high voltage electrical transmission towers – some reaching nearly 100 feet in the air – going on for miles and miles – well beyond the horizon – with most of the right of claimed via eminent domain. The proposed underground gas pipeline from Bradwood will be out of sight and deeply buried. In Oregon it does not take long for trees and berry bushes to quickly cover any open space. The pipeline right of way could create an opportunity for local communities, conservation groups and willing property owners to add more open space and natural habitat adjacent to the right of way for local nature preserves.

Safety and Fire Fighting

Good emergency services are a critical part of any major industrial development project. Clatsop Community College has a fire fighting training program and shipboard firefighting simulator which could be used to train emergency workers. Clatsop Community College also offers a full curriculum of maritime training and related USCG license preparation classes. Training and safety should be no problem at Bradwood.

It is my sincere hope that the Bradwood Landing LNG terminal be approved.

Sincerely,

Jim Sargent

ORIGINAL

November 5, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE, Room 1A
Washington, DC 20426

FILED
OFFICE OF THE
SECRETARY
2007 NOV 13 P 4: 26
FEDERAL ENERGY
REGULATORY COMMISSION

Re: Docket No. CP06-365-000 et al.

My name is Charlene Damitio. My husband, Rick, and I live on Puget Island. Our home is four-tenths of a mile across the Columbia River from Bradwood Landing. If you visit our home at 101 Ostervold Rd., have a seat on our deck and look across the river, you will realize why I am writing this letter. The picture will, indeed, be worth a thousand words.

IND26-1 | This half-mile proximity that I speak of between my and many of my neighbors' homes and the proposed facility is a shore-to-shore measurement. According to Northern Star's plans, their dock is going to be built 300 feet from shore. The dock itself will be 105 feet. Add the width of the beam of an average LNG tanker of 143 feet and that puts some of us another 548 feet closer to the liquid natural gas—at one of the riskiest times in the whole process of getting it from across the world to here; i.e., when the liquid gas is being transferred from the tanker to the storage tanks.

IND26-2 | Those of us living on the stretch of island directly across the river from Bradwood Landing will be most effected. We will suffer the lights, the noise from the combustion vaporizers, the pollution, and the inevitable erosion to our beaches from the powerful tugboats pushing the tankers into dock. We stand to not only lose our peace and tranquility, but our houses—literally—from the erosion.

IND26-3 | But I am not writing for just us folks on the front lines. I feel all of Puget Island is too close for comfort. Not to worry Northern Star tells us—LNG cannot explode. What they don't tell us is that a fire from an accidental leak would burn so hot and so fast that it would look like an explosion. We are finding it difficult to take comfort from the difference between a real explosion and a fire burning hot enough and fast enough to just look like an explosion. Which brings us to a question we have: Is there not a guideline of some kind as to just how close to a residential neighborhood an LNG facility can be built? There are a thousand or more people living on Puget Island, and that means families, children, churches, farms—all at risk in the event of an accident.

We realize that FERC has countless issues to consider in deciding whether or not to issue a permit to Northern Star—some very major issues regarding the environment, the estuary, and future energy needs. Our hope is

Individuals

26

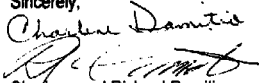
IND26-1 | Section 4.11.5.3 discusses the hazards associated with a spill from an LNG carrier, the zones of concern and their impacts, and what communities fall within each zone of concern.

IND26-2 | Visual impacts due to lighting at the terminal are discussed in section 4.7.2.7 and noise impacts are discussed in section 4.10.2.2. Air quality impacts from LNG vessels and the LNG terminal are discussed in section 4.10.1. See also our response to comment PM3-18.

IND26-3 | As discussed in section 4.11.4, LNG terminals must comply with the siting requirements of 49 CFR 193. Figures 4.11.4-1 and 4.11.4-2 show the thermal radiation zones and vapor dispersion zones calculated for the terminal.

that the concerns of the residents of Puget Island will be taken as seriously as the rest, and that in the end Northern Star's Bradwood Landing permit will be denied.

Sincerely,



Charlene and Richard Damitio
101 Ostervold Rd.
Cathlamet, WA 98612
(360) 491-2587
charickd@aol.com

Individuals

26

ORIGINAL

FRANSEY KEEL

199 Ostervoid Road
Cathlamet, WA 98612
360 849-4254
franseyke@yahoo.com

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: Docket No. CP06-365-000 et. al.

Dear Ms. Bose,

IND27-1 In reference to the Technical Memorandum from Coast & Harbor Engineering regarding the "Mixing Zone Analysis for Bradwood Landing Point Source Discharge" for NorthernStar Natural Gas, I like to bring to your attention a minor error in Par. 2.4, page 3. Flow rate of 4,200 gallons/hr. Maximum flow rate of firewater system is 4,400 gallons/min. (GPM) as stated in several draft reports and the FERC DEIS.

IND27-2 My other comment regarding this memorandum is Par. 2.2 pages 2, 3, Hydrodynamic Conditions. The analysis of the mixing zone was intended for a worse case scenario ambient hydrodynamic conditions. The research recognize a reversal of flow during flood tide (up stream), which is very significant for a period of time. The memorandum however used a 0.0 ft/sec flow as the worse-case condition.

I disagree with the memorandum as the upstream flow condition will create double exposure to the ambient flow by the discharged effluent.

IND27-3 A major concern is the amount of CHROMIUM VI (Hexa-Chrom) created during the Submerged Combustion Vaporized (SCV) process of 190.55 lbs/yr. What's especially worrisome is the cumulative effect after several years of operation and following river maintenance dredging and shore-side disposal, this Chromium VI¹ and other pollutants will become airborne and a outright poison to the local population.

¹ LENNTECH Chromium (Cr) and Water.

Individuals

27

IND27-1 We address this study in the EIS.

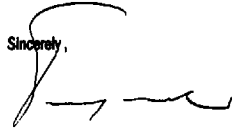
IND27-2 The worst case would be when there is no ambient current to assist with the mixing process. In theory it seems possible that since the river reverses flow that the worst-case scenario would be one in which part of the river is exposed to a double dose of the effluent, resulting in a stronger plume of discharge. However, in reality for several reasons, the worst-case scenario is the period during which the river's current is nearly zero (when the river is in the process of changing directions). For the effluent to double back onto itself it would first have to travel down/up river (depending on the river's initial direction of flow) and then undergo a change in direction and travel back to the exact location of the point of discharge. Given that the discharge point is located around many wharf pilings there is no straight line path that would go undisturbed by swirling eddies. At the same time the effected zone is a relatively small area (especially when considering the vertical direction), meaning that even if some of the effluent were to somehow flow back to the point of discharge it would likely be at a different depth as the original discharge. Instead, the worst-case scenario is one in which the river was assumed to be completely stagnant for an extended period of time, which is never the case. In actuality, eddies and currents in the river are constantly creating small zones of mixing and turbulence, meaning that as a whole the river may not be moving, but within it are pockets of water that are constantly circulating. Essentially, any type of movement within the water column, whether it be from eddies, or simply flow caused by differing densities (due to temperature differences), aids in the mixing of the effluent. Basically, any type of mixing results in diluting the effluent at a much faster rate.

IND27-3 Total chromium data from an existing LNG facility was used for the mixing zone analysis but was conservatively assumed to be chromium VI. Chromium VI was not specifically detected in the discharge at the existing LNG facility and may not be present in the SCV discharge at the Bradwood Landing site. Any chromium in the SCV discharge water would be dissolved and would not settle out into the sediment. The concentrations would be very low even prior to mixing with the river water and would meet ODEQ water quality standards within a mixing zone of 2 feet. There would be no effect on sediments from the dissolved chromium.

K-832

I will make the USACE aware of this condition as not to jeopardize any future dredge disposal sites,
due in part our beach is a "Beach nourishment site".

Sincerely,



Frans Eykel

Cc: USACE, Ms. Karla G. Ellis, CENWP-00-GP Portland, Oregon

Individuals

27

Individuals

28

ORIGINAL

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2011 NOV 13 P 4: 26

FEDERAL ENERGY
REGULATORY COMMISSION

Magalie R Salas, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington DC 20426

RE: Docket #: CP06-365

Dear Magalie Salas,

I support Bradwood Landing, the proposed LNG terminal on the Columbia River. I support Bradwood for environmental reasons and I have listed them below:

- Methane, otherwise known as Natural Gas produces a much lower amount of CO2 than coal or coal gasification. We are going to need reliable energy supplies and Natural Gas produces less CO2.
- Many of the world's gas reserves historic "stranded" reserves. These reserves were discovered during oil explorations and capped. So much of the drilling and discovery has been completed. That alone lessens the environmental impact.
- Until recently oil wells burned their excess natural Gas, flared it off. They looked at methane as a useless byproduct in the exploration and development of oil wells. Now, that methane is being captured and sent to market. This again is a very positive environmental gain. The conservation of energy!
- Bradwood will have minimal impact along its pipeline route with directional drilling of the pipeline under rivers and sensitive wetlands. Only 36 miles of pipeline to get Bradwood Landings Natural Gas to the Northwest energy markets.
- Northern Star, Bradwood Landings developer has committed to restoring the Hunt Creek Estuary and Hunt Creek. A small project but we all know how positive Salmon enhancement on multiple projects adds up to Salmon restorations.

Northern Star is a responsible company developing a responsible project. Please join me in supporting Bradwood Landing.

Thank you

COLLIN BOOTH
2175 38TH
LONGVIEW, WA 98632

IND28-1 Comment noted.

IND28-1

K-834

ORIGINAL

Audrey Munk

From: "Audrey Munk" <amunk@pacifier.com>
 To: "Munk, Audrey" <amunk@pacifier.com>
 Sent: Wednesday, October 31, 2007 3:59 PM
 Subject: Notes for FERC

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 SECRETARY

2007 NOV -8 P 2: 24

Docket No. CP06-365-000 et al

TO: FERC

FEDERAL ENERGY
 REGULATORY COMMISSION

You have not heard from me before. What you are proposing is such an outrageous and horrible thing you want to do to my life that I could never quite fathom that it could really happen to me and my neighbors! So I have not spoken before, thinking the problem would go away. Not so!


IND29-1 I own 40 acres of hilly land in Cowlitz County in Washington, where you propose to permit a pipeline for LNG. The last plan I heard was to put this line right through the middle of my acreage, thereby destroying its value forever, along with my water supply, yard, garden, a 150-plant blueberry patch, tree farm, and my house. The property has been in the family since 1929, housing three generations and still counting. Our wonderful spring has served us faithfully for 75 plus years.

How could you or anyone believe that I would favor giving this up for any reason, let alone that a few strangers out there are looking for jobs??
 It is unthinkable!

Another of our group of opponents, Marjie Castle, has a similar situation, and her impassioned plea that your permits involve her life, her dreams, and her future, brought tears to my eyes, and that is my plea also! No way will I ever willingly give it up! So just back off!!

Audrey Munk
 252 King Road
 Kelso, WA 98626-1917
 Re: Bradwood Landing

amunk@pacifier.com



10/31/2007

Individuals

29

IND29-1 A pipeline easement would not destroy property values, as discussed in section 4.8.3.3. Impacts on forest and other vegetation are discussed in section 4.4.2.3. NorthernStar's plan to mitigate impacts on residences within 50 feet of its pipeline construction right-of-way is discussed in section 4.7.3.3. See our responses to comments PM2-4 and PM6-85.

K-835

November 8, 2007

FERC EIS Hearing Members

Dear Members,

I oppose the proposed LNG project at Bradwood Landing.

IND30-1 This project is a direct threat to the restoration of salmon along the entire Columbia River basin into British Columbia, Canada. The gouging out of 47 acres of sediment in Clifton Channel will destroy habitat and organisms in the salmon food chain, as well as salmonides and smolts. Entrainment and impingement will destroy these and even larger fish. Fresh water organisms taken in as ballast and released later in the ocean will die in salt water. Maintaining the turning basin will result in continued silt disturbance, increased velocity of channel flow, more shoreline erosion and more destruction of wetlands than has been admitted previously by the applicant.

IND30-2 Applicant has not submitted any design to address entrainment or impingement, nor has the problem of wave stranding by these megalith tankers been considered.

IND30-3 This project is in direct violation of Goal 16 of the State of Oregon.

Sincerely,

Jean M. Dominey

Jean M. Dominey
3647 Duane
Astoria, OR 97103

Attachment: Letter to Clatsop County Commissioners, 10/22/2007, by Jean M. Dominey

***Entrainment involves the drawing in of marine life through an intake tunnel, pipe, or canal at a velocity the marine animals cannot resist. Once drawn in they are subject to impingement, becoming trapped against 'prevention devices' such as screens, racks, bars, and barrier nets. Larger animals may then drown or suffocate after becoming impinged". www.nirs.org/reactorwatch/licensedtokill/executivesummary.htm

Individuals

30

- IND30-1 Potential impacts on aquatic resources due to construction and maintenance dredging of the maneuvering area and berth (including habitat alteration, the removal of benthic organisms, entrainment and impingement, turbidity, and wake stranding) are discussed in section 4.5.2.1.
- Section 4.5.1.1 has been revised to include additional information on shoreline erosion. Further analysis will be included in the revised BA and EFH Assessment.
- Wetland impacts due to construction of the proposed project are discussed in section 4.4.1.
- IND30-2 Minimization of entrainment and impingement of fish is discussed in the response to comment FA1-28.
- Wake stranding is discussed in the response to comment FA2-19.
- IND30-3 While various sections of the EIS address estuaries and associated wetlands, the intent of the EIS is to evaluate impacts, and weigh them collectively, relative to the purpose and need for the project. Where practicable, mitigation measures are included as conditions to the EIS findings. Further, NorthernStar would comply with other federal, state and local environmental requirements as stipulated in table 1.3-1.

To: Federal Energy Regulatory Commission

From: Carolyn Eady
793380 Hwy. 202
Seaside, OR 97138
(503) 755-2617

Date: 11/8/2007

Re: Bradwood Landing: Draft EIS CP06-365 & 366

Following are my comments regarding the DEIS for the proposed Bradwood Landing LNG facility:

I. Omissions

IND31-1

- Sensitive Resources along the Waterway: Figure 4.7.1-1 p. 4-276.
 1. Station Camp and Dismal Nitch, part of the Lewis and Clark National Historical Park located 1-2 miles on either side of the Astoria Bridge on the Washington side.
 2. The Astoria Bridge connecting Oregon and Washington.
 3. Clatsop County's parks on or near the Columbia River including the John Day Boat Ramp, the Westport Boat Ramp and the Big Creek Park near Knappa.
 4. The Oregon Department of Forestry (ODF) campground and trail at Gnat Creek.
 5. The City of Warrenton Trails, part of which runs along the Columbia River.
 6. The City of Astoria River walk along the Columbia River

IND31-2

- The frequency of major floods in Northwest Oregon (five over the past 150 years), which usually closes the Columbia River to traffic with many freighters lined up along the Astoria waterfront. [It should also be noted that, according to ODF¹, the flood of 1996 caused "thousands of shallow, rapidly moving landslides."]

IND31-3

- The frequency in which the Coast Guard closes the bar at the mouth of the Columbia River to all traffic due to severe weather. [It was closed last

¹ ODF Issue Paper: Landslides and Public Safety, Big Picture Considerations, October 2, 2006.

Individuals

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IND31-1

We discuss the LCNHP in sections 4.7 and 4.9. Station Camp and Dismal Nitch are outside of the Zones of Concern and would not be affected by the project. The EIS text has been revised to discuss the Astoria Bridge. Warrenton's river front trail. The City of Astoria River Walk, Clatsop County parks, and docks at John Day Park and Knappa are discussed in section 4.7. The docks at Westport would not be affected by the project. The ODF campground and trail at Gnat Creek is outside of the Zones of Concern and would not be affected by the project.

IND31-2

See our response to comment PM6-15. The Bradwood Landing terminal would be raised to be above the potential flood level.

IND31-3

LNG vessels would not cross the Columbia River bar during severe weather and would remain in the Pacific Ocean where protection would not be needed. An LNG vessel that has discharged its load would not require protection if it is delayed from departing the LNG terminal due to bar closure.

	November 8, 20072
IND31-3 cont'd	month due to 25-30 foot waves.] <i>Who protects LNG carriers when there is a major tie up like this?</i>
IND31-4	<ul style="list-style-type: none"> The fact reported in the URS report that a shielded arc welded pipeline failed in the 1964 9.2 Level Alaska subduction earthquake.² This is significant omission because the DEIS reassures the reader that "California has not experienced a major pipeline rupture during the past 61 years." (p.4-22) California has not experienced a 9 Level earthquake during this period, whereas Alaska has. A Level 9 earthquake is 30 times stronger than a Level 7. <p>2. <u>Errors</u></p>
IND31-5	<ul style="list-style-type: none"> "An earthquake associated with the portion of the Cascadian Subduction Zone in northwestern Oregon and southwestern Washington has not occurred in historic time." (p. 4-11) "Given these PGA's, and the lack of historical seismicity in the Pacific Northwest with regard to Cascadian Subduction Zone events to assist in bracketing earthquake recurrence, etc." (p. 4-11) <p><i>I consider these the most glaring and serious errors in the DEIS. To the uninformed, they downplay the serious seismic risk in this area. Based on geological research over the past 20 years, we can pinpoint the date of major subduction earthquakes over many thousand years, including a 9 Level on January 26, 1700.³ They reoccur every 300 to 500 years but can reoccur in 100 years. Thus, we are 307 years into this time period; we know a major earthquake could occur at any time! A local geologist estimated our risk of a major subduction earthquake during the next 50 years at 15 to 20 %. How do you reconcile these facts with the following statement in the DEIS?</i></p>
IND31-6	<p>URS (2006a) conducted a site-specific seismic hazard analysis for the proposed LNG terminal facility that indicated a peak horizontal bedrock acceleration of 0.38 gravity with a 2% probability of exceedence in 50 years (i.e. a 2,475-year return period) or peak horizontal acceleration bedrock acceleration of 0.17 gravity with a 10 % probability of exceedence in 50 years (i.e. a 475-year return period). (p. 4-11)</p>
IND31-7	<p>This is not an academic exercise to the people who live here. The knowledge acquired over the past 20 years has changed education, building codes, warning systems, signage, emergency preparedness, etc. My worse case scenario is if there was a Level 9+ quake in this area that would devastate</p>
	<p>² See URS Final Geohazard Report, February 2007, p. 4-2. They state that it failed during a massive flow liquefaction event and state that large scale flow liquefaction of this type is "not likely to impact the pipeline." This is not very reassuring.</p> <p>³ See URS Report February 2006, p. 5-2. URS used a recurrence interval for the maximum megathrust earthquake of 450 plus or minus 200 years in their probabilistic equations. p. 6-8</p>

Individuals

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IND31-4	See our response to comment IND22-14.
IND31-5	See our response to comment PM6-18.
IND31-6	See our response to comment IND22-11.
IND31-7	See our response to comment IND22-12.

IND31-7 cont'd	<p style="text-align: right;">November 8, 20073</p> <p>Portland and the coast; the damage to the Bradwood terminal and/or pipeline could cause numerous fires in our forest and surrounding areas with no agency able to help us control them.</p>
IND31-8	<p><u>3. Hazards Associated with the Pipeline</u></p> <p>While I am very concerned with the geological hazards at the proposed terminal site, it is clear that they are being taken seriously. I do not get that same sense with the pipeline. I recognize that much work has been done to identify the faults and non-seismic landslide hazards. The issue that I am raising is has significant recognition been given to how these hazards would be magnified in the event of a massive earthquake. (See footnote 2 on previous page.)</p> <p>URS's Supplemental Geohazards Assessment Report, March 2007 acknowledges the liquefaction and lateral spreading especially along the Columbia River in Oregon, but then dismisses the hazard with the following statement:</p> <p style="padding-left: 40px;">Seismic wave propagation, tectonic subsidence, and tsunami/seiche hazards were not found to present a significant threat to the proposed pipeline. (p. 12)</p> <p>I do not understand the basis for this statement.</p>
IND31-9	<p>They also discuss the primary non-seismic hazards in Cowlitz County as landslides; various techniques are describes for mitigation. Once again, my concern is how well do these various techniques hold up in the event of a major earthquake or a major flood?</p>
IND31-10	<p><u>Recommendation:</u> Given the extreme impact if any errors or faulty assumptions have been made in the technical reports on geohazards, I strongly urge that FERC submit them to an independent scientific review.</p>

Individuals

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IND31-8	<p>As described in section 4.1.4.3, liquefaction and lateral spreading are generally not significant hazards for pipelines due to their ductile nature. However, additional geotechnical field studies are required to determine appropriate site-specific mitigation measures for hazards along the pipeline route. Seismic loads would be factored into slope stability assessments. Also see the response to comment LA7-25.</p>
IND31-9	<p>See our response to comment PM6-19.</p>
IND31-10	<p>See our response to comment SA1-4.</p>

November 8, 2007

To: FERC

From: John Dunzer, 2964 Keepsake, Seaside 97138, OR

Subject: COMMENTS ON BRADWOOD FEDERAL EIS

Cfob-365
Cfob-366

07 Nov. 14

ORIGINAL

IND32-1

SECTION 3.1.6.3 ALTERNATIVE VAPORIZATION TECHNOLOGIES

SOURCES OF VAPORIZATION HEAT THAT WERE CONSIDERED

- AMBIENT AIR - INFEASIBLE BECAUSE OF COOL WEATHER
- RIVER WATER - ENVIRONMENTAL CONCERNS OF WATER DISCHARGE, ONLY FEASIBLE FOR 7 MONTHS OF YEAR
- ELECTRICAL POWER - TOO EXPENSIVE
- WOOD CHIPS - LACK OF STORAGE AREA, PRICE VARIATION, EMISSIONS, ROAD TO SITE INADEQUATE FOR DELIVERY BY TRUCK.
- WASTE HEAT FROM COGENERATION - NEED TO GENERATE TOO MUCH ELECTRICITY FOR GRID TO GET WASTE HEAT
- NATURAL GAS - SELECTED ALTERNATIVE BY BRADWOOD

THE NATURAL GAS ALTERNATIVE IS NOT FEASIBLE BECAUSE IT VIOLATES EMERGENCY OREGON LEGISLATION PASSED AUG 6,2007 (CLIMATE CONTROL ACT-HB3543) WHICH REQUIRES A REDUCTION IN GREENHOUSE GAS EMISSIONS IN OREGON.

- INCREASE CO2 GREENHOUSE EMISSIONS FROM NATURAL GAS IN NORTHWEST US BY 1.5%
- INCREASE CO2 GREENHOUSE EMISSIONS FROM NATURAL GAS IN OREGON BY 5%
- INCREASE TOTAL CO2 GREENHOUSE EMISSIONS IN OREGON BY 1%

BRADWOOD MUST BE BUILT WITHOUT USING FOSSIL FUELS FOR REGASIFICATION. THE EIS IS DEFICIENT FOR NOT INCLUDING THIS INFORMATION

Individuals

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IND32-1

There are no federal standards or regulations regarding CO₂ emissions. Given that the FERC has exclusive jurisdiction over onshore LNG import terminals, Oregon's CO₂ emissions standards for new energy facilities do not apply to the project. However, NorthernStar has stated that it would voluntarily comply with Oregon's CO₂ emissions standards for new energy facilities. See section 4.10 of the EIS.

IND32-2

THE ANALYSIS OF THE ALTERNATIVE OF USING WASTE HEAT FROM COGENERATION WITH WOOD CHIPS AS A FUEL PRESENTED IN THE PRESENT EIS IS IN ERROR.

- THE AMOUNT OF WASTE HEAT REQUIRED FROM COGENERATION CAN BE REDUCED BY CO-LOCATING FACILITIES WHICH USE PROCESSES THAT CAN PARTIALLY HEAT UP THE LNG (AIR SEPARATION TO CREATE INDUSTRIAL GASES, ICE MAKING). THIS REDUCES REGASIFICATION HEAT REQUIRED FROM COGENERATION PLANT TO 70KW WHICH WILL GENERATE 25KW OF ELECTRICITY AND SUPPORT THE NEEDS OF BRADWOOD LNG WITH NO IMPACT ON GRID.
- USE WOOD CHIPS FROM CONSTRUCTION AND DEMOLITION WHICH IS PRESENTLY RECYCLED BY METRO PORTLAND TO PROVIDE AN AFFORDABLE, SUSTAINABLE WOOD CHIP FUEL
- RECYCLED CONSTRUCTION AND DEMOLITION WOOD WASTE HAS BEEN PROVEN BY 2006 TEST PROGRAM BY 6 NEW ENGLAND STATES TO BE ACCEPTABLE (LEVEL OF EMISSIONS) FUEL. AN AIR QUALITY PERMIT WAS GRANTED TO A SIMILAR WOOD WASTE PLANT IN LAKEVIEW OREGON THIS YEAR. EMISSIONS ARE NOT A PROBLEM
- SHIP FUEL BY BARGE, ONE A WEEK. THIS IS STANDARD PRACTICE ON COLUMBIA. BRADWOOD DOCK ONLY USED 15% OF TIME FOR LNG.
- USE THE 10 ACRE SITE ADJACENT TO BRADWOOD THAT IS PRESENTLY ZONED FOR FOR THIS USE WITH A CONDITIONAL USE PERMIT, A TWO WEEK SUPPLY OF WOOD WASTE(1 MILLION CU FT.) CAN BE STORED IN THREE COVERED 100 FT IN DIAMETER SILOS 45 FEET IN HEIGHT. THIS SITE ALSO IS LARGE ENOUGH FOR THE COGENERATION PLANT AND AIR SEPARATION AND ICE PLANTS. AN EXISTING RAIL LINE ALLOWS PRODUCT SHIPMENT.

THIS INFORMATION WAS PROVIDED TO FERC BY THE ATTACHED LETTER ON SEPTEMBER 21, 2006 WELL IN ADVANCE OF THE PREPARATION OF THE EIS.

BY NOT CORRECTING THE ANALYSIS OF THE WOOD WASTE SECTION OF THE ALTERNATIVE REGASIFICATION TECHNOLOGIES THE EIS IS NOT A DOCUMENT WHICH CAN BE USED FOR FERC DECISION MAKING AND IS SUBJECT TO COURT ACTION AS A DEFICIENT EIS.

Individuals

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IND32-2

Our analysis in section 3.1.6.3 discussed the burning of wood chips as an alternative source of heat for the terminal vaporizers. Use of a 10-acre site adjacent to the proposed LNG terminal site for a wood chip fueled cogeneration facility would entail potential additional environmental impacts (e.g., wetlands, vegetation, air quality, noise, visual, etc.). We do not believe this alternative is environmentally superior to the proposed vaporization heat source of natural gas. Our EIS is not deficient and may be used by the Commission as part of its decision making process.

COLUMBIA BIOENERGY LLC MILL CREEK BUSINESS CENTER
2609 N. HIGHWAY 101 SUITE 101D
SEASIDE, OREGON 97138
(503) 470-0392 T (503) 717-8100 F

SEPTEMBER 21, 2006

TERRY L. TURPIN, P.E.
OFFICE OF ENERGY PROJECTS
FEDERAL ENERGY REGULATORY COMMISSION
888 FIRST STREET, N.E.
WASHINGTON, DC 20426

SUBJECT: BRADWOOD LANDING LNG PROJECT (DOCKET PF05-10-000)
ALTERNATIVE GASIFICATION SCHEME

DEAR MR. TURPIN,

THIS SUBMITTAL IS PER YOUR REQUEST FOR ADDITIONAL INFORMATION FOR THE FERC ENVIRONMENTAL IMPACT STATEMENT(EIS) FOR THE SUBJECT PROJECT. ENCLOSED PLEASE FIND A DRAFT COPY OF "COLUMBIA ONE" A 25 MW WASTE WOOD FIRED COGENERATION PLANT PROPOSED TO BE CO-LOCATED WITH THE BRADWOOD LNG FACILITY.

COLUMBIA ONE IS A UNIQUE ALTERNATIVE TO LNG GASIFICATION THAT WILL PROVIDE SIGNIFICANT MITIGATION TO THE IMPACTS OF THE BRADWOOD LNG PROJECT SUCH AS ADDING AN ADDITIONAL 80 FULL TIME FAMILY WAGE JOBS, IMPROVED AIR/WATER QUALITY AND SOLID WASTE DISPOSAL, AND A SUBSTITUTION OF ALTERNATIVE FUEL FOR FOSSIL FUEL.

THE ENCLOSED DOCUMENT IS FORMATTED AS A DRAFT OF A "OREGON SOLUTIONS PROJECT" AS MAY, IN THE FUTURE, BE DESIGNATED BY THE GOVERNOR. OBVIOUSLY WITHOUT FERC APPROVAL OF THE PROJECT AND A SUBSEQUENT ANALYSIS BY THE OREGON SOLUTIONS STAFF AND OTHER ORGANIZATIONS IDENTIFIED BY THE DOCUMENT, THERE IS NO COLUMBIA ONE PROJECT. THIS IS A DRAFT PROPOSAL FOR IMPLEMENTATION BUT IT IS A VALID DESIGN ALTERNATIVE FOR THE BRADWOOD PROJECT AND IT SHOULD BE CONSIDERED IN THE PREPARATION OF THE BRADWOOD EIS.

SINCERELY YOURS

CC W/ ENCL
MAGALIE R. SALAS-FERC

JOHN DUNZER
CHIEF EXECUTIVE OFFICER
COLUMBIA BIOENERGY LLC

Individuals

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UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

November, 8th, 2007

William & Doris Dragich Trust
954 Fall Creek Rd
Longview, Washington State, 98632-9741
360-425-4786
DragichW@aol.com

MOTION/NOTICE TO COMMENT
AND SUBMIT QUESTIONS ;DEIS
SCOPING MEETING.

IN DOCKET, NO.CP06-365-000
NO.CP06-366-000,NO.CP06-377-000
Northern Star Energy LLC, Bradwood
Landing LLC Natural Gas Import
Terminal Facilities & Associated
Facilities at Bradwood, Clatsop County
Oregon, Hilda Lahti Elementary School
42535 Old Highway 30, Astoria Oregon
FERC file ID=11471107

The William & Doris Dragich Trust : do file this Motion/Notice to Comment and Submit Questions with the Commission as a party or parties that are requesting to comment and submit questions based on these facts:

Questions for The Federal Energy Regulatory Commission in the siting of Liquefied Natural Gas at Bradwood, Oregon, Lower Columbia River Region Draft DEIS:

Abbreviations Used:

FERC – Federal Energy Regulatory Commission
LNG – Liquefied Natural Gas
NG – Natural Gas
CEII – Critical Energy Infrastructure Information

- | | |
|---------|---|
| IND33-1 | 1. What specific criteria does the FERC use to determine if an LNG terminal facility site is suitable or not. And what differentiates a good location versus an unsuitable location. |
| IND33-2 | 2. What specific criteria does the FERC use to determine whether an LNG facility can be secured. How can a site as the proposed Bradwood site be made secure in relation to terrain, vegetative cover, immediate or adjacent access routes of the Railroad, Clifton Channel, Columbia River, US Highway 30(Oregon), Bradley State Park (Oregon), and Puget Island (Washington), with roads connecting to Washington State Route 4. |
| IND33-3 | 3. What specific criteria does the FERC use to determine whether an LNG vessel turning basin and berth is a suitable location and defined as safe and secure. Further explain how the proposed turning basin and berth can made safe and secure in relation to their proximity to the Columbia River Navigational Channel which is traversed frequently by large cargo vessels some of which have lost power and maneuverability and have run adrift. |
| IND33-4 | 4. What specific criteria does the FERC use to determine if the public is safe from an LNG facility. |
| | 5. What maximum number of people does the FERC consider an acceptable risk within 0.5 miles, 1 miles, 2 miles, 3 miles, 5 miles, 7 miles, and 10 miles in relation to the Sandia Laboratory Studies regarding LNG vessel's partial leak or breach and an LNG storage tank failure. |

Individuals

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- IND33-1 A variety of qualitative and quantitative criteria are used to determine the suitability of an LNG terminal site. Regulatory specifications regarding the LNG facility layout and safety siting factors that must be met are described in sections 3.1.5.3 and 4.11. Other factors that favor site suitability are also discussed in section 3.1.5.3.
- IND33-2 As described in the WSR (see Appendix H), LNG facilities are subject to the security regulations in 33 CFR 105 and would be required to implement a Coast Guard-approved Facility Security Plan. A 200-yard security zone would be implemented around an LNG vessel at the LNG terminal and a 50-yard security zone would be implemented around the LNG terminal when an LNG vessel is not present (see section 4.11.5.5). Also see our response to comment IND23-1.
- IND33-3 LNG facilities must comply with the siting requirements of 49 CFR 193, Subpart B and NFPA 59A, 2001 edition (see section 4.11.4).
- IND33-4 The Sandia Report analysis of an LNG cargo tank breach considers impacts in three zones ranging from 500 meters to 3,500 meters. Consequences due to spills associated with LNG storage tanks are analyzed by calculating thermal exclusion zones and vapor dispersion zones. When assessing potential impacts, the FERC considered all pertinent resources within these areas. The level of risk is unrelated to the number of persons in a given area but to the likelihood of a spill occurring multiplied by the consequences of the incident. The draft EIS presents a consequence analysis and given the proposed mitigation measures, states that the likelihood of a spill occurring is highly unlikely.

IND33-5	6. What magnitude earthquake can the proposed Bradwood LNG facility withstand before any equipment failures occur considering the non-rigid soil type along the banks of the Lower Columbia River.														
IND33-6	7. What is the 99% Confidence Level (a statistical measure) that a major LNG facility pipe will fail, an LNG storage tank will fail, and the regasified LNG sendout pipeline will fail in relation to the known unstable soils and seismic instability of the Bradwood area in 5, 10, 20, 30, and 50 years.														
IND33-7	8. What specific criteria does the FERC use to determine if threatened, endangered, and protected species and their habitat will be undamaged and protected.														
IND33-8	9. What specific criteria does the FERC use to determine if a mitigation plan will actually mitigate damages.														
IND33-9	10. What is the FERC process to determine that any and all information, reports, studies, data, Environmental Impact Statements, and Water Suitability Assessments associated with the proposed Bradwood LNG permit application are comprehensive and accurate.														
IND33-10	11. What specific criteria does the FERC use to compare against the information, reports, studies, data, Environmental Impact Statements, and Water Suitability Assessments received to determine if the proposed Bradwood LNG facility site is suitable or not.														
IND33-11	12. Is there any United States location accessible or made accessible to an LNG vessel in comparison to the proposed Bradwood site that the FERC would not provide a site permit for as long as the applicants did the required paper work.														
IND33-12	13. What are the criteria that would cause the FERC to deny a site permit for a proposed LNG facility in comparison to the proposed Bradwood site.														
IND33-13	14. What FERC Department/Staff is responsible for comparing permit application information with FERC criteria, in reference to questions 11 and 13, and making the determination regarding site suitability and the Waterway Suitability Assessment. And has there been any actions to dismiss or bypass any permit application information in the determination of a permit application approval for the Bradwood proposal.														
IND33-14	15. Has there been any administration requests to fast track, expedite, or ensure approval of the proposed Bradwood LNG site permit.														
IND33-15	16. What is the position of the FERC to the Judge Radden decision regarding the protection of salmon and salmon habitat in relation to the dredging of historic Indian fishing grounds and documented irreplaceable endangered salmon species rearing grounds in the area of the Clifton Channel.														
IND33-16	17. How will the proposed ballast water screens which can shred juvenile salmon during ballast water intake protect salmon at the proposed Bradwood site.														
IND33-17	18. If under the equal protection provision an LNG vessel security exclusion zone equal in size to other security exclusion zones for LNG vessels operating in other areas of the country; is wider than the Columbia River Navigation Channel, and then blocks river transit of all other vessels which need to use the Channel. What methodology does the FERC use to explain the blockage of a major river artery of the Pacific Northwest's economy, in the import and export of trade through river commerce, river recreation, and marine services and support of trade in relation to the fact that this region has shown no measurable need for LNG. Not only in relation to the Bradwood LNG proposal but other proposals which could materialize, creating a frequently blocked Columbia River.														
	19. What are the long term projected losses or costs to the following businesses, public services, and economies due to the siting of an LNG facility(s) on the Columbia River in relation to river blockages and potential loss of shipping lines serving this region.														
	<table> <tr> <td>a. Grain exports</td><td>b. Container imports exports</td></tr> <tr> <td>c. Other exports</td><td>d. Vessel repair and maintenance</td></tr> <tr> <td>e. Fishing / Crabbing business</td><td>f. River related recreation</td></tr> <tr> <td>g. Restaurant & Lodging</td><td>h. Stevedoring</td></tr> <tr> <td>i. Port revenue and fees</td><td>j. Coast Guard</td></tr> <tr> <td>k. Fire and Safety Depts.</td><td>l. Employment</td></tr> <tr> <td>m. Economies of the affected communities</td><td></td></tr> </table>	a. Grain exports	b. Container imports exports	c. Other exports	d. Vessel repair and maintenance	e. Fishing / Crabbing business	f. River related recreation	g. Restaurant & Lodging	h. Stevedoring	i. Port revenue and fees	j. Coast Guard	k. Fire and Safety Depts.	l. Employment	m. Economies of the affected communities	
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k. Fire and Safety Depts.	l. Employment														
m. Economies of the affected communities															

Individuals

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IND33-5	As described in section 4.1.3.3, the LNG tanks would be supported on deep foundations and the potential for soil liquefaction is proposed to be mitigated through vibroflotation. The final engineering design for the LNG terminal would incorporate detailed seismic specifications that would be required to satisfy the FERC's draft "Seismic Design Guidelines and Data Submittal Requirements for LNG Facilities." The specific magnitudes of the earthquakes are discussed in section 4.1.3.3.
IND33-6	With the mitigation measures described in section 4.1, unstable soils and seismicity would not result in an adverse impact on the LNG terminal or pipeline.
IND33-7	As described in sections 4.5 and 4.6, the project has the potential for adverse impacts on listed species; however, these impacts would be mitigated.
IND33-8	The FERC staff has established baseline mitigation measures in its Plan and Procedures. We evaluate the sufficiency of applicants' mitigation plans on a project-specific basis through staff evaluation and consultation with the appropriate resource agencies and stakeholders. Construction inspections and post-construction monitoring are conducted to document the effectiveness of construction mitigation measures and evaluate the success of restoration.
IND33-9	Information that is used for preparing a draft EIS is reviewed by the FERC staff, and our third-party contractors, who are independent, experienced environmental specialists. All data filed by NorthernStar are part of the public record, and some studies related to specific resources were reviewed by staff of other federal and state agencies, with their comments submitted to the FERC also placed in the files for this proceeding. The draft EIS is made available to the public and government agencies for review to help us ensure that the information presented is comprehensive and accurate. The WSA, prepared by the applicant, is classified as SSI and is evaluated exclusively by the Coast Guard.
IND33-10	The project must meet certain safety and environmental regulations and the FERC, Coast Guard, and COE must comply with certain statutes before issuing any permits and authorizations (see section 1.3). The Coast Guard will determine if the waterway is suitable for use by LNG marine traffic in its LOR. The design of the Bradwood Landing terminal is suitable, as discussed in section 4.11. See our response to comment IND33-9.
IND33-11	The FERC has denied authorization to a proposed LNG import terminal--the KeySpan LNG Facility Upgrade Project in Rhode Island. A project would not be approved if our assessment determined that the project would result in an unacceptable level of adverse impacts that could not be mitigated.

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- IND33-12 The FERC staff assigned to this project works in the Office of Energy Projects. The project team responsible for the production of this EIS is listed in Appendix J, and includes the FERC staff, and staff from NRG, our third-party environmental contractor. The Coast Guard is responsible for evaluating the WSA, using staff stationed in Sector Portland and the Pacific Command offices in Oakland and Alameda, California. NorthernStar is responsible for applying for all necessary permits for its project, and the status of those permit applications is listed in table 1.3-1.
- IND33-13 See our response to comment PM2-20. However, under the EPAct 2005, the FERC has an obligation to expeditiously review natural gas applications.
- IND33-14 The FERC staff is unaware of any official agency position on the Judge Redden decision.
- IND33-15 The purpose of the fish screens is to mitigate impacts of water withdrawal on juvenile salmon. Therefore, they would protect salmon.
- IND33-16 While a safety/security zone would be in place around an LNG ship, other vessels would be allowed to enter this zone with permission. This would also allow vessels to pass at four designated areas of two-way traffic along the LNG marine waterway. Through communication and scheduling, the Coast Guard anticipates that the safety/security zone would have a very minor impact on vessel traffic.
- IND33-17 Fire and safety departments would need to increase resources. As described in section 4.11.6, NorthernStar is in the process of developing an ERP and Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies. The Coast Guard has not yet obligated any resources to the project. Security escorts are expected to be delegated to local law enforcement entities, which could then be part of the Cost-Sharing Plan. All other items in this list would either be unaffected or would be beneficially impacted by the project (see section 4.8).

IND33-18	20. What methodologies does the FERC use to justify the direct and indirect short and long term damages to irreplaceable historic Indian fishing grounds and irreplaceable historic and current salmon rearing grounds caused by dredging of the Clifton Channel and frequent churning of the Clifton Channel bottom via the LNG vessel turnings.
IND33-19	21. What is the amount of damage to the Columbia River salmon habitat in comparison to the proposed applicant funded mitigation. Comparing the applicants proposed funded mitigation to the amount of funds currently going into salmon habitat restoration by non-LNG related sources. And the amount of damage repaired by the proposed applicant funds, in the repair attempt effected by the applicants proposed salmon restoration mitigation.
IND33-20	22. The endangered and protected Lower Columbian White-tailed Deer currently use the Bradwood site as habitat and to travel East and West along the river valley which has been stated by Wildlife officials to be beneficial for the deer in order to avoid genetic deterioration due to inbreeding. How will the FERC ensure that the deer will not be blocked by structures, lights, noise, and fences in the narrow corridor which exists at the Bradwood site.
IND33-21	23. Since the NG demand in the Pacific Northwest is considered stable with no additional supply needed, what is the criteria used by the FERC in the permit process to justify the siting of the Bradwood LNG facility over sites or potential sites within the region of the product end user.
IND33-22	24. Does the FERC cite a regional need for the Bradwood LNG proposal.
IND33-23	25. Is there a FERC rationale for placing an importance on the Bradwood LNG permit process.
IND32-24	26. In the FERC permit process of the Bradwood LNG proposal is the promotion of foreign imports rather than domestic energy production, including renewable energy, that would be far less vulnerable to attack, terrible accident, or susceptible to foreign supply disruptions, a major factor.
IND33-25	27. In the permit process of the Bradwood proposal is there a FERC provision for revising it's mission and administrative rules to promote domestic energy production, including renewable energy over foreign energy imports for National Economic Benefit.
IND33-26	28. What in the FERC permit process for the Bradwood proposal sendout pipeline, will ensure that the many field drains or drain tiles will be left undamaged or repaired to excellent condition in the farmlands it will pass through.
IND33-27	29. In the Bradwood permit process, of foreign imported LNG, what provisions are made by the FERC for the prevention of damage to gas equipment known to be damaged by imported LNG.
IND33-28	30. Under the FERC provisions for the use of eminent domain, what is the Pacific Northwest regional benefit to be provided as a public use and necessity.
	31. Under the FERC permit process for the proposed Bradwood LNG facility, how will the FERC provide for and ensure that the safety of the public will not be dependent on the private company operators of the LNG facilities including their sendout pipelines, knowing that not all leaks are reported. A known industry practice that can cause more casualties and severe incidents. And knowing that a safety conscience company may sell to a less safety conscience company at any time.
	32. In the permit process for the proposed Bradwood LNG facility how will the FERC ensure the public is safeguarded to the highest extent possible, using the best methods. Too include the latest in odorant technology.
	33. In the permit process how will the FERC ensure that the equal protection provision is provided for in safeguarding the public over the full length of the Bradwood proposal sendout pipeline, especially in regard to odorant in the product stream, knowing that odorant is required in the main NG transmission pipelines in other jurisdictions in which the pipeline connects.

Individuals

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IND33-18	No historic Indian fishing grounds have been identified in the project area. See section 4.9. Impacts on salmon and mitigation are described in sections 4.5 and 4.6. The dredging of the turning basin would occur within the main stem of the Columbia River, adjacent to the navigation channel, and not in Clifton Channel. See also our response to comment IND82-5.
IND33-19	NorthernStar has made a commitment that the proposed project would provide an overall significant net benefit to the environment of the lower Columbia River ecosystem. We have recommended in section 4.4.1.2 that NorthernStar's final Compensatory Mitigation Plan be filed, along with agency approvals, with the Secretary prior to construction of the project. Compensatory mitigation funded by the applicant for preservation and restoration of aquatic habitat would be based on project-related impacts on salmonids; a comparison of this level of funding to that currently being contributed for salmonid restoration throughout the lower Columbia River is not relevant to the EIS. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.
IND33-20	See our response to comment FA4-6.
IND33-21	As described in section 1.1, additional supplies of natural gas will be needed in the Pacific Northwest. Because the objective Bradwood Landing Project is to serve the Pacific Northwest (see the beginning of section 3.1), we only looked at alternatives along the Pacific coast.
IND33-22	NorthernStar's applications are being reviewed in a manner consistent with the FERC staff's review of all other LNG import terminal applications.
IND33-23	NorthernStar proposes to import LNG to provide a new supply of natural gas to the Pacific Northwest, as explained in section 1.1. Section 3 discusses renewable energy resources. The FERC does not promote one form of energy over another nor does it promote use of domestic energy sources over foreign sources. Section 4.11 indicates we believe that with the measures to be implemented by NorthernStar and the conditions to be imposed by the Coast Guard, the chance of an accident or terrorist attack is highly unlikely.
IND33-24	Repair of field drains or drain tiles impacted by pipeline construction is a requirement for FERC-regulated projects, in accordance with the FERC staff's Plan.
IND33-25	See our responses to comments PM1-22 and PM6-79.
IND33-26	The Commission's Order for this project will present its findings of public convenience and necessity.

Individuals

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- IND33-27 Section 4.11 addresses pipeline safety.
- IND33-28 See our response to PM5-81. See also our response to comment IND33-27.

IND33-28 cont'd	34. With respect to public safety in the permit process of the proposed Bradwood LNG facilities, how much weight does the FERC give requests on behalf of the public for safeguarding as compared to the permit applicant's willingness to provide them in relation to the fact that odorant safeguards are in common use. And is this the same weighting that FERC personnel would desire if they were the affected public.
IND33-29	35. Regarding LNG vessel navigation in the confined shorelines of the Columbia River valley, how will the FERC fully cover the risks and dangers in relation to the Bradwood proposal faced by the public and Coast Guard personnel, in the permit process, should an event or accident with LNG transport occur. 36. How can the FERC, in the permit process of the proposed Bradwood LNG facility, properly safeguard the public, public safety agencies, and their personnel by relying on, so stated by Sandia Laboratory's model, the limitations of which may not reflect actual occurrences, in reference to LNG vessel navigation events, accidents, or terrorist attack, in the destruction of the vessel. 37. How will the FERC through the permit process of the proposed Bradwood LNG facility, ensure the public and safety agencies personnel in a confined river valley, are properly safeguarded without information gained from full scale open water testing.
IND33-30	38. Can the FERC in general or as part of the Bradwood LNG permit process, perform or demand that the appropriate government agency or permit applicant perform realistic full scale LNG vessel testing in relation to safeguarding the public, safety agencies, and their personnel, from LNG vessel events, accidents, or explosions, prior to final permit approval. What process would be required to make this happen. And could full scale testing reflect other qualified scientific opinion and approach to benefit the public.
IND33-31	39. As part of the FERC permit process of the Bradwood proposal, what measures and procedures will be implemented to ensure the safety of densely populated regions further up river from terrorists taking the LNG vessel to any of those locations and exploding it.
IND33-32	40. As part of the Bradwood LNG permit process, will the FERC request that a fully independent risk analysis be performed in order to protect the public, especially for a confined river valley in which the Bradwood proposal is located. And what process would be required to make this happen for the benefit of the public.
IND33-33	41. In regard to Columbia River Navigation Channel and Clifton Channel dredging as part of the Bradwood proposal, the public could be better served if the FERC sought fully independent analysis of a full scale comparable example of river dredging effects to the down stream conditions rather than relying on limited computational models of those effects. And what permit process would be required to ensure this occurred under FERC.
IND33-34	42. What in the proposed Bradwood LNG facilities permitting process protects individuals and the public from sendout pipelines located too close to structures and residences if a leak, accident, blowout, or explosion occur. 43. What is the tested or is generally accepted from empirical evidence, damage distance from a regasified LNG sendout pipeline the size, pressure, flow rate, and pipe material as that of the Bradwood proposal. 44. How will the FERC through the permit process, ensure the safety of individuals, residences, structures, businesses, and the public in relation to the tested or generally accepted damage distance due to a leak, accident, blowout, or explosion of the proposed Bradwood sendout pipeline.
IND33-35	45. In regard to the FERC permit process for the proposed Bradwood sendout pipeline, when and for what purpose, and based on what criteria, has any LNG facility sendout pipeline or NG pipeline installation minimum distance requirements from residences and structures been lowered or removed from the governing Code of Federal Regulations and on what date did this occur.

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IND33-29	Safety and security issues, along with mitigation, are discussed in detail in section 4.11. The modeling approach used by FERC employed during project review included the best available methods and in areas of uncertainty, used conservative assumptions. Also, the GAO Report (GAO 2007) presented a survey of experts who work in areas related to LNG risk, hazards, and consequence modeling. The report determined that the primary hazard to the public would be heat from a fire. A total of 11 of 15 experts were of the opinion that current methods for estimating LNG fire heat hazard distances are "about right" or too conservative.
IND33-30	Full-scale LNG vessel breach scenario testing would be outside the scope of this EIS.
IND33-31	Credible terrorist attack scenarios were developed in the WSA including the measures needed to be in place to detect, deter, and respond. This was further analyzed in the WSR. The scenarios developed in the WSA process and the WSR analysis are considered SSI and not releasable to the public.
IND33-32	The FERC will not request a fully independent risk analysis because that would be outside the scope of this EIS.
IND33-33	The EIS discusses dredging in sections 4.2.2.2 and 4.3.2.3. See our response to comment IND33-18.
IND33-34	See our response to comment IND33-27. If an explosion were to occur from a gas pipeline, the resulting damage would depend on the volume of gas released before it ignites and the conditions in the vicinity of the leak (e.g., the topography, meteoric conditions). There are no established distances based on the pipeline characteristics.
IND33-35	A discussion of the DOT's Minimum Federal Safety Standards in 49 CFR Part 192 is included in section 4.11.9.1. These standards do not include requirements for a minimum distance between a natural gas pipeline and residences or structures; rather, the standards include requirements for pipeline design that varies depending on the presence of nearby residences.

- IND33-36 46. In regard to the safety issue of the proposed Bradwood LNG facility sendout pipeline distance from residences and structures, is the FERC placing the public at risk if no minimum distance is required under the permit process in relation to the destructive capability of high pressure large diameter NG pipelines.
- IND33-37 47. Under the FERC permit process for the Bradwood LNG proposal, what procedures allow and require an LNG facility sendout pipeline to be routed around certain businesses, properties, structures, and residences but not others. And how will the FERC ensure that any or all of the public can make use of this pipeline location procedure under the equal protection provision.
- IND33-38 48. Under the FERC permit process, what will be the temperature of the regasified LNG as it enters the sendout pipeline of the Bradwood proposal.
49. Under the FERC permit process, the following Bradwood proposal sendout pipeline temperature information request is a necessary component for the affected landowners to make adjustments to their farming or other business operations as needed:
- At 2 mile intervals for each of the following parameters, beginning at the Bradwood facility, ending at the Oregon shore of the Columbia River and beginning again at the Washington shore of the Columbia River
- Temperature of product in pipe
 - Temperature of ground surface directly above the centerline of the pipeline while the ground surface temperature 500 feet away is at temperatures ranging from 10degF to 110degF at 10degF intervals
 - Temperature of the ground surface 50 feet away from the centerline of the pipeline while the ground surface temperature 500 feet away is at temperatures ranging from 10degF to 110degF at 10degF intervals.
- IND33-39 50. In the FERC permit process for the Bradwood LNG proposal what criteria is used in the applicant's amount of spending on salmon habitat mitigation versus spending for public safety.
- IND33-40 51. How will the FERC in the permit process ensure that the public is properly safeguarded if odorant is not required in the regasified LNG sendout pipeline for the Bradwood proposal.
- IND33-41 52. In the permit process, how will the FERC ensure that a fully independent analysis of the Bradwood LNG proposal occurs regarding all aspects of the project including salmon habitat destruction and mitigation. And verify over the span of the existence the Bradwood proposal that habitat destruction mitigation measures are maintained, and the salmon habitat is truly mitigated and no other destruction has occurred or is ignored.
53. Through the permit process of the Bradwood proposal, how will the FERC ensure threatened and endangered salmon habitat is properly mitigated into the future when no guarantee of continued mitigation funding is indicated should the project fail for any reason, yet the habitat damage will have been done.
- IND33-42 54. Under the FERC permit process for defining CEII in the transport and transmission of LNG and regasified LNG, what criteria required rule changes under the definition of CEII to extend this provision to storage and construction of LNG facilities in the Bradwood proposal.
55. What is the purpose and public benefit of CEII as defined by the FERC when energy facilities are fixed structures, as is the Bradwood proposal, and easily identified simply by observation, including sendout pipelines which will be exposed at certain locations.
56. Under the FERC permit process for the Bradwood LNG proposal, how will the FERC ensure due process and redress regarding eminent domain will occur under the present FERC procedure of labeling necessary information to the affected landowners as CEII and thereby denying this information to guaranty due process and redress
57. How is the public benefited by restricting access to necessary information regarding the Bradwood LNG proposals under the FERC definition of CEII, thereby restricting their ability to make sound decisions based on the merits of a proposal.

Individuals

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- IND33-36 See our response to comment IND33-35.
- IND33-37 NorthernStar selected the route for its sendout pipeline. The EIS, which is a public document, presents our review of that route. Section 4.7.3.3 discusses impacts on residences. We have recommended that the Commission Order include a condition that would assist in the mitigation of impacts on residences within 50 feet of construction work areas.
- IND33-38 The temperature of natural gas in the pipeline would be close to ambient temperatures and would not affect farming.
- IND33-39 The costs for salmon habitat mitigation and public safety are not related.
- IND33-40 The pipeline would be operated under the DOT's pipeline safety standards contained in CFR 49 Part 192, including leakage survey requirements in 192.706. See also our response to PM5-81.
- IND33-41 The FERC's environmental staff and its third-party contractor provide an independent analysis of the impacts of the project, including impacts on salmonids. Additional independent analysis is provided through cooperating agency review, the Pre-filing scoping process (see section 1.4), and the draft EIS comment process. The adequacy of compensatory mitigation proposed for the project is discussed in the response to comment FA2-10. Therefore, implementation of the final Compensatory Mitigation Plan would be assured through the FERC's authorization of the project. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.
- IND33-42 See our response to comment PM1-18.

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58. In relation to the permit process, what criteria has FERC used to define LNG as CEII over qualified independent analysis which has shown that LNG in general and certain LNG proposals including the Bradwood proposal are not critical to the energy needs of the end users over short and long term and thereby non-critical to the nation as referenced by the study of Loretta Lynch.
 59. What is the highest ratio of air to regasified LNG that the mixture is still deadly: to humans, to plants, and to animals in the area of the Bradwood LNG proposal.
 60. What is the range of ratios of air to regasified LNG that will cause ignition in reference to the Bradwood proposal.
 61. Through the permit process of the Bradwood proposal what is FERC doing to lower and mitigate the potential incidents of death, injury, and damages to the public in responsibility for NG pipeline permits since the LNG facility sendout pipelines are under the jurisdiction of the FERC.
 62. In consideration of NG pipeline industry death and injury. The damage statistics indicate a number of incidents, leaks, blowouts, and explosions to NG pipelines in the region surrounding the Bradwood proposal site. The causes are due to corrosive soils, slide prone hills, and seismic activity. How many pipeline leaks, blowouts, explosions, deaths, injuries, and damage can be expected statistically on average with this proposal. And is there any quantity that would be considered too high by the FERC, permitting process.
 63. Considering the saturated corrosive soils the Bradwood proposal sendout pipeline will be routed through on the Oregon side of the Columbia River. How will the FERC through the permit process prevent pipeline leaks from spreading over large areas and asphyxiating pets, livestock, or humans or exploding causing death, injury, or damage.
 64. Considering the slide prone hills the Bradwood proposal sendout pipeline will be routed through on the Washington side of the Columbia River, how will the FERC through the permit process prevent pipeline leaks from spreading over large areas and asphyxiating pets, livestock, or humans or exploding causing death, injury, or damage.
 65. In the FERC permit process for the Bradwood proposal will there be any full scale LNG blast test reports utilizing the pipe materials selected for installation by the applicant to ensure the public is safeguarded from flooding should a pipeline blowout take out a levee that was not sufficiently protected. Or the public safeguarded from a hillside slide caused by a pipeline blowout that was not sufficiently protected against.
 66. In the FERC permit process for the Bradwood proposal, are there any signed affidavits by individual landowners specifically requesting to keep their names off of any affected landowner or pipeline route list.
 67. Is FERC allowed to deny access to all other affected landowner names under the Bradwood proposal other than those specifically requesting their names be withheld from affected landowner or pipeline route lists by signed affidavits.
 68. What is the criteria the FERC uses to justify a requirement for a Non-Disclosure Agreement as applied in the requests for information by affected landowners in the Bradwood permit process when no proprietary information is requested, no national security issues are involved, and what is requested is generally common LNG/NG industrial textbook, plant and pipeline information.
 69. In the FERC permit process for the Bradwood proposal, how do LNG facilities promote the public good through less dependence on foreign energy and support energy independence through domestic sources including renewable energy.
 70. In the permit process for LNG facilities such as the Bradwood proposal, what is the National Economic Benefit of LNG as compared to domestically produced energy including renewable energy.
 71. In the permit process for LNG facilities such as the Bradwood proposal, what is the National safety and energy security risks including terrorist attack of LNG as compared to domestically produced energy including renewable energy.

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- IND33-43 As described in section 4.11.1, natural gas (methane) is a simple asphyxiant and would need to be present at very high concentrations to cause asphyxiation. Methane can cause asphyxiation if oxygen concentrations are reduced to 10 to 12 percent. See our response to comment LA3-66.
- IND33-44 As described in section 4.11.1, methane vapors (regasified LNG) in air at mixtures between 5 percent and 15 percent by volume are flammable.
- IND33-45 Pipeline safety and the FERC's role are discussed in section 4.11.9.1.
- IND33-46 Using the Incident Rate for Earth Movement, it is estimated that an earth movement incident may occur every 2,075 years for the 36.3 mile pipeline.
- IND33-47 See our response to comment IND22-12. Furthermore, the high concentrations required to cause asphyxiation would not normally occur with transmission pipeline leaks as a confined space, such as a building would be required to concentrate the methane vapors.
- IND33-48 Full scale tests are outside the scope of this EIS.
- IND33-49 We are unaware of any signed affidavits from landowners requesting that their names be removed from the environmental mailing list for the project.
- IND33-50 See our response to comment PM1-18.
- IND33-51 The Commission's determination of public necessity will be disclosed in its Order for this project.
- IND33-52 Section 1.1 offers a brief summary about the project purpose and need. The Commission would make its determination of public necessity in its Order for this project. We discuss renewable energy sources in section 3.1.1.3. The economic benefits of this project are discussed in section 4.8.
- IND33-53 We are not aware of any specific studies on this topic.

IND33-54	72. What National Economic Benefit decrease will occur when the security exclusion zone around LNG vessels coming to the Bradwood LNG terminal are required to be at least equal to that of security exclusion zones around LNG vessels enroute to other United States LNG terminals. What impact will this have on the large grain export business and its associated businesses when those export ships are blocked from passage. And what multiple effect will each additional LNG facility or expansion of LNG storage have.
IND33-55	73. Considering that FERC is charged with securing public use and necessity, as part of the permit process on the Bradwood proposal, how will the FERC ensure that the superior public use and necessity of domestic energy supply are maximized and the national economic, safety, and energy security risks of LNG and foreign energy imports are minimized.
IND33-56	74. What mandate are the FERC personnel under to provide permits to LNG proposals in general and to specific LNG proposals at the Bradwood site.
IND33-57	75. In the FERC permit process on the Bradwood proposal where does it provide a listing for corporate, financial, and company operating personnel structure to protect the public.
IND33-58	76. Does the FERC permit process prohibit a performance audit of FERC personnel on the Bradwood proposal to ensure those affected by the project have been treated as favorably as the applicant.
	77. In the permit process how will the FERC ensure there are no conflicts of interest regarding the Bradwood proposal.
IND33-59	78. Considering that farming is a business and that humans require food more than LNG, how is the FERC, through the permit process ensuring that farmers, ranchers, food producers, fishermen, and other businesses have at least equal if not more weight and favorable treatment as the permit applicant in relation to the Bradwood proposals sendout pipeline.
IND33-60	79. Considering the cause and effects in the question immediately above, how is public use and necessity benefiting the local, regional, and national economies through the FERC permit process of the Bradwood proposal by causing the price of food to rise as well as everything that is transported via the Columbia River and the profits of fishermen, farmers, ranchers, and other businesses to go down. And what consideration have these factors been given in the FERC permit process. And what FERC procedure is required to include these factors in the permit criteria.
IND33-61	80. In the permit process how will the FERC ensure that the public, businesses, individuals, residences, and structures are not injured or damaged in relation to the Bradwood proposal.
	81. What is the FERC procedure with regard to the Bradwood proposal in the permit process should the public, businesses, individuals, residences, or structures be harmed or incur damages.
IND33-62	82. In the permit procedures with the Bradwood proposal, how will FERC ensure damages are minimized without the use of existing odorant technology or requiring the development of a more desirable and industry welcomed odorant technology for the proposed high volume high pressure larger diameter sendout pipeline.
IND33-63	83. What are the FERC permit requirements in the Bradwood LNG proposal to support, satisfy, and remedy recommendations on behalf of the public regarding LNG facilities including sendout pipelines that run counter to best technologies and methods or which endanger the public.
IND33-64	84. In the FERC permit requirements on siting the Bradwood LNG facility what are the specific equations, rules, and guidelines that allow LNG facilities to be built in less populated areas and not densely populated areas.
IND33-65	85. In the permit process for the Bradwood LNG facility has the FERC compared the benefits and costs of transmission of regasified LNG over long distances to growing renewable energy locally and throughout the nation. And what is the FERC procedure to make this comparison occur.
	86. In the FERC permit requirements for the Bradwood LNG facility why is there no criteria for LNG facilities to be built nearer to the population demand centers for the LNG product in order to increase cost efficiency of supply in the energy industry. And what is the FERC procedure required to make this occur.

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IND33-54	Other ships would not be blocked from passage during the LNG carrier transit in the waterway to the proposed Bradwood Landing LNG terminal. We do not think that other commercial ship traffic would be adversely affected or delayed by the project. See our responses to comments PM1-52, PM3-11, and others. The economic benefits of the project are discussed in section 4.8. Cumulative impacts from multiple LNG import terminals or other natural gas projects in the vicinity are addressed in section 4.12.
IND33-55	We address safety and security issues in section 4.11. See our response to comment IND33-51.
IND33-56	The NGA mandates that the FERC regulate the interstate transportation of natural gas. The EPAct 2005 gives the FERC authority to site onshore LNG import terminals, and obligates the FERC to expeditiously review all natural gas projects. See our response to comment IND33-22.
IND33-57	NorthernStar's corporate structure is a matter of public record and was provided in Exhibits A and B attached to its applications to the FERC. Public safety is addressed in section 4.11.
IND33-58	The FERC has Rules of Practice, found at 18 CFR 385, including our ex-parte rules, to ensure that all parties are treated fairly in a proceeding, and that applicants are not given preferential treatment over other stakeholders. We also have a conflict-of-interest policy.
IND33-59	The project would not have any significant adverse impacts on fishing (see sections 4.7.1.4 and 4.8.1.7) or farming (see sections 4.4.2 and 4.7.3.1). Rather than having negative impacts on local businesses, the project should benefit the local economy, as discussed in section 4.8. See response to comments PM3-5 and PM5-47.
IND33-60	See response to comment IND33-26.
IND33-61	Although liability is outside the scope of the EIS, financial liability due to a marine accident may be subject to the Limitation of Vessel Owner's Liability Act, 46 U.S.C. 181. Under 49 U.S.C. 60111, the Secretary of Transportation can order the operator of an LNG terminal to demonstrate and maintain financial responsibility in the amount that the Secretary feels adequate.
IND33-62	See our response to IND33-40.
IND33-63	Our review of project design, technologies, and safety is provided in section 4.11.
IND33-64	Population density is just one factor that is considered out of many in evaluating the suitability of a given site for an LNG terminal. There are no specific equations or rules regarding population density but proximity to residential areas influences the analysis of noise impacts, visual impacts, etc.
IND33-65	The EIS discusses renewable and other energy sources as alternatives to the proposed project in section 3.1.1.3.

- IND33-66 87. What local, regional, and National economic factors have been included in the benefit cost analysis of the local, regional, and National economies for consideration in the FERC permit process for the Bradwood proposal.
- IND33-67 88. What are the factors in the FERC permit process that determines demand for the proposed Bradwood LNG facility in a region where NG energy demand is being met or decreasing.
89. What is the FERC procedure to include lack of need for the proposed Bradwood LNG facility as determining criteria for an LNG facilities siting permit
- IND33-68 90. What is the FERC procedure to include sendout pipeline failure and loss of life as a factor in determining criteria for the proposed Bradwood LNG facility siting permit
- IND33-69 91. What is the FERC procedure to include the inability to adequately safeguard the incoming LNG vessels or the LNG facility due to terrain and vegetative cover as a determining factor for the proposed Bradwood LNG facility siting permit.
- IND33-70 92. What is the FERC procedure that determines excessive endangered species habitat destruction with ineffective mitigation in the proposed Bradwood LNG facility site permit.
- IND33-71 93. What is the FERC procedure to include excessive food source or local business destruction into the determining criteria for proposed Bradwood LNG facility site permit
- IND33-72 94. What is the FERC procedure to include negative local, regional, or national economic benefits into the determining criteria for the proposed Bradwood LNG facility site permit
- IND33-73 95. Considering that the affected landowners have elected representatives yet each is notified that their property could be affected and notified of their rights, how is FERC through the permit process of the Bradwood proposal ensuring that each of the affected Native American entities are notified of the affects to their historic and current fishing grounds, and supporting fish habitat.
- IND33-74 96. In the FERC permit process for the proposed Bradwood LNG facility it was indicated that an LNG site comparison and rating method be used to help determine future LNG sites on the merit and demerit point system. What were the results of the FERC in the development of this method and the criteria for it.
97. In the FERC permit process for the proposed Bradwood LNG facility, will all critical criteria be compiled in table format and published prior to the FERC final issuance of permit. And how will the FERC ensure that all criteria is included and what is deemed critical criteria.
- IND33-75 98. In the permit process how will the FERC require and ensure that the owners and operators of the Bradwood LNG proposal. And future owners and operators of the proposed Bradwood LNG facilities including sendout pipelines will follow all applicable permit requirements and procedures under the law.

I therefore make this Motion/Notice to Comment and Submit Questions, for any and all parties and or documents that this issue pertains to under the above Docket No's CP06-365-000, CP06-366-000, CP06-376-000, CP06-377-000, and for the reasons and facts stated in my Motion/Notice to Comment and Submit Question for the Draft DEIS.

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Individuals

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- IND33-66 A discussion of potential impacts on local economies is included in section 4.8. The Commission's Order would include its determination of public need. See response to IND33-26.
- IND33-67 Section 1.1 explains that there is a future need for additional sources of natural gas in the Pacific Northwest. See our response to comment IND33-21.
- IND33-68 Pipeline safety is discussed in section 4.11.9. The pipeline must be constructed and operated according to DOT standards.
- IND33-69 The Coast Guard has determined that the Columbia River would be suitable for LNG marine traffic with the conditions described in the WSR (see section 4.11.5.5 and Appendix H). This includes adequate security for the LNG ships.
- IND33-70 The FERC's procedures for consulting with the FWS and NMFS regarding potential impacts on federally listed species are described in section 4.6. As stated in section 4.6.3, the FERC would not allow construction to begin until after we have concluded formal consultation with the FWS and NMFS.
- IND33-71 No food sources or local businesses would be destroyed by this project. See our response to comment IND33-59.
- IND33-72 See our response to comment IND33-66.
- IND33-73 Consultations with Native Americans are discussed in section 4.9.3. No historic Indian fishing grounds have been identified by Native Americans, the SHPOs, or cultural resources consultants that may be affected by the project. Sections 4.3 and 4.5 discuss impacts on fish habitat.
- IND33-74 Section 3 offers a discussion of alternative LNG terminal locations on the West Coast, and comparisons between LNG terminal sites in Oregon. The FERC does not do regional planning and reviews individual projects on their own merits. See our responses to comments PM2-32 and FA4-1.
- IND33-75 The Commission's project Order will outline all requirements. The FERC staff monitors authorized projects during construction and operation, conducts inspections, and reviews reports that must be submitted by NorthernStar. See sections 2.6 and 5.0.

Clifton 365
Clifton 366

- My name is Georgia Marincovich. We have homes on both ends of the county. We are landowners in Clifton Oregon which is a fishing village on the Columbia River. It was one of the first Salmon Cannery's in Oregon and is a historical fishing area and historical site. This area is also known for its wildlife, elk and deer hunting, duck and geese hunting, and has also been an area historically used by trappers of otters, neutria, beaver. There are Beaver building dams on Hunt Creek and there are sea otters that are swimming around the docks in Clifton. Interestingly Clifton does not appear on the LNG map.
- Tenasillahee Island has been sent aside as a Wildlife Refuge for White Tail Deer. It is a sanctuary for geese, ducks and eagles and also is a notable sport fishing area. Fisherman have fished the Clifton Channel for over a hundred years and there are established drifts in that area which have been cleared for drift fishing by the fishermen. The fishing cannery has a historic warehouse which is used for storing nets, and hanging and repairing nets. Fish are received at the station for delivery to market.
- My fear is that the LNG project will be built and this area will be destroyed. Hunts Creek is a valuable part of the estuary and the falls above Bradwood along with it and the surrounding wet lands could never be replacing by mitigation. When this huge project is completed this area will be destroyed. The project will suck 1 billion yes1 billion gallons of water from the Columbia River which is low on water now and in this water will be small fish and other nutrients needed for the wildlife in this area. This sucking of water for ballast will occur three times a week as I understand it.
- There are also important scientific studies on salmon smolt which is being done in this area and that project will be terminated. (The smolts will be sucked up and the estuary destroyed.) The Columbia River is one of a few rivers in the world which has a large amount of Salmon and Sturgeon and other fish. The Pacific Northwest and Alaska have the only rivers which support the Salmon Commercial Fishing Industry. We are spending millions of dollars to restore salmon habitat and wetlands in Oregon and it is hard to believe that anyone who has in education in this field would even think of allowing such a project to proceed in this area.
- We have been waiting to hear from the Federal Regulatory Agencies who have been mandated to protect our Salmon, And our environment under Section 404 of The Clean Water Act, The Magnuson-Stevens Fishery Conservation and Management Act, The Fish and Wildlife Conservation Act, The National Environmental Policy Act, The Rivers and Harbors Appropriation Act of 1899, the Endangered species Act, NOAA Fisheries Services Activities related to Wetlands Policy and Guidance. And other conservation agencies. The National Marine Fisheries Service, The Pacific Fisheries Management Council, Oregon Fish and Wildlife, Washington Dept of Fish and Game Who is protecting the environment? When did the Federal Regulatory Agencies who are to protect the environment sell themselves down the river to Politicians. Where are they in the midst of the oncoming disaster?

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Individuals

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- IND34-1 Clifton appears on a number of maps in the EIS, including figures 2.1-1, 2.1.2-1, 2.1.5-1, 4.7.1-1, and 4.7.2-1.
- IND34-2 If the LNG project is authorized and built, the area would not be destroyed. As discussed in section 4.3.2.3 and NorthernStar's terminal ESC Plan, NorthernStar would implement extensive measures to avoid and minimize impacts on Hunt Creek during both construction and operation of the LNG terminal. NorthernStar's final Compensatory Mitigation Plan would compensate for unavoidable impacts on wetlands (see section 4.4.1.2). Due to the ecological importance of Hunt Creek, NorthernStar would enter the Hunt Creek Mitigation Site (the portion of Hunt Creek below the falls) into a conservation easement to ensure the protection and preservation of the creek in perpetuity. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.
- IND34-3 LNG carriers would intake ballast and cooling water during normal operations, as is typical for all large cargo ships. The Columbia River flows at a rate of 45 million gpm more than 95 percent of the time; therefore, the amount of water that would be removed for ballast by the LNG vessels would not have a measurable effect on the volume of water in the river. See also our response to comment PM1-31.
- IND34-4 See our response to comments PM3-68 and FA1-28.
- IND34-5 Section 1.3 describes the role of various federal agencies with regulatory authority over applicable permits, approvals, and statutory requirements. See table 1.3-1 for a list of the major federal, state, and local permits, approvals, and consultations identified for construction and operation of the Bradwood Landing Project. See table 1.4-1 for a list of federal, state, and local agencies that have participated in interagency scoping meetings to help the FERC better assess and mitigate the potential environmental impacts of the Bradwood Landing Project. Many of these agencies have also provided comments on the draft EIS (see comments beginning with FA, SA, and LA). As part of the consultation process, the NMFS and FWS will develop BOs indicating whether or not the project is likely to jeopardize the continued existence of or adversely modify critical habitat of any federally listed species.

Individuals

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Response to Bradford Landing LNG

Cowlitz County should hesitate to welcome the Bradford Landing LNG project for several reasons, both related to our need for creating a sustainable community which offers and supports healthy living. Rather than embrace the chance for a small number of jobs that may or may not go to local residents or to people who choose to live in the county, we must consider the long-term impact of this project on the people and the land. The possible damage that can occur because of this LNG project versus the direct benefits to the region should stop us from endorsing this project.

While it is clear that we as car-driving, energy-consuming people must find ways to efficiently fuel our lifestyles, this LNG project should be denied in lieu of finding more suitable and less violent means of providing energy. Important to note is that the energy provided by this LNG project would not much benefit the region. Rather, as we know, pipelines through the county would carry the LNG to the main north-south pipeline which would then carry the LNG where it is needed—maybe north, maybe even east via other pipelines.

More than anything, Cowlitz County needs to aim higher than it has. We need to look toward a more sustainable future that provides more living-wage jobs to residents thus providing healthier lifestyles and supporting a social climate where individuals and families feel secure. Poverty and then, often, crime, happen most often because of a failing economy. Cowlitz County needs to find ways to attract sustainable, living-wage jobs while maintaining the natural environment and improving upon possibilities for riverfront enjoyment and public use, such as Willow Grove and other parks in the region. If we destroy these assets it only becomes more difficult to attract what we need: new businesses, companies willing to give Cowlitz County a try, employers that plan to invest and remain in the area.

It may seem a backward approach to some, but saying no to a project such as this one is a step toward envisioning a more sustainable future for more Cowlitz county residents. We must develop habits of planning that create a community where people have what they need and, eventually, feel invested in helping to keep the quality of life high. We need to create a community where it is natural that we not only consider the benefit or the detriment to our own lives and property but to the lives and property of our neighbors. As we come closer to creating a community where more people feel secure, able to earn a living wage, and see themselves as vital members of their community, we can build and prosper — without exploiting and destroying our gift, our natural resources.

This region is an attractive target for a business proposal such as that of Bradford Landing. They cannot be blamed for their proposal in our region. This region is sparsely populated, less educated, and generally poorer than the Puget Sound area, for example. Yet it is our responsibility to hold Bradford Landing accountable. Too often governments give in to the pressure of companies in order to collect a few tax dollars or for a few jobs or because we are just tired of fighting, but we must scrutinize and offer no bends in our environmental and social assessment of this project.

The following information is meant to support my argument that endorsement and support of the Bradford Landing LNG project will take Cowlitz County farther from the necessary goal of developing a sustainable community that provides both living wage jobs and a high quality of life for its residents. Bradford Landing is counting on this region to be asleep as they begin their work. They are counting on a relatively easy time inserting their will and beginning to earn profit. It is up to us to question and keep them accountable. They will not willingly comply with rigid guidelines or bow out because research shows this region not welcoming or appropriate for their project. It is our duty to question and make their work challenging and, perhaps, no longer happening in this region.

K-854

K-855

- IND35-1 1. In the EIS, numerous documents and evaluations have not been completed in time for inclusion, and it is stated in the EIS that the documents must be submitted before the close of the comment period. This does not allow time for any meaningful public review and comment of those documents, thereby thwarting the public review process. (e.g., cultural resources surveys and SHPO's review; EHA Assessment and BA; Waterbody Mitigation Plan)
- IND35-2 2. The EIS states that "the Bradwood Landing Project would require construction of facilities that do not fall under the Commission's jurisdiction" (three natural gas pipeline laterals and electric transmission facilities.) If these facilities are required for the proposed project, then not evaluating them is piece-mealing. The Biological Opinion and Environmental Impacts must address all of the project impacts, not just pieces of the impacts that fall within specific jurisdictions. The public and decision makers cannot make informed comments and decisions without understanding the full scope and impacts of the proposed project. All of the impact forecasts in the EIS are understated if they exclude portions of the project (three natural gas pipeline laterals and electric transmission facilities) and should be recalculated and recirculated for public comment.
- IND35-3 3. The document states that "we do not believe that commercial or recreational river users would be adversely affected." Commercial and recreational river users have made a very convincing argument that they will be adversely impacted both by legal traffic restrictions while LNG ships are in transit and by aesthetic changes. If this project is approved and implemented, and it is found that commercial and recreational river users will be adversely impacted, how will this impact be mitigated? How will the project mitigate adverse impacts to aesthetics that are likely to impact the recreational tourism that provides many jobs in the Puget Island, Skamokawa and Cathlamet area?
4. The vast majority of the Cowlitz PUD energy source is provided by:
Coal 2.2%
Hydroelectric (Water) 86.8%
Nuclear 10.0%
- *Includes the following fuel types - biomass, natural gas, petroleum, waste incineration and wind.
- IND35-4 Homes in the Cowlitz PUD service area are encouraged, through rebate incentives, to heat their homes and their domestic water with electricity. As industry consumes a greater percentage of Cowlitz PUD energy than residential customers do, clearly industry is supplied energy by electricity also. Washington voters passed an initiative clearly demonstrating their desire to increase renewable energy sources in the state, and in fact requiring that PUDs provide a greater mix of energy from renewable sources. Given this information, it is not at all clear that the project goal of "providing a new source of natural gas for the Pacific Northwest" is a goal shared by the people of Washington, yet it will require condemnation of land in the State of Washington for the proposed pipeline. How is the project justified if natural gas is not currently a major source of energy and does not qualify as a desired source of future energy given the requirement for increased renewable energy in the State of Washington? Bradwood Landing proponents provide a justification graph that does not include proposed and approved wind power projects, making the justification graph and the project justification suspiciously biased and not credible.
- IND35-5 5. How will the proposed safety requirements be funded? Will the shoreside firefighting capabilities be funded entirely by this project? Does this include all of the equipment and all of the expenses associated with additional personnel requirements? If not, why should local taxpayers permanently subsidize this project given the small number of permanent jobs it will bring to the area and the recreation/tourism jobs that will potentially be lost?

Individuals

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- IND35-1 See our responses to comments PM6-94 and SA1-179.
- IND35-2 The electric power line is evaluated in the EIS. The nonjurisdictional laterals would be built and operated by entities other than NorthernStar, and their exact route is not yet determined. However, we have added discussion regarding general impacts based on the likely routes that would be used. Also we have recommended a condition be included in the project Order requiring additional information about the laterals, including environmental surveys and permit approvals. See section 2.2.
- IND35-3 There is no evidence that commercial or recreational river users would be adversely affected by this project. See sections 4.7.1.4 and 4.8.1.7, and responses to comments PM1-52, PM5-31, PM5-46 and others. As the Columbia River is a working river with existing ship traffic, the presence of LNG vessels should not have significant adverse impacts on aesthetics that would impact tourism. On the contrary, the Lower Columbia Economic Development Council has stated that many landowners and tourists come to Wahkiakum County to see the ships and river traffic and that the project would not hurt growth but add to it (see comment LA1). Visual impacts are addressed in section 4.7.1.5,
- IND35-4 See the revised discussion of the project purpose and need in section 1.1.
- IND35-5 See our response to comment PM1-1 and LA3-55

6. From the final draft mitigation plan:

"Upon completion of construction, restoring the ROW, with the exception that a 10-foot-wide path directly over the Pipeline will be maintained in a herbaceous state, and trees greater than 15 feet in height will not be allowed to grow within 15 feet of the Pipeline."

from page 8 of
http://www.bradwoodlanding.com/filing-papers/2007_08/FINAL%20Mitigation%20Plan%20Revision%207%208_1_07.pdf

- IND35-6 Based upon the information in the mitigation plan, the pipeline will result in increased edge habitat and therefore has the potential to increase impacts on species that are dependent upon closed canopy forest. I could not find that these impacts were discussed, analyzed and mitigated. The plan says that the route was realigned to minimize impacts to old growth forest, but what will be the impacts of the proposed project to species dependent on closed forest canopy (increased nest predation or parasitism, etc.) and how will those impacts be mitigated? Permanent impacts to forested areas should at a minimum be mitigated at a 3:1 ratio of creation or protection:impacts. Nest predation or parasitism impacts should be evaluated through studies which should be required as mitigation to be funded by the project proponent but overseen by resource agencies. Mitigation should be outlined that will be required if the studies indicate that impacts to nest success have occurred.
- IND35-7 7. The EIS states that water quality impacts to streams will be temporary. However removal of shrubs or trees and replacement of those shrubs and trees with herbaceous or grass species for the 10-foot width of the crossing, will result in higher light penetration at the crossing and therefore higher summer temperatures in the streams. As a number of the streams are on the 303(d) List for high summer temperatures, this impact will be significant and adverse and has the potential to impact federal listed as threatened or endangered salmon species.
- IND35-8 8. The EIS states that there is no evidence that property values would be impacted on Puget Island. However, it does not appear that the comparison of properties to other LNG area property values is valid because it does not appear that the property values of those surrounding properties is based upon access to scenic quality and rural atmosphere, as is the case in Puget Island. If Bradwood Landing will increase business and commercial growth in the project area as is suggested in the discussion of property values in the EIS (4.8.2.3), growth inducing impacts to the project area must be evaluated.
- IND35-9 9. The Bradwood Landing facilities should be required to provide electrical power to docked ships so that ships will not need to idle while docked to unload. This reasonable and prudent measure would reduce impacts to air quality. Cowlitz County has significant pollution, particularly from the Weyerhaeuser Plant, which has recently been on the list of the 10 most polluting plants in the country. Prevailing winds will blow pollution from Bradwood Landing towards Longview and Portland.
- IND35-10 10. The safety distance required for other U.S. LNG projects cannot be implemented for the proposed project. Alternative locations that would permit the accepted safety standards should be seriously considered rather than waiving the standards.

Submitted By Deborah Brink

Individuals

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- IND35-6 Upland forested communities would be replanted in-kind with trees, with the exception of the portion of the right-of-way within 15 feet of the pipeline (30 feet total), thereby minimizing the extent of disturbance. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Plan and Procedures. Impacts on terrestrial wildlife species due to construction and operation of the pipeline are discussed in section 4.5.3.3. The adequacy of NorthernStar's Compensatory Mitigation Plan is discussed in the response to comment FA2-10.
- IND35-7 As described in section 4.3.2.4, all waterbodies which are 303(d) listed for temperature would be crossed using the HDD or conventional bore method. Clearing within areas crossed using the HDD method would be limited to hand trimming associated with the temporary deployment of HDD guidance (telemetry) cables. NorthernStar would maintain a riparian buffer to minimize impacts associated with vegetation clearing at waterbody crossings.
- IND35-8 While we expect the project to stimulate the local economy, that does not imply that we predict that the area around the Bradwood Landing terminal would become more industrialized, because of current zoning. However, there are other industrial facilities already existing along the lower Columbia River, such as the Wauna mill. The area around the existing Portland LNG peak shaving plant already includes "many other industrial or commercial properties." Our analysis of potential impacts on property values took into account the mainly rural nature of the project area and nearby Puget Island. Also see response to comment IND3-16.
- IND35-9 See our response to comment FA3-4.
- IND35-10 No safety standards have been waived. All LNG import terminals that would fall under FERC's jurisdiction, regardless of location, are required to comply with the same safety standards and regulations.

IND36-1

1. In the EIS, numerous documents and evaluations have not been completed in time for inclusion, and it is stated in the EIS that the documents must be submitted before the close of the comment period. This does not allow time for any meaningful public review and comment of those documents, thereby thwarting the public review process. (e.g. cultural resources surveys and SHPO's review; EHA Assessment and BA; Waterbody Mitigation Plan)

2. The EIS states that "the Bradwood Landing Project would require construction of facilities that do not fall under the Commission's jurisdiction" (three natural gas pipeline laterals and electric transmission facilities.) If these facilities are required for the proposed project, then not evaluating them is piece-mealing. The Biological Opinion and Environmental Impacts must address all of the project impacts, not just pieces of the impacts that fall within specific jurisdictions. The public and decision makers cannot make informed comments and decisions without understanding the full scope and impacts of the proposed project. All of the impact forecasts in the EIS are understated if they exclude portions of the project (three natural gas pipeline laterals and electric transmission facilities) and should be recalculated and recirculated for public comment.

3. The document states that "we do not believe that commercial or recreational river users would be adversely affected." Commercial and recreational river users have made a very convincing argument that they will be adversely impacted both by legal traffic restrictions while LNG ships are in transit and by aesthetic changes. If this project is approved and implemented, and it is found that commercial and recreational river users will be adversely impacted, how will this impact be mitigated? How will the project mitigate adverse impacts to aesthetics that are likely to impact the recreational tourism that provides many jobs in the Puget Island, Skamokawa and Cathlamet area?

4. A very small portion of the Cowlitz PUD energy source is provided by natural gas. The Cowlitz PUD energy mix, as presented on their website, is as follows.

Coal	2.2%
Hydroelectric (Water)	86.8%
Nuclear	10.0%
Other*	1.0%

*Includes the following fuel types - biomass, natural gas, petroleum, waste incineration and wind.

Homes in the Cowlitz PUD service area are encouraged, through rebate incentives, to heat their homes and their domestic water with electricity. As industry consumes a greater percentage of Cowlitz PUD energy than residential customers do, clearly industry is supplied energy by electricity also. Washington voters passed an initiative clearly demonstrating their desire to increase renewable energy sources in the state, and in fact requiring that PUDs provide a greater mix of energy from renewable sources. Given this information, it is not at all clear that the project goal

Individuals

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IND36-1 See our responses to comments IND35-1 through IND35-10

IND36-1
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of "providing a new source of natural gas for the Pacific Northwest" is a goal shared by the people of Washington, yet it will require condemnation of land in the State of Washington for the proposed pipeline. How is the project justified if natural gas is not currently a major source of energy and does not qualify as a desired source of future energy given the requirement for increased renewable energy in the State of Washington? Bradwood Landing proponents provide a justification graph that does not include proposed and approved wind power projects, making the justification graph and the project justification suspiciously biased and not credible.

5. How will the proposed safety requirements be funded? Will the shoreside firefighting capabilities be funded entirely by this project? Does this include all of the equipment and all of the expenses associated with additional personnel requirements? If not, why should local taxpayers permanently subsidize this project given the small number of permanent jobs it will bring to the area and the recreation/tourism jobs that will potentially be lost?

6. **From the final draft mitigation plan:**

"Upon completion of construction, restoring the ROW, with the exception that a 10-foot-wide path directly over the Pipeline will be maintained in a herbaceous state, and trees greater than 15 feet in height will not be allowed to grow within 15 feet of the Pipeline."

from page 8 of http://www.bradwoodlanding.com/filing-papers/2007_08/FINAL%20Mitigation%20Plan%20Revision%203%208_1_07.pdf

Based upon the information in the mitigation plan, the pipeline will result in increased edge habitat and therefore has the potential to increase impacts on species that are dependent upon closed canopy forest. I could not find that these impacts were discussed, analyzed and mitigated. The plan says that the route was realigned to minimize impacts to old growth forest, but what will be the impacts of the proposed project to species dependent on closed forest canopy (increased nest predation or parasitism, etc.) and how will those impacts be mitigated? Permanent impacts to forested areas should at a minimum be mitigated at a 3:1 ratio of creation or protection:impacts. Nest predation or parasitism impacts should be evaluated through studies which should be required as mitigation to be funded by the project proponent but overseen by resource agencies. Mitigation should be outlined that will be required if the studies indicate that impacts to nest success have occurred.

7. The EIS states that water quality impacts to streams will be temporary. However removal of shrubs or trees and replacement of those shrubs and trees with herbaceous or grass species for the 10-foot width of the crossing, will result in higher light penetration at the crossing and therefore higher summer temperatures in the streams. As a number of the streams are on the 303(d) List for high summer temperatures, this impact will be significant and adverse and has the potential to impact federal listed as threatened or endangered salmon species.

Individuals

IND36-1
cont'd

8. The EIS states that there is no evidence that property values would be impacted on Puget Island. However, it does not appear that the comparison of properties to other LNG area property values is valid because it does not appear that the property values of those surrounding properties is based upon access to scenic quality and rural atmosphere, as is the case in Puget Island. If Bradwood Landing will increase business and commercial growth in the project area as is suggested in the discussion of property values in the EIS (4.8.2.3), growth inducing impacts to the project area must be evaluated.
9. The Bradwood Landing facilities should be required to provide electrical power to docked ships so that ships will not need to idle while docked to unload. This reasonable and prudent measure would reduce impacts to air quality. Cowlitz County has significant pollution, particularly from the Weyerhaeuser Plant, which has recently been on the list of the 10 most polluting plants in the country. Prevailing winds will blow pollution from Bradwood Landing towards Longview and Portland.
10. The safety distance required for other U.S. LNG projects cannot be implemented for the proposed project. Alternative locations that would permit the accepted safety standards should be seriously considered rather than waiving the standards.

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Longview, WA 98632

Individuals

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CPQ6-366
CP06-365
FERC ORIGIN
OCT 7 NOV 14
The real reasons for the push to permit LNG facilities on the Columbia River

I hold in my hand statements published in December of 2003 by FERC

The title? CALIFORNIA NATURAL GAS MARKET OUTLOOK

IND37-1

A statement of interest. (and I quote) "Planned gas-fired electric plants in the west for the period 2003-2006 will be located along the major interstate natural gas pipelines, and along the intrastate natural gas pipelines in California."

Another FERC statement states "between 2006 and 2009, approximately 8.65 Bcf per day of natural gas may be available to California from potential LNG import terminals to be located in California and Baja, California."

Then the wars began. Here is a map showing 21 California, Baja California LNG projects put on hold or discontinued. NO LNG! WWII developed between Conoco Phillips, Marathon, Chevron, Texaco, Sempra, and Shell to gain the permit for the Baja, California LNG site. Sempra and shell joined forces and won that war.

Sempra has since dedicated 11 billion dollars to develop their west coast infrastructure. Sempra experienced a huge blow when their frontier line coal fired electric generator plant and their sunrise link coalfired electric generator plant and subsequent interstate electric transmission lines failed. After those defeats and the loss of the Frontier lines champion, California energy Czar Joseph F. Desmond, Sempra switched gears and concentrated on LNG gas fired generation. They are now working to achieve that end and Joseph Desmond is still a familiar name in that same pursuit. Joseph Desmond championed Sempra's Frontier transmission line and now champions NorthernStar's Bradwood landing as senior vice president of external affairs. A gas and oil exploration company by the name of Venoco owns GRACE, the oil platform that Northernstar has contracted to purchase for an offshore LNG terminal in California. Venoco now has plans to explore for natural gas in this region and is aware of previous explorations which discovered potential natural gas storage chambers in the region. Sempra has no storage chambers in their territories. Sempra's Chairman of finance is on the board of directors of Venoco.

Individuals

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IND37-1

NorthernStar intends for its project to serve markets in the Pacific Northwest, not California. See responses to comments PM1-23 and PM5-43.

IND37-1
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Now comes Northwest Natural Gas , a partner with NorthernStar, and TransCanada's Palomar natural gas pipeline project. It turns out that a Mr. Henry Morse a present/or former CEO of TransCanada is the General Manager of the North Baja, California pipeline, Semptra's Costa Azul LNG hook up and is also the project manager for the Palomar project which will mesh with Bradwood Landing and intends to accommodate mid-west and southwest natural gas markets. Another FERC 2003 quote, " In 2011, increased pipeline capacity in the west is projected to serve the Midwest primarily and California to a lesser extent."

There ladies and gentlemen are the dots.. You connect them and then you must deny this or any permit for an LNG terminal on the still pristine Columbia River because this is about big government, big money and to hell with a forward looking part of America which is well into the process of generating clean, green renewable energy so that it won't be a parasite on this countries energy needs.

Vonda Kay Brock
939 Fall Creek Rd.
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98632

Vonda Kay Brock

Nov 07/2007

Individuals

Individuals

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Testimony Regarding Proposed Liquified Gas Facility at Bradwood, Oregon

IND38-1

On Saturday, January 30, 1965, at 1:20 in the morning, after weeks of heavy rain, the cliff near Bugby Hole gave way and crashed into the Columbia River. A huge wave was generated, which surged across and washed over a section of the Puget Island dike, killing Haakon Gabrielsen, age 59, as it destroyed his house. Other homes were damaged, including those of Fred Aegerter and Tom Irving. Extensive damage was done to the dike, sloughs, and crops planted nearby. Representatives from the Army Corps of Engineers, Rep. Julia Butler Hansen, and other state and county agencies met to assess the area's needs. All of this, along with pictures showing the slide and the damages, was reported on the front page of the *Wahkiakum County Eagle* on February 4, 1965.

Many concerned local residents, myself included, have previously testified regarding this event, which happened only a few hundred yards from the proposed Bradwood liquified natural gas terminal. It appears, although I cannot find a clear diagram of the proposal, that the plan is to drill horizontally and run their pipeline right through the base of that very cliff.

What Was FERC's response to our testimony? Quoting from page 4-9 of the DEIS— "...we received comments about a landslide that reportedly occurred in 1965, upriver of and adjacent to the Bradwood Landing site.... We were unable to find information regarding such a landslide occurring in 1965. In addition, a review of aerial photographs from various intervals dating back to 1948 did not reveal any indications of landslides occurring within a 1-mile radius of the site."

So what was their problem? All someone had to do was walk into the local paper of record and ask publisher Eric Nelson, whose father wrote the original story and took the pictures, if he had anything on a slide in 1965. They would have got what I got in five minutes. Furthermore, the exposed cliff is still visible and anyone with an elementary knowledge of geology can see that a slide has occurred there fairly recently.

If you've lived here for more than two years, you know a basalt rockslide ends up blocking SR4 every couple of years, taking days, months or sometimes even years to clear, and that it's impossible to prevent them for happening.

Maybe that's it. No one from Northern Star or FERC has really shown much interest in *what it's like* to live around here—the fishing, the weather, the wildlife. Does this result in an inability to really care about

IND38-1

Information regarding the landslide that occurred in 1965 approximately one-half mile from the proposed LNG terminal site has been added to section 4.1.3.3. The geologic conditions at this location are not the same as at the LNG terminal location.

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what this terminal and pipeline and all these tankers might really do to us around here. Or is there maybe even an agenda which is so focused on seeing a permit awarded as to knowingly suppress any inconvenient evidence? Why has Puget Island been left out of the background in so many renderings of the facility? Just ignore potential problems until you get your deal done?

My opinion has been all along that if ^{regulators &} a person really cared about the damage from a magnitude 9 earthquake, huge floods washing out the 500ft high ridge separating Bradwood from the mighty Columbia, basalt cliffs crashing into the river generating huge waves, maybe even all this happening at once, they wouldn't ^{allow or} put the terminal and pipeline there in the first place. ^{to be sited &}

The Greeks had a concept they called *hubris*, which is just a cockiness which makes you believe you can handle anything which might come along. It was forever causing guys to end up poking out their own eyes, or the gods punishing them by having their liver eaten by vultures for all eternity. The point was that when you are playing with powerful forces, you should have a little humility. No one *really* knows how to prepare an LNG terminal for a Cascadia Subduction Zone earthquake because there hasn't been one in 300 years. But we're due for one now. Don't you do something the rest of us will all regret.

Richard Beck . B.S.
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Cathlamet, Washington 98612

ACCOMPANYING EXHIBITS:

- A *Wahkiakum County Eagle* Thursday, Feb. 4, 1965.
- B Debris from slide, 1-30-65, with view of cliff in background.
- C 40-ton shovel washed carried across the dike by wave.
- D Debris, water, and buildings damaged by wave.
- E Map of area, showing location of slide and elevation of ridge.
- F Picture of slide taken 11-6-2007.

Individuals

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IND39-1 Comment noted.

NorthernStar would implement various mitigation plans to compensate for impacts on waterbodies, wetlands, vegetation, and habitats. NSNG will go well beyond what is required for mitigation and that is why I support Bradwood Landing and the Draft EIS.

NorthernStar has proposed a very robust Mitigation Plan, including restoration programs at Hunt Creek, Svensen Island, and Delameter Creek, to create or enhance wetland habitats as compensation for wetlands and habitats impacted by its project. I trust our state agencies to get this right and for Bradwood to meet or exceed the agencies standards.

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CP-316
CP-365

IND39-1

K-864

Individuals

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Name: Richard Parker
Street: 1910 SE 3rd St.
City: Astoria
Zip: 97103

Signature: Richard Parker

1 of 2

Name: Richard Parker
Street: 1910 SE 3rd St.
City: Astoria
Zip: 97103

Signature: Richard Parker

2 of 2

Individuals

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Testimony to FERC
Public Meeting, November 8, 2007
Hilda Lahti School, Knappa, Oregon

07 Nov. 14
Docket No. CP06-365-000
Docket No. CP06-366-000

Bradwood Landing, LLC
NorthernStar Energy, LLC

IND40-1 Evidence submitted to you by many other people proves there will be substantial air and water pollution and environmental damage resulting from the construction and day-to-day operations at Bradwood. Additionally, this site is known to be at risk for a substantial earthquake, and the pipeline routes (through Washington and the Palomar line) snake through miles and miles of geologically unstable and unsafe land.

IND40-2 So what will happen in an emergency? The DEIS and local emergency resources share one common trait: both have significant, scary gaps.

The Knappa Fire District has "sole responsibility for emergency response and mitigation for incidents at Bradwood." To compile its "Resource Gap Analysis," the Fire District researched the four existing LNG terminal facilities in the U.S., incidents at the 2 LNG peak shaving plants in Oregon, and information from the Coast Guard and NorthernStar Natural Gas. I am attaching the report to for your consideration.

In its testimony submitted to the Clatsop County Commissioners on October 18, 2007, the fire district identifies massive gaps in its resources. As we all know, emergencies occur in every industry from a variety of causes. More employees, vehicles, equipment, training, and a new fire station facility within 3 miles of Bradwood are needed to cope with just the "predicted routine emergencies" at the terminal.

The report says that even these improvements will NOT be enough to deal with "catastrophic incidents." The report does NOT address resources needed for emergencies on LNG tankers, along the shipping channel, the proposed pipeline route, or in neighboring forests and communities. It does NOT include resources needed by other emergency responders, such as police, security, HazMat, and ambulances.

The Knappa, Astoria, Warrenton, and Clatskanie fire districts will need a total of 15 more full-time employees and 6 interns to provide what the Knappa district calls a "conservative, effective response to incidents at Bradwood Landing." The district will need numerous annual trainings for responders. It will need four specialized fire, rescue, and communications vehicles; a

IND40-1 Earthquake and landslides hazards and mitigation are discussed in sections 4.1.3.3 and 4.1.4.3.

IND40-2 See our response to comment PM1-1 and LA3-55

K-866

Individuals

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IND40-2
cont'd

watercraft; combustible and/or multi-gas detectors for all emergency vehicles and personnel; satellite communications equipment; and much more.

The fire districts can't afford these essential resources – and NorthernStar, the Coast Guard, the State of Oregon, Clatsop County, and the federal government have NOT offered to pay for them.

At the Clatsop County Planning Commission hearing in July, 2007, NorthernStar said it would have its own fire-fighting team on-site at Bradwood. However, after prolonged prodding from the Commissioners, the company admitted this would not be a free-standing unit, but simply assorted employees who would somehow manage to leave their own essential jobs at a moment's notice. The company did not reveal the equipment, personnel, or training it would provide. Of course, this assumes that NorthernStar would actually run and operate the Bradwood terminal, instead of selling the permitting rights to a major gas industry corporation.

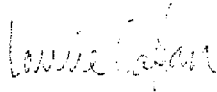
Environmental damage from even a routine industrial accident at Bradwood could be widespread, long-term, and devastating. It's hard to imagine what the impact of an actual catastrophe would be, especially without massive spending for equipment, personnel, and other resources throughout the estuary and beyond.

Why would the federal government even consider siting such a complex and potentially dangerous facility without ensuring the necessary resources to protect it?

This foolhardy proposal needs to die, NOW.

The reputation of FERC is suffering because of its enthusiastic support for the LNG industry. More and more Americans believe the agency should be called Friend to Every Resource Company, or, Fleeing - a polite 'F' word - the Environment and Rural Communities.

Please fulfill your responsibilities as a regulatory agency and protect the public from this horrific project. FERC must reject LNG at Bradwood.



Laurie Caplan
766 Lexington Avenue
Astoria, OR 97103
503-338-6508

K-867

07 Nov 14
C106-365
C106-365

Comments for the Public Record by Jerry Havens
FERC Public Hearing on Bradwood Landing
November 8, 2007 - Astoria, Oregon

IND41-1

Thank you for permitting me to comment at this public hearing. I am appearing as a scientist and as a concerned citizen to inform you of potential problems in FERC's approval of vapor cloud exclusion zones prepared for the Bradwood Landing DEIS.

Recent events indicate to me that FERC's compliance with the Congressional mandate to consider remote siting of LNG terminals in order to protect public safety is being based largely on exclusion (safety) zones required by U.S. Department of Transportation regulation 49 CFR 193. As a result, the establishment of such exclusion zones, which are mandated for land-based facilities only, has become the key method by which sufficiently remote siting is insured. I believe that such methods as are presently applied do not and can not insure the public safety as intended. In the limited time available, I will comment only on the vapor cloud exclusion zone determinations.

Presently, only two modeling models are approved for determining vapor cloud exclusion zones for LNG terminal applications. The DEGADIS model, of which I am a co-author, was developed with support of the U.S. Coast Guard and the Gas Research Institute. Approved for use in the federal regulation in the early 1990's, DEGADIS does not account for any holdup of LNG vapor by dikes or other obstructions (to flow). Because of the need for models which can account for such complicated effects (the real world), the FEM3A model was developed as a result of a ten-year-long research effort supported by the Gas Research Institute and a consortium of international LNG interests, for which I was the Principal Investigator. FEM3A, approved in 2000, is clearly specified in 49 CFR 193 as the model that must be used if vapor holdup by impoundments or vapor fences is to be taken into account.

Here, the applicant attempts to take the (vapor-holdup) effect of the impoundment into account without using the only permissible method (FEM3A) for doing so. Instead, it

Individuals

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IND41-1

See our responses to comments IND73-1 through IND73-5.

IND41-1
cont'd

uses DEGADIS coupled with an absurd assumption that the LNG vapor evolved from a spill would accumulate in the impoundment without mixing with air. In effect, the applicant assumes that zero LNG vapor would be released from the impoundment during the first several critical minutes after a spill, when the rate of vapor generation from the spilled LNG is the greatest. This assumption has the effect of substantially reducing the calculation of the size of the vapor exclusion zone. And -- most important -- the assumption has been proven to be wrong. Experiments have conclusively shown that the LNG vapor does not simply remain in an impoundment until the volume of the pure, unmixed and unwarmed vapor exceeds the volume of the impoundment. But that absurd, and demonstrably wrong, assumption is the basis for the calculation of the vapor exclusion zone in this case. To be reasonable, the calculation must be redone, either using DEGADIS without attempting to take the effect of vapor holdup in the impoundment into account, or by using FEM3A, which correctly factors in the effects that the impoundment does have.

I believe that the vapor cloud exclusion zones determined in the DEIS fail to provide for public safety as intended by 49 CFR 193 in two other ways:

- The design spill used by the applicant here has been arbitrarily specified as the breakage of a 6-inch line on the cargo unloading line for the facility, with a ten-minute duration spill of 140,320 gallons, while the impoundment volume into which the spill would occur has been sized (and therefore deemed credible) to account for a ten-minute duration spill of 529,091 gallons resulting from a full rupture of the ship unloading line. My review of eleven other environmental impact statements shows DEIS approval for design spill from the ship unloading line ranging from 28,900 gallons (Keyspan) to 812,000 gallons (Trunkline). I do not understand how FERC can approve such a large variation in the design spill which determines the extent of the vapor cloud exclusion zone. After all, the ship unloading lines, as well as the arrangement of the smaller lines serving the unloading line are all based on similar technology and design specifications. Since the vapor cloud zone determinations are directly related to the size of the

Individuals

IND41-1
cont'd

spill. the lack of consistency shown in the design spills selected by the various applicants could have the appearance of simply determining the size of the spill that the property line distance allows.

- The determination of the vapor cloud exclusion zone has been made assuming a wind speed of 2 m/s. This assumption is not conservative; although allowed by 49 CFR 193, the basis for this assumption predates scientific findings that 2 m/s wind speed cannot be assumed to be worst case. As both theoretical models and experimental evidence indicate, the maximum downwind safety zone can occur at a wind speed higher than 2 m/s (4.5 mph), and such higher wind speeds are not an unusual condition. In this regard, I point out that the fire radiation exclusion zone is required to be determined, as Bradwood Landing appears to have done, for the wind speed that maximizes the exclusion zone. The same reasoning is applicable to the determination of the vapor cloud exclusion zone.

Individuals

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IND42-1

CP 06-365
CP 06-366
11/4/07
Comments of Jim Kodama on the Bradwood Landing DEIS 11/08/07

I read in the paper that tonight we'd hear from Jerry Havens on the subject of LNG. So I spent a few minutes on Internet and here's what I found.

To believe Mr. Havens' claim that he is not an LNG proponent or opponent is to ignore the obvious. He is simply a hired gun, brought in by project opponents, to scare the bejeezus out of people who aren't familiar with the details of this project, the safety record of the industry, or the science behind LNG. Mr. Havens would have us live our lives in fear that there's a terrorist hiding behind every tree and bush in the Pacific Northwest, just waiting for the chance to get us.

The US Coast Guard is aware of the risks posed to LNG carriers from terrorists as well as the robust construction of LNG carriers. The measures identified by the Coast Guard are designed to "harden the target" and make it difficult for a terrorist to damage an LNG carrier.

In 2004, Sandia National Laboratories published "Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water". This 167 page report has been widely accepted as accurately representing the risks of an LNG spill over water. The report discusses the issues relating to a massive spill into the water and it also discusses the probability of such an event. Bradwood Landing used the Sandia Labs guidance to analyze their project.

The probability of an accidental release of LNG is extremely unlikely. In fact, it's close to zero. On the Columbia River, LNG carriers will be tethered to tugboats and will travel at 12 knots or less. The bottom of the river is mostly sand. Given these factors and the excellent safety record of the pilots, it is extremely unlikely that an LNG carrier would suffer an accident that could breach the cargo tanks. In fact, to date, there has never been a significant spill of LNG from any LNG carrier.

It turns out that Mr. Havens has testified against many LNG projects across the county. He was recruited by the mayor of Fall River, Massachusetts to oppose the Weaver's Cove LNG project. He has filed testimony against Sound Energy Solutions in Long Beach, California.

IND42-1

Comment noted.

K-871

IND42-1
cont'd

And for some people here today, Mr. Havens should be a familiar face. In 2005, an environmental group opposed to Bradwood Landing brought Mr. Havens to Astoria to deliver his fear-mongering stump speech.

So I have to wonder, Mr. Havens, who is paying for you to be here today? I challenge you to tell us.

Despite his testimony, since Mr. Havens made his concerns known to the Secretary of Homeland Security in Feb. 2004, FERC has issued (14) separate Final Environment Impact Statements, related to LNG facilities. I have included a list of these in my written testimony.

Finally, most telling was the rebuttal testimony I came across in the Weavers Cove project, and I quote, "Finally, and perhaps most importantly, Dr. Havens is not an expert on the safety and security of LNG vessels or the security of LNG terminal facilities. He has no identifiable experience whatsoever in analyzing terrorism events, their effects, their probabilities or the potential to mitigate such threats."

It concludes, "In summary, based on these flaws, Dr. Havens' modeling, and his criticisms based on that modeling, are erroneous, unreliable and add nothing to this record. His opinions, whether voiced to the Commission or to the Congress, are just that, opinions, but opinions nevertheless, unsupported by scientific or technical analysis."

Thank you,

Jim Kodama
Kelso, Washington

Project Name	Docket No.	Date FEIS was issued
Calhoun LNG	CP05-91	8/10/2007
Southern LNG Elba III Project	CP06-470	8/3/2007
Casotte Landing	CP05-420	12/22/2006
Gulf LNG Energy (MS)	CP06-12	11/24/2006
Creole Trail	CP05-360	5/5/2006
Crown Landing	CP04-411	4/28/2006

Individuals

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Cove Point	CP05-130	4/28/2006
Port Arthur LNG	CP05-83	4/28/2006
Ingleside Energy	CP05-13	6/10/2005
Golden Pass	CP04-386	6/3/2005
Weaver's Cove	CP04-36	5/20/2005
KeySpan LNG [Denied]	CP04-223	5/20/2005
Vista del Sol	CP04-395	4/15/2005
Corpus Christi LNG	CP04-37	3/7/2005
Sabine Pass LNG	CP04-47	11/12/2004
Freeport LNG	CP03-75	5/28/2004

IND43-1

About 125 ships per year would enter and travel along the Columbia River to deliver cargo to the LNG terminal, resulting in about a 7 percent increase in traffic, still well below historic high ship traffic levels.

0 Feb 345
0 Feb 346
01 Nov 14

ORIGINAL

I believe that Bradwood Landing will continue to meet and exceed the standards of Federal, State and County Agencies, as the project continues through the permitting process.

- Water intakes by LNG ships at berth would be screened to prevent the entrainment or impingement of Salmon or Steelhead smolts.....this sets a high standard for shipping on the Columbia.

Individuals

IND43-1 Comment noted.

Name: Frank Aquisto
Street: 833 S. Edgewood
City: Seaside Or
Zip: 97138
Signature: [Signature]

Name: James H. Dethm
Street: 7020 E. Woodland Rd
City: Portland
Zip: _____
Signature: _____

Name: Dale Titusell
Street: _____
City: _____
Zip: _____
Signature: [Signature]

Individuals

Federal Energy Regulatory Commission
Public Comment Meeting
November 8, 2007
Knappa, Oregon

RE: CP06-365
NorthernStar Natural Gas, LLC
Proposed Bradwood , Oregon LNG Regasification Terminal

Thank you for one last opportunity to publicly express my concerns with the DEIS as printed. I hold a degree in Biology, Master's Degree in Technology and advanced certification in brain research. I am not an amateur to research and understand the hours of commitment FERC staff and 3rd party contractors have put into this document. As I stated last evening, though, it has many, many missing pieces and I can't help but wonder if that was done deliberately. If so, one's imagination could run overtime as to why. So let imaginations fly. Many times, it's not imagination but reality that results.

IND44-1 Mr. Friedman, you have stated multiple times over the course of this week that landowners could go to NorthernStar to get an answer as to IF the pipeline was on their property and at what mile marker. All my husband could get for an answer was, "The drill site is not on your property." Tonight, Gary Coppedge of NorthernStar told my husband, once again, the drill site is not on our property and that, in fact, they, NorthernStar did not know where the drill site was to be on *either* side of the river. The revised Cowlitz County Geohazard report supported our claims that the hillside near the proposed HDD drill site to have been on our property was unstable and further recommended three possible alternative placements for that drill site. Two recommendations would have seriously increased cost to NorthernStar as well as require additional HDD's up the Abernathy Creek draw. The third alternative was to move the drill site west of the proposed site. That would mean further up on top of the ridge within the association of homeowners to which we belong. Based on a neighborhood survey on feelings toward the proposed NorthernStar LNG project and the relative location of KB Pipeline within our neighborhood, only one piece of property was left.

The proposed major horizontal directional drill site for placement of the 30-inch pipeline under the Columbia River has been moved and not by just a few feet but over the width of at least, 2 five acre parcels, or, approximately 1350 feet or about a quarter of a mile. This new location has not been communicated to landowners in the area and will be located within a few feet of a year-round creek that feeds into Mill Creek, one of the last NATIVE SALMON RUN creeks left on the entire Columbia River. Along each side of the unnamed creek wetlands exist. Eagles, owls, raccoons, deer, elk, many birds and other wildlife call that area home.

Furthermore members of the homeowner's association,--Mr. Coppedge, Mr. Garrett and any other NorthernStar representatives who may be present--have the right to know the location of that drill site because you will affect their lives far more than the owner of that one piece of property who has no plans to build on it, now or in the future. It is our association's private road you will use to access that property. Your permission from us is needed as well.

Individuals

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IND44-1 See our responses to comments IND72-1 and IND72-2.

IND44-1
cont'd

Because all of this information is conspicuously missing from the DEIS, and because the location change was known by the FERC prior to issuance of the DEIS, I, therefore, formally demand all further discussion and consideration of this Draft Environmental Impact Statement be stopped until all pertinent environmental, water quality, road, safety, socio-economic, affected residential and any other additional necessary information is gathered and reports submitted to the appropriate agencies for their review and comment AND a new draft environmental statement released for comment by the public.

My formal request along with supporting documents is being formally submitted by electronic and regular mail service with copies submitted to the State of Washington, Senators Cantwell and Murray, Congressman. Brian Baird, Mr. Brian Hatfield, Mr. Dean Takko, Mr. Brian Blake, Cowlitz County Commissioners, the Cowlitz County Planning Department, as well as appropriate environmental agencies.

Thank you.

Marjorie A. Castle
212 Whitewater Road
Longview, WA 98632

Individuals

Filed: 2007, Nov. 15

C 06-366
C 06-365

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

William&Doris Dragich Trust
954 Fall Creek Rd
Longview, Washington State, 98632-9741
360-425-4786
DragichW@aol.com

November, 8th, 2007

MOTION/NOTICE TO COMMENT
AND SUBMIT QUESTIONS ;DEIS
SCOPING MEETING.

IN DOCKET, NO.CP06-365-000
NO.CP06-366-000,NO.CP06-377-000
Northern Star Energy LLC, Bradwood
Landing LLC Natural Gas Import
Terminal Facilities& Associated
Facilities at Bradwood,Clatsop County
Oregon,Hilda Lahli Elementary School
42535 Old Highway 30,Astoria Oregon
FERC file ID=11471107

The William&Doris Dragich Trust : do file this Motion/Notice to Comment and Submit Questions with the Commission as a party or parties that are requesting to comment and submit questions based on these facts:

Questions for The Federal Energy Regulatory Commission in the siting of Liquefied Natural Gas at Bradwood, Oregon, Lower Columbia River Region Draft DEIS:

1. On September 7th,2005 an original list of 512 landowners was submitted to FERC by Northern Star Energy LLC's legal representative Van Ness and Feldman. Copies were sent to FERC and contractor Natural Resources Group.At that time no CEII was proclaimed and no privacy claim invoked. All future request for landowner lists or pipeline route maps were denied.
2. On December 14th,2006 a Biological Assessment Meeting on the Bradwood proposal was held.No notification was given to interveners and interveners who were present were denied attendance and reasons as to why they were denied attendance. In reference to ex parte communication it is noted on the meeting roster that John Buchovecky, Northern Star legal representative and Gary Coppedge,Northern Star Vice President were in attendance.
3. In a FERC manual titled: Ideas For Better Stakeholder Involvement; Page 9,Industry Options Chapter,Titled:Make Route Information Easy and Understandable. Northern Star either has claimed exemption under item 4 of the Freedom of Information Act, or CEII exemption under FERC Rule 630.

I therefore make this Motion/Notice to Comment and Submit Questions, for any and all parties and or documents that this issue pertains to under the above Docket No's.CP06-365-000, CP06-366-000, CP06-376-000, CP06-377-000, and for the reasons and facts stated in my Motion/Notice to Comment and Submit Question for the Draft DEIS.

Kimberly D. Bose
Secretary
Federal Energy Regulatory
Commission
888 First Street N.E.
Washington D.C. 20426

Individuals

45

IND45-1 See our responses to comments PM1-17, PM1-18, and PM6-82.

K-878

Individuals

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November 9, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Subject: PF07-13-000 Motion to Split the Palomar Application and Combine Segment 2 with Bradwood Landing, CP06-365-000, et al.

Dear Ms. Bose

I request FERC order Palomar to split its application into two parts and that FERC consider Segment 2 as integral to the Bradwood Landing approval process, CP06-365-000, et al.

The motion is made based on the following evidence:

1. The Daily Astorian (Nov. 27, 2006, *Who knows where the gas will go?*) reported the following (highlights added):

Joe Desmond, NorthernStar vice president of external affairs, said the Bradwood project doesn't need the Palomar gas line because it has its own pipeline - that hooks into the Williams Northwest system.

But Williams Northwest Pipeline spokeswoman Michele Swaner said her company doesn't have room for all the gas NorthernStar plans to import to its Bradwood facility.

"It does make sense that they signed up on Palomar," she said. "Physically, we're capable of receiving it, but it would take the place ... of all the other gas supplies flowing in that system both north and south. We have long-term agreements in place. ...We're unlikely to disrupt the relationship we already have with our customers right now."

Even with the projected declines in supply from Canada and the Rocky Mountains, she said, there's not enough demand for gas in Oregon and Washington to absorb the full volume from Bradwood. But she said there is demand for that volume in California. Williams has a stake in a different LNG pipeline that would run east from the proposed Jordan Cove LNG terminal in Coos Bay to meet the Williams pipeline south of Roseburg, near the California border.

Peter Hansen, chief executive officer of the competing LNG development company, Oregon LNG, said his company had to change its pipeline route because - even without gas from Bradwood Landing - the Williams pipeline at Kelso was full. Oregon LNG now plans to run a 117-mile pipeline similar to the Palomar line down to Northwest Natural's Molalla hub.

"That's why Bradwood's doing the Palomar pipeline, because they have recognized the Williams pipeline doesn't have room," Hansen said.

IND46-1

We have added new text to section 1.0 describing the capacity of the Williams Northwest pipeline system for the natural gas from the Bradwood Landing Project. Natural gas supply and demand in the Pacific Northwest are addressed in section 1.1. See also our responses to comments PM1-10 and PM3-50. The Jordan Cove LNG Project and Oregon LNG Project are discussed in section 3.1.3.4.

IND46-1

K-879

IND46-2

2. Page 2-28 of the Bradwood Landing DEIS describes the Palomar pipeline as follows,

[T]he Palomar pipeline would then proceed northwest to interconnect with Northwest Natural's existing storage field at Mist. From Mist, the Palomar pipeline could branch off to serve the Bradwood Landing LNG facility.

At best this description is erroneous; at worst misleading. An honest description of the Palomar pipeline would have been, it makes a bee-line to Bradwood with a possible spur to Mist; a spur that is not now part of Palomar's NOI.

FERC, thus far, has steadfastly declined to consider Palomar as a predictable, and now necessary, outcome of Bradwood. It is a matter of fact that Segment 2 of Palomar requires Bradwood (especially now that the Mist spur is clearly off the table). The evidence above points to Palomar not only being necessary to Bradwood, but perhaps primary or even its sole outlet.

I believe Palomar was, in the first instance, not properly considered in Bradwood, based in part, on an erroneous description of the Palomar purpose and alignment.

FERC should correct these oversights by granting this motion.

Regards,
Marc Auerbach
Birkenfeld, Oregon

Individuals

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IND46-2

See our response to comments PM1-24 and CO4-1 regarding the purpose and route of the Palomar pipeline. The Palomar pipeline is not inter-dependent on the Bradwood Landing Project, and will be studied separately by the FERC, and reviewed on its own merits.

Sirs:

IND47-1 I am opposed to the proposed LNG facility at Bradwood Landing in Oregon. This development is not needed in Oregon. We do not need the amount of gas the project will supply. We are working in Oregon to reduce our fossil fuel use. We need to be creating more renewable, cleaner, and safer energy sources.

IND47-2 This facility would endanger Oregon's people, environment, and certain aspects of its economy. The project will require the construction of hundreds of miles of pipeline which will result in the loss of thousands of acres of forests and farms. The necessary dredging of the Columbia River will degrade salmon habitat. The facility will require security buffers that will impede commerce and recreation. The facility will basically be a giant bomb waiting to go off either accidentally or by terrorist attack.

IND47-3 The facility would benefit primarily energy companies and California where most of the gas would go. Californians have already rejected proposals such as these in their state because of the many risks involved. Why should Oregonian's shoulder California's risk and environmental degradation?

Sincerely,
John Peterson
Portland, OR

Individuals

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IND47-1 See the revised discussion of the project purpose and need in section 1.1 and the expanded discussion of renewable energy sources as alternatives to the project in section 3.1.1.

IND47-2 The Bradwood Landing pipeline would be 36.3 miles long. Impacts on salmonids would be mitigated and the impacts of the safety/security zone around the LNG ships would be minor. Safety and security measures would be implemented to protect against accidental or intentional LNG releases.

IND47-3 NorthernStar intends for its project to service markets in the Pacific Northwest, not California. See our response to comment PM1-23.

Individuals

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Robert E. QUOIDBACH Enterprises 611 Shamrock Road
Longview, Washington 98632-9638 (360) 423-8767
E-Mail: shamrock98@kalama.com

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: Docket No. CP06-365-000 et al.

November 28, 2007

To Whom It May Concern:

In general, I find the venture capitalists promoting this concept have misnamed themselves.....not "NorthernStar" but "NorthernScar" would be more appropriate for the environmental scar they are proposing for the Lower Columbia Drainage area.

IND48-1 The greatest flaw in this DEIS is its failure to show a real purpose and need. NorthernStar's business plan appears to be.....if we build it, they will buy it. Section 1.1 Purpose and Need, pg. 1-3 states this project will "provide up to 1.3 BCFD of natural gas to the Pacific Northwest." On p.1-4 they state "For a high growth case, the Northwest Gas Association predicts regional gas average demand to reach 2.6 BCFD, an increase by about 25 percent over current levels." Thus, NorthernStar expects to supply 50 percent of the projected gas demand with their more expensive LNG. They fail to explain how or why.

IND48-2 Another flaw in this DEIS is its failure to consider the capacity of the 20 inch KB pipeline now flowing East through Cowlitz County. If its flow is reversed, the proposed 30 inch line could be reduced to a 22 inch line. The construction 100 foot scar could then be reduced to 50 feet and the permanent easement to 30 feet. This would cut the environmental impact in half.

IND48-1 See the revised discussion of the project's purpose and need in section 1.1, and our response to comment IND33-26.

IND48-2 The existing KB pipeline already serves the Beaver power plant. The KB pipeline flows in the opposite direction of the proposed Bradwood Landing pipeline. The KB pipeline transports gas from the existing Williams Northwest system west to Beaver. The KB pipeline would be too small to handle all the natural gas from the Bradwood Landing LNG terminal, and could not meet all of the proposed project objectives.

K-882

Individuals

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IND48-3

As a property owner with the KB pipeline running through three quarters of a mile of my forest land, plus my experiences with a B.S. in Civil Engineering, forty five years as an industrial contractor, ten years as a Diking District #1 supervisor and ten years on the Washington State Forest Practices Appeals Board, I feel well qualified to critique the pipeline portion of this DEIS. My tree farm at 230 Grasset-Poston Road will be adjacent to the proposed pipeline for one half mile and then impacted by it for one quarter mile.

Maybe if we listened, history wouldn't have to repeat itself? I have experienced the false promises of the KB group: to replant trees, to plant for wildlife, to maintain a privacy screen, to clear only ten feet on top of the pipe.....none of which happened because permits are granted but nobody follows up.

This draft DEIS contains pipeline gray areas that need attention:

4.8.3.5 Tax Revenues, pg. 4-351 states: "Property taxes on the pipeline would be assessed by and paid to.....Cowlitz County in Washington." Property taxes should be clearly specified as real estate & personal property taxes. Current County policy unfairly charges the landowner for real estate taxes and the pipeline companies only for personal property taxes. In my case, three acres of forest land have been converted to Industrial land with no back taxes required and KB rides free with me paying their land tax. NorthernStar should be required to pay all current real, personal property and conversion back taxes.

4.4.2.3 Existing Upland Vegetation, pg. 4-115 states: "In areas where timber would be harvested, the trees would be cut and stacked for commercial sale. The logs would be hauled to the market and the proceeds of the sale collected by the property owner." This is not the way it is done. NorthernStar should conduct a timber cruise, pay for the timber rights, take out DNR forest practice permits and pay for the value of any reproduction trees that are not yet ready for market.

2.3.3, Pipeline and Associated Facilities, pg. 2-35 states: "Where the Bradwood pipeline would be adjacent to the existing KB pipeline, the temporary construction right-of-way would overlap onto the existing pipelines permanent right-of-way. The overlap would be up to 10 feet....., but no closer than 15 feet from the existing pipeline." Will the property owner be paid for this encroachment? On a large portion of my land the KB pipe is 20 feet from the property line. Thus only 5 feet of spoil could be deposited if the 15 feet takes precedent.

IND48-3

We will require NorthernStar to follow through with all mitigation and restoration commitments. Section 2.5 describes our environmental compliance inspection and monitoring program. Condition 14 requires the use of third-party environmental compliance monitors.

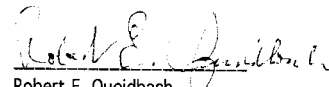
Individuals

48

IND48-3
cont'd

Finally, there should be a standard easement with site specific clauses plus a liability hold harmless clause, a statement that NorthernStar pays all current real estate and personal property taxes, plus any conversion back taxes, and upon the 50 year (pg. 2-63) abandonment of the pipeline there shall be a recorded reconveyance and release of the right-of-way easement.

Respectfully submitted,


Robert E. Quidbach

ORIGINAL

COMMENT ON FILING
Submission #2
FERC draft Environmental Impact Statement
OEP/DG2E/Gas3
Bradwood Landing LLC
NorthernStar Energy LLC
Docket No. CP06-365-000, CP06-366, et al

FILED
OFFICE OF THE
SECRETARY
2007 DEC -5 P 3 10
FEDERAL ENERGY
REGULATORY COMMISSION

20 November 2007

By: James N. Reed
P.O. Box 648
184 Columbia Street
Cathlamet, Washington 98612
jnreed48@hotmail.com

This is my second set of submissions on the draft Environmental Impact Statement for the Bradwood Landing proposal. It should be read as supplementary to the first set of comments. I attempted to submit this material electronically but the FERC website could not confirm my user address.

Expertise

As mentioned in my former filings, I am retired after spending six years in senior management positions within the upstream LNG business (production, liquefaction, and transportation). My former company has been in the upstream LNG business since the late 1960's. In addition, I have also held the positions of Chief Engineer for international operations and of Chief International Negotiator.

I have visited some half dozen LNG terminals in the Far East to understand the operating procedures and conditions that might affect the delivery of LNG but do not have professional qualifications in LNG terminal design or operation. I am relatively new to the Pacific Northwest and therefore am unfamiliar with specific conditions along and in the Columbia River and its estuary.

Individuals

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K-885

This second set of comments is a more generalized discussion of the draft Environmental Impact Statement than my first submission; this submission identifying issues missing or omitted. Consequently, it does not generally contain section or page references.

MITIGATION VS. IMPACT

IND49-1 I AM NOT FAMILIAR WITH THE DETAILED REQUIREMENTS OF DOMESTIC U.S. ENVIRONMENTAL IMPACT STATEMENTS. INTERNATIONALLY, THEY CAN BE DESCRIBED AS 'BEFORE AND AFTER' STATEMENTS. INTERNATIONAL ENVIRONMENTAL IMPACT STATEMENTS ARE NOT JUST A GENERALIZED DISCUSSION OF MITIGATION EFFORTS AS SEEMS TO BE THE CASE WITH THE SUBJECT DRAFT EIS. INTERNATIONAL ENVIRONMENTAL IMPACT STATEMENTS ASSUME THAT MITIGATION IS INHERENT IN THE ORIGINAL PROPOSAL. SO A CONCLUDING STATEMENT SUCH AS "WE INTEND TO INSTALL FISH EXCLUSION SCREENS ON THE WATER INTAKES" WOULD BE UNUSUAL IN AN INTERNATIONAL EIS.

LET ME BROADEN THAT EXAMPLE. THE BRADWOOD LANDING SCHEME CALLS FOR SALMONOID EXCLUSION SCREENS. IT DOESN'T TELL US WHAT THE POPULATION IS BEFORE AND IT DOESN'T TELL US WHAT THE POPULATION WILL BE AFTER. THERE IS NO KILL RATE ESTIMATE I CAN FIND FOR THE USE OF MITIGATION EXCLUSION SCREENS. ALL WE KNOW IS THAT THE FACILITY WILL HAVE EXCLUSION SCREENS OF UNKNOWN EFFICACY.

ONE SHOULD COMPARE THIS APPROACH TO THAT OF THE BONNEVILLE DAM AUTHORITY. THE AUTHORITY HAS PERFORMED STUDIES THAT SHOW 85% OF SALMONOIDS SURVIVE PASSAGE THROUGH THE TURBINES. THE FISH SKIMMING BYPASS SYSTEM FURTHER REDUCES THE LOSS BY A VARIETY OF NUMBERS DEPENDING ON THE MODE OF OPERATION. THIS IS MORE SIMILAR TO WHAT I WOULD EXPECT IN AN INTERNATIONAL EIS.

FURTHER BROADENING MY EXAMPLE REDUCTIO ABSURDUM, I RECALL THE ORIGINAL NORTHERNSTAR PROPOSAL TO USE AIR HEAT EXCHANGERS (INSTEAD OF SUBMERGED COMBUSTION VAPORIZERS IN THE CURRENT PROPOSAL). IF THIS EIS WERE TO DRAFTED FOR AIR HEAT EXCHANGERS, INSTEAD OF SPECIFYING THE RESULT PRODUCING "X" GPM OF RAINFALL OR FOG (INSERT YOUR OWN NUMBER), IT WOULD SAY NORTHERNSTAR WOULD MITIGATE THE EFFECTS OF RAINFALL BY REQUIRING ALL THEIR EMPLOYEES TO WEAR HATS AND THOSE EYE

Individuals

49

IND49-1 Section 4.5.2.1 has been revised to include additional information on the potential impacts on aquatic resources, including salmonids, due to entrainment and impingement. As described in section 4.5.2.1, fish screen designs have been reviewed and approved by the NMFS. Furthermore, we have recommended that NorthernStar conduct post-construction monitoring to assess the effects of impingement and entrainment from use of the screened water supply system on juvenile salmonids during terminal operations and provide annual reports to both the FERC and NMFS regarding the efficacy of the screened water intake system, which would identify any problems and address how such problems would be rectified; therefore, impacts on fish in the vicinity of the intake screens are not expected to be significant. See also our response to comment PM1-31.

K-886

IND49-1
cont'd | GLASSES WITH WINDSHIELD WIPERS. THIS WOULD NOT BE AN ENVIRONMENTAL BEFORE AND AFTER STATEMENT, AS I AM ACCUSTOMED IN THE INTERNATIONAL ENERGY BUSINESS.

ABANDONMENT

IND49-2 | PRESUMABLY THE BRADWOOD FACILITY WILL EXPERIENCE REMEDIAL WORK AT THE END OF ITS USEFUL ECONOMIC LIFE. WHILE EXTENSIVE DISCUSSION IS NOT USEFUL AT THIS STAGE, INASMUCH AS REMEDIAL TECHNIQUES EVOLVE OVER TIME, A STATEMENT AS TO THE END CONDITIONS SHOULD BE CONTAINED IN AN ENVIRONMENTAL IMPACT STATEMENT.

I DO NOTE THAT THERE IS NOW SOME OUTSIDE DISCUSSION OF END-LIFE OPERATIONS NOT ADDRESSED IN THE DRAFT EIS. IN THE ENERGY BUSINESS, WE DON'T TYPICALLY CALL IT DECOMMISSIONING. THIS SOUNDS MORE LIKE A MILITARY TERM TO ME. IN THE OIL AND GAS INDUSTRY, WE CALL IT ABANDONMENT. TECHNICALLY, ABANDONMENT IS A LOT OF WORK BUT IS REALLY A NO-BRAINER. IT IS THE REMOVAL OF THE FACILITIES, THE CLEANING OF THE SITE AND THE RESTORATION OF THE SITE TO A STANDARD SPECIFIED IN THE ENVIRONMENTAL IMPACT STATEMENT.

WHAT IS NOT A NO-BRAINER IS HOW WE CAN ASSURE OURSELVES THAT THERE WILL BE AN ENTITY LEFT STANDING WHO WILL HAVE THE FINANCIAL CAPABILITY TO UNDERTAKE THE ABANDONMENT TASK. WITH LARGE OIL COMPANIES, A CORPORATE GUARANTEE IS USUALLY SUFFICIENT INASMUCH AS A LARGE BODY OF ASSETS WILL STILL REMAIN AT THE END OF THE LIFE OF A SINGLE FACILITY. A SPECIALIZED CORPORATE ENTITY FORMED EXCLUSIVELY FOR AN LNG TERMINAL MAY NOT HAVE ANY FINANCIAL RESOURCES TO UNDERTAKE ABANDONMENT AT END-LIFE UNLESS IT HAS PROVIDED FOR A SPECIAL SECURITY STRUCTURE. ONE MUST REMEMBER THAT THE OPERATOR WILL BE DISTRIBUTING ITS PROFITS SO THERE MAY BE ONLY MINIMAL AMOUNTS OF MONEY LEFT WHEN THE FACILITY COMES TO THE END OF ITS USEFUL ECONOMIC LIFE. WE FACE THE POTENTIAL OF HAVING A RUSTING EYESORE MOTHBALLED AND LEFT IN PLACE, OWNED BY A FINANCIALLY EXHAUSTED FINANCIAL SHELL. THE SIZE OF THIS OBLIGATION IS PRETTY BIG. IN THE ENERGY BUSINESS, THE COST OF ABANDONMENT CAN RUN UP TO 25% OF THE CAPITAL COST OF THE FACILITY.

UNLESS FERC REQUIRES THE ESTABLISHMENT OF SOME FORM OF ABANDONMENT SECURITY, THE RIVER USERS WILL BE WELL AND TRULY EXPOSED.

Individuals

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IND49-2 We address abandonment in section 2.9. NorthernStar has filed a decommissioning plan with Clatsop County and committed that it would provide financial assurances in the form of a surety bond or letter of credit for an amount appropriate to cover the reasonable costs of decommission the facility

Individuals

49

THE USE AND VALIDATION OF MODELS

IND49-3 THERE HAS BEEN NUMEROUS MENTION OF THE USE OF COMPUTER MODELING TO DETERMINE THE EFFECTS OF THE LNG TERMINAL AT BRADWOOD LANDING. I DON'T KNOW MUCH ABOUT THE COLUMBIA RIVER AS SUCH BUT I HAVE HEARD ALL KINDS OF DISCUSSIONS REGARDING MODELS FOR NOISE, SEDIMENTATION, POOL SPILL VAPOR AND COMBUSTION FRONTS, AND SO ON. THE MOST RECENT DISCUSSION IS THE TESTIMONY OF Dr. J. HAVENS, WHO ASSERTS THAT THE VAPOUR MODEL IS BEING MISUSED. I HAVE NO PARTICULAR EXPERTISE IN THAT SPECIFIC DISPUTE BUT I WOULD LIKE TO COMMENT ON HOW MAJOR ENERGY COMPANIES ADDRESS THE USE OF COMPUTER MODELING.

TYPICALLY, WE HAVE A VERY GOOD INTUITIVE IDEA OF THE EFFECTS OF OUR OPERATIONS, BASED ON A DEEP EXPERIENCE OF OPERATING MAJOR FACILITIES. THESE INTUITIONS ARE BACKED UP BY MANY LONGTIME AND PROVEN CALCULATIONAL METHODS. IN THE PAST, THERE WERE ALSO MANY PUBLISHED FIELD STUDIES THAT GAVE US CONFIDENCE IN OUR CALCULATED RESULTS. WITH THE ADVENT OF TRUE COMPUTER SIMULATION MODELS, WE WOULD STILL PERFORM PARALLEL TRADITIONAL CALCULATIONS. IF THE COMPUTER MODELS DEVIATED SIGNIFICANTLY FROM THE CALCULATIONS BASED ON YEARS OF EXPERIENCE AND REFINEMENT, WE WOULD READDRESS THE QUESTION TO VALIDATE THE MODEL (THIS IS NOT TO SAY THAT THIS IS THE ONLY WAY TO VALIDATE MODELS). WE WOULD THEN USUALLY ATTEMPT TO DETERMINE WHICH MODEL INPUTS WERE MOST INFLUENTIAL TO THE RESULTS OF THE COMPUTER SIMULATION AND ASSESS OUR CONFIDENCE IN THOSE INPUTS. THIS WOULD OFTEN RESULT IN SOME MODIFICATION IN THE COMPUTER INPUTS.

FOR EXAMPLE, I HAVE BEEN TOLD THAT EXPERIENCE WITH DREDGING OPERATIONS IN THE COLUMBIA RIVER OVER MANY YEARS SUGGEST THAT THE PROPOSED TURNING BASIN CAN FORM A SEDIMENT TRAP IN FRONT OF THE CLIFTON CHANNEL. AS I UNDERSTAND IT, NORTHERNSTAR'S MODEL INDICATES THAT THE DREDGING WILL NOT SIGNIFICANTLY INFLUENCE SEDIMENTATION IN THE CLIFTON CHANNEL. PERSONALLY, I HAVE NO IDEA. THIS IS A PERFECT EXAMPLE OF WHEN IT IS APPROPRIATE TO REVISIT MODEL ASSUMPTIONS. THERE IS NO INDICATION, HOWEVER, OF ANYONE REVISITING AND VALIDATING THE COMPUTER MODEL TO DETERMINE WHETHER IMPORTANT INPUT IS UNCERTAIN OR VARIABLE, AS WOULD TYPICALLY BE DONE BY A MAJOR ENERGY COMPANY.

IND49-3 We explain how we modeled the thermal and vapor exclusion zones at the LNG terminal in section 4.11.

IND49-3
cont'd

I REMEMBER A DEVELOPMENT IN INDONESIA WHERE A SINGLE HAND CALCULATION AND THE RESULTING REVISIT OF THE MODEL INPUT RESULTED IN THE REDUCTION OF THE NUMBER OF WELL SLOTS IN A PLATFORM BY 30% AND A REDUCTION OF SOME 25% IN CAPITAL EXPENDITURES; ALL BECAUSE THE INPUT TO THE MODEL WAS RE-EXAMINED AND FOUND TO BE FAULTY.

THE DRAFT EIS, OTHER RECENT SUBMISSIONS, AND PUBLICALLY AVAILABLE SUPPORT DATA DO NOT OFFER THE LEVEL OF CONFIDENCE IN MODELING REQUIRED IN THIS INDUSTRY.

DESIGN CONCERNS

IND49-4

THERE ARE NUMEROUS DESIGN CONCERNS, LARGE AND SMALL, THAT LOOK RISKY IN THE NORTHERNSTAR PROPOSAL AS DESCRIBED IN THE DRAFT ENVIRONMENTAL IMPACT STATEMENT. WHILE THESE DESIGN CONCERNS MIGHT BE ADEQUATELY ADDRESSED IN THE FUTURE, IT IS NECESSARY TO BE VERY SURE THAT NORTHERNSTAR HAS THE INTERNAL FINANCIAL AND TECHNICAL COMPETENCE TO IDENTIFY AND ADDRESS THESE CONCERNS. IN PAST SUBMISSIONS, MY CONCERNS HAVE BEEN IN REGARDS TO:

- THE SCADA CONTROL SYSTEM
- CORROSION PROTECTION
- FIRE CONTROL AND SUPPRESSION
- EMISSIONS, LIGHT AND NOISE
- FOUNDATION INTEGRITY

PERHAPS THE MOST SERIOUS "UNDEFINED" RISK IS THE FACILITY FOOTPRINT. NORTHERNSTAR HAS PROPOSED A VERY SMALL FACILITY FOOTPRINT BY INTERNATIONAL COMPARISONS. REDUCED FACILITY FOOTPRINTS OFTEN GIVE RISE TO UNINTENDED BUT SERIOUS DESIGN AND OPERATING LIMITATIONS. UNFORTUNATELY, THESE LIMITATIONS ARE NOT REVEALED UNTIL COMPLETION OF THE FEED ("FRONT END ENGINEERING DESIGN"). WE ARE THEREFORE ALL FACING A CONUNDRUM TOGETHER. IN AN ATTEMPT TO SATISFY ASCETIC AND ENVIRONMENTAL CONCERNS, NORTHERNSTAR MAY BE COMPROMISING OPERATING EFFICIENCY AND SAFETY.

THIS IS WHY HAZ-OP STUDIES ARE SO VITAL AND WHY THEY MUST BE PERFORMED BY PERSONNEL VERY FAMILIAR WITH THE OPERATION OF LARGE SCALE ENERGY FACILITIES, A CONCERN THAT SHOULD BE ADDRESSED BEFORE PERMITS ARE ISSUED.

Individuals

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IND49-4

If NorthernStar receives initial authorization from the FERC, it would be required to provide additional detailed design information and other safety and security information. After the information is filed with the FERC, there would be several reviews and approval points after the initial authorization, including reviews by the Coast Guard.

K-890

CATASTROPHIC LOSS

IND49-5 AS TO MAJOR CONSEQUENCES, WE KNOW ALL ABOUT THE U.S.S. COLE IN YEMEN AND HOW TERRORISTS COULD CAUSE A BIG LNG POOL FIRE WITH A ZODIAC AND SOME EXPLOSIVES. BUT I AM GOING TO ASSUME THAT THE COAST GUARD AND THE NAVY HAVE CONSULTED ON THE PROPER SECURITY DISTANCES (YOU MIGHT WANT TO CHECK TO MAKE SURE).

IF BRADWOOD LANDING WAS LOCATED IN AN ACTIVE MARITIME ENVIRONMENT WITH REDUNDANT RESOURCES AND THE AVAILABILITY OF NEW HIGH YIELD FOAMS AND EMERGENCY RESPONSE, AND FINALLY IN A PLACE WHERE IT WAS NOT SO EASY FOR SOME YAHOO TO LOAD A ZODIAC FULL OF FERTILIZER AT SWENSON PARK, OUT OF THE SIGHT OF THE COAST GUARD, AND GO CRUISING, WE ALL MIGHT BE MORE PHEGMATIC. INSTEAD, THE SETTING OF THE PROPOSED TERMINAL HAS MANY CITIZENS JUSTIFIABLY ALARMED. AN ACTUAL SITE-SPECIFIC EXAMINATION OF A CATASTOPHIC LNG LOSS SHOULD BE UNDERTAKEN.

UNLIKE THE MANY LNG TERMINALS THAT OPERATE AROUND THE PACIFIC RIM, THE BRADWOOD SITE IS SITUATED IN A DENSELY FORESTED AND REMOTE AREA. SMALLER SPILLS OF LNG, DUE TO OPERATIONAL FAILURES, REPRESENT POTENTIALLY A GREATER CONSEQUENCE THAN THOSE ELSEWHERE. POOLS CAN ELONGATE IN THE COMBINED CURRENT AND WIND ENVIRONMENT. THAT IS WHY THE DRAFT ENVIRONMENTAL IMPACT STATEMENT SHOULD ADDRESS SMALL SPILLS OR RELEASES, POTENTIALLY STRUNG OUT ALONG THE COASTLINE, AND DETERMINE HOW MANY ACRES OF FOREST WOULD BE INCLUDED WITHIN AN IGNITION FRONT. IT IS NOT EVIDENT FROM THE DRAFT EIS HOW A PRODUCT SPILL WILL BE CONTAINED, OTHER THAN BY BARRIERS. IT IS CERTAINLY NOT EVIDENT IN THE DRAFT EIS THE EXTENT OR EFFECT OF A FOREST FIRE.

WATER DISPOSAL

Page 2-24

IND49-6 FRANKLY, I AM JUST FATIGUED TO FIND THAT YET ANOTHER ORGANIZATION PROPOSING FACILITIES, WHICH INCLUDE THE PROVISION FOR THE DISPOSAL OF WASTE WATER INTO PUBLIC BODIES OF WATER. HAVEN'T WE COME TO THE POINT WHERE INDUSTRIALS SHOULD JUST INJECT THEIR WATER IN DISPOSAL WELLS (WHERE THE ACQUIFERS ARE OF LESSER QUALITY) INSTEAD OF SAYING, "WELL, IT'S JUST A LITTLE BIT"? I WENT THROUGH THIS WHOLE DISPOSAL EVOLUTION IN THE OIL BUSINESS. WHEN I STARTED IN THE BUSINESS,

Individuals

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IND49-5 As discussed in section 4.11 of the final EIS and as shown in table 4.11.4-1, spills at the LNG terminal would be contained by the outer tank containment wall, or 1 of 2 impoundment sumps. In accordance with 49 CFR 193, thermal exclusion zones and vapor dispersion zones have been calculated for a variety of spills at the LNG terminal and are discussed in section 4.11.4. Table 4.11.5-2 in Section 4.11.5 presents calculations along with hazard distances for a variety of spill sizes from LNG carriers.

IND49-6 See our response to comment PM5-60.

Individuals

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K-891

IND49-6
cont'd

WE HAD PERCOLATION PITS WHERE THE WATER WOULD EITHER EVAPORATE OR ENTER THE SURFACE WATERS. I RECEIVED PROPOSALS THAT WANTED TO FLUSH OUT PIPELINES WITH WASTE WATER INTO STORM SEWERS LOCATED JUST ABOVE RECHARGING LAKES FOR DRINKING WATER. IT IS JUST SO TIRESOME TO HEAR THE SAME OLD JUSTIFICATIONS FOR DOING WHAT IS WRONG.

IF THE COLUMBIA RIVER JURISDICTIONS JUST STOPPED THE DISPOSAL OF WASTE INTO THE COLUMBIA RIVER AND INSTEAD MANDATED INDIVIDUAL OR GROUP REINJECTION, THIS PLACE WOULD BE IN A WHOLE LOT BETTER SHAPE. THE LEAST THESE JURISDICTIONS CAN DO IS START AND CERTAINLY AT LEVELS PROPOSED. THE TECHNOLOGY EXISTS AND IS SO ROUTINE THAT IT IS INEXPLICABLE THAT NEW DISCHARGE SOURCES ARE STILL BEING CONTEMPLATED. NORTHERNSTAR PROPOSES TO DISPOSE OF ALMOST 5500 BARRELS OF WATER PER DAY CONTAMINATED WITH CHEMICAL TREATMENTS OF VARIOUS CONCENTRATIONS (THEIR ONLY SEEMING CONCERN IS THE TEMPERATURE OF THE DISCHARGE). THIS LEVEL OF DISPOSAL WOULDN'T BE TOLERATED FROM OILFIELDS AND IT SHOULDN'T BE TOLERATED HERE.

PERMITTEE

IND49-7

FINALLY, I BELIEVE THAT FERC SHOULD ADDRESS THE INTERNAL TECHNICAL CAPABILITIES OF THE OPERATOR, NORTHERNSTAR, WITHIN THE FRAMEWORK OF ITS ABILITY TO PERFORM UNDER AN ENVIRONMENTAL IMPACT STATEMENT. SURELY, FERC WOULD NOT ISSUE A PERMIT TO JUST ANYONE. THE QUESTION MUST BE ASKED: CAN NORTHERNSTAR ACTUALLY PERFORM UNDER ITS PERMITS? LNG HAS BEEN A BUSINESS FOR THE BIG BOYS NOT JUST ANY GROUP THAT IS INTERESTED IN MAKING MONEY OR THINKS IT WOULD LIKE TO BE IN THIS BUSINESS. I BELIEVE THAT STILL IS THE CASE.

I WOULD NOTE HERE THAT FOREIGN COUNTRIES DEMAND A FULL DESCRIPTION OF COMPANY PARTICULARS BEFORE AWARDED EVEN AN EXPLORATION CONCESSION. THE ONLY DESCRIPTION OF NORTHERNSTAR I CAN FIND IS THEIR SECURITY AND EXCHANGE COMMISSION FILING, WHICH IS INADEQUATE FOR A PROJECT APPROVAL OF THIS TYPE.

LET ME DESCRIBE ONE REASON WHY PERMITTEE TECHNICAL CAPABILITY IS INHERENT IN AN ENVIRONMENTAL IMPACT STATEMENT:

WHEN A COMPANY HIRES AN EPC CONTRACTOR (ENGINEERING, PROCUREMENT AND CONSTRUCTION), THE OPERATOR (IN THIS

IND49-7 See responses to comments IND3-4, IND33-57, and IND33-75.

Individuals

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IND49-7
cont'd

CASE, NORTHERNSTAR) NORMALLY HAS A SIGNIFICANT INHOUSE TECHNICAL EXPERTISE GROUNDED IN EXPERIENCE RUNNING ACTUAL FACILITIES. WHEN WE RECEIVE A PRELIMINARY DESIGN, WE CHECK AND CONFIRM THE DESIGN. WE ASK WHETHER WE CAN OPERATE IT SAFELY AND EFFICIENTLY. WE APPLY LESSONS LEARNED FROM OUR OWN OPERATIONS. THERE ARE NUMEROUS TECHNICAL CORRECTIONS MADE BY THE OPERATOR, OFTENTIMES BECAUSE EPC COMPANIES DO NOT HAVE THE LEVEL OF QUALITY ASSURANCE OR THE DEPTH OF TECHNICAL UNDERSTANDING OF BIG PLAYERS. THIS IS EXPERIENCE THAT RUNS DEEP IN THE ORGANIZATION. THE EXPERIENCES OF SENIOR MANAGEMENT ARE NOT PARTICULARLY HELPFUL (OR I MIGHT ADD, WELCOME), IN THIS EXERCISE. OPERATIONS PEOPLE ASK WHETHER WE HAVE HAD PROBLEMS WITH VARIOUS DESIGN SELECTIONS, HOW WE WILL UNDERTAKE MAINTENANCE AND REPLACEMENT, WHAT REDUNDANCIES WE BELIEVE ARE PRUDENT, AND THE LIST GOES ON. THIS IS NUTS AND BOLTS STUFF. BUT IT REPRESENTS WHETHER AN ENVIRONMENTAL IMPACT STATEMENT IS A FEASIBLE COMMITMENT OR JUST A DOCUMENT.

NORTHERNSTAR, NO MATTER HOW MANY SENIOR PEOPLE THEY GO OUT AND HIRE, SIMPLY DOES NOT APPEAR TO HAVE THE DEPTH OF TECHNICAL SKILL NOR THIS INSTITUTIONAL WISDOM. WITHOUT IT, YOU ARE ACCEPTING A DESIGN BASED ON THE DESIGN ECCENTRICITIES OF AN EPC CONTRACTOR, AN ENTITY NOT DRIVEN PRIMARILY BY OPERABILITY (IN FACT, MANY SAY A CONTRACTOR IS DRIVEN BY "CHANGE ORDERS"). MANY OF THE DESIGNERS IN EPC COMPANIES ARE HIRED JUST FOR A SINGLE PROJECT AND DO NOT HAVE THE INTEGRATED DESIGN PHILOSOPHY OF A MAJOR PLAYER IN THE INDUSTRY. IN READING THE SEVERAL SUBMISSIONS OF NORTHERNSTAR OVER THE LAST YEAR OR SO, I HAVE NOT BE FAVORABLY IMPRESSED WITH THE DEPTH OF TECHNICAL WORK OR THE UNDERSTANDING OF THE REQUIREMENTS OF AN INTEGRATED PROJECT AND VALUE TRAIN OF THIS SIZE.

THIS IS NOT TO SAY THAT NORTHERNSTAR IS NOT TRUSTWORTHY OR SINCERE. I CREDIT THEM WITH DOING THEIR BEST. I DO NOT DOUBT THAT THEY COULD SUCCESSFULLY CONSTRUCT AND OPERATE STANDARD INDUSTRIAL FACILITIES, SUCH AS BIODIESEL PLANTS. I QUESTION, HOWEVER, WHETHER LNG TERMINALS IN THE COLUMBIA RIVER IS THE APPROPRIATE PLACE FOR COMPANIES LIKE NORTHERNSTAR.

K-892

Individuals

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ORIGIN--

November 29, 2007

Office of the Secretary
Federal Energy Regulatory Commission
888 First St. N.E.
Washington DC 20426

RECEIVED
OFFICE OF THE
SECRETARY
2007 DEC -4 P 2:36
FEDERAL ENERGY
REGULATORY COMMISSION

Attention: Bradwood Landing / Oregon LNG Pipeline
Docket CP06-365-000

IND50-1

I am writing this letter to let you know that we oppose the Oregon LNG pipeline, the Bradwood terminal and the Palomar Pipeline. It is our belief the pipelines are a dangerous threat to the Oregon coast, Columbia River, The Deschutes River, their tributaries, prime farm land, forests, the salmon recovery efforts, plus many endangered species, and our personal safety and welfare. We are also upset because Oregonians are losing the use of their land and income through eminent domain for a project that does not serve "public need and necessity" in the Pacific Northwest. In addition, there has not been an independent assessment of the demand for LNG to justify the need for the projects.

Not only will the proposed high pressure 36 inch Oregon LNG pipeline and the Palomar pipeline be carrying non-odorized gas that will serve less than 10 per cent of the Oregon residents, it will be built at the permanent expense of rural resident's ability to make crop choices to support their families. This pipeline forces farmers to stop growing deep rooted crops over the right away, destroys field drainage systems, blocks underground irrigation supply lines and sprinkler systems, cuts through septic drain fields, plus restricts access of heavy equipment to logging and farming of fields on either side of the pipe line. In addition the pipeline is in direct violation of Oregon's "Exclusive Farm Use" laws that Oregon farmers must follow when operating their farms.

There are several reasons why we are strongly opposed to this proposed pipeline right-away:

1. The Oregon LNG pipeline will run near our house and through the middle of our septic drain field.
2. The pipeline has no economical benefit or value to us.
3. The pipeline will cut through two different field drainages easement from neighboring farmers that empty into the stream on our property.

IND50-1

The purpose and need for the Bradwood Landing project is addressed in section 1.1. Safety is addressed in section 4.11.

K-893

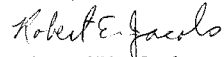
Individuals

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4. It could handicap access to the back portion of our property that has only one access.
5. This will make the fourth gas line in our local area if Palomar goes through.
6. Most importantly, as individuals we are fearful and uncomfortable with a possible gas line and/ or leak near our house.

In summary, we do not want to see a gas pipeline that will serve less than 10 per cent of Oregon residents going through on the backs of rural residents. If the gas line must go in, then we feel it should be much smaller in diameter and follow public right of ways or fence lines away from buildings and private residents.

Sincerely,



Robert and Rhea Jacobs
29474 S. hwy 170
Canby, Oregon 97013

K-894

Individuals

51

11 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

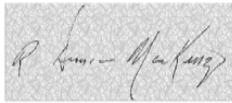
Re: Bradwood Landing LLC
Docket No. CP06-365-000 et. al.

Dear Ms. Bose:

Please enter the attached document containing my comments on the Draft
Environmental Impact Statement for the subject project into the public record.

Thank you for your attention to this matter, I remain...

Very truly yours,

A handwritten signature in dark ink, appearing to read "R. Duncan MacKenzie", is written over a light gray rectangular background.

R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

K-895

IND51-1

Reference is made to the water usage information presented in the DEIS on page 4-53 as Table 4.3.1-1.

As found in the DEIS Table 4.3.1-1 and as discussed on page 4-77, the indicated water discharge from the submerged combustion vaporizers is expected to be 160 gallons per minute. Please refer also to the applicant's Note 4, Resource Report 2, Table 2-2, and Resource Report 2, 2.3.6 'Disposal of Water to Surface Water Bodies - Operations', page 2-15 [FERC Accession Number 20060605-4005 CD-1].

Noted on line 19, page 1 of 3, of the Selas Vaporizer Data Sheet, [applicant's "Bradwood Landing Terminal Application for Air Contaminant Discharge Permit" pages 34 through 36 of 129 [FERC Accession Number 20070522-0112] is the calculated "Water Overflow Rate" of 19 gallons per minute from each vaporizer.

Considering a worst-case condition of all seven vaporizers operating, the expected outflow would be $7 \text{ SCV's} * 19 \text{ gpm} = 133 \text{ gallons per minute}$. This results in a discrepancy of $160 \text{ gpm} - 133 \text{ gpm} = 27 \text{ gallons/minute}$. Over the course of a year this aggregate difference would be approximately $27 \text{ gpm} * 60 \text{ min} * 8760 \text{ hours} = 14.2 \text{ million gallons per year}$.

It should be noted that the Thermal Mixing Model Report [FERC Accession Number 20071016-0189] prepared by the applicant's consultant, *Coast and Harbor Engineering*, uses an outflow rate (Variable Q0 = 0.1052 E-01 m³/s page 11 of 40, and Q0 = 0.010515 m³/s page 28 of 40) that equates to 166.67 gallons per minute.

- It is recommended that the FERC require the applicant to account for the apparent difference, and identify the source of the additional water if any. It is further suggested that the thermal mixing model be re-examined as the stated outflow discharge rate is different than the value noted in Resource Report 2 and the DEIS.

Additional DEIS References:

2-22	2.1.3.5 Vaporization System
3-43	3.1.6.3 Alternative Vaporization Technologies – Natural Gas Combustion
4-77 and 4-78	4.3.2.3 LNG Terminal - Operation Impacts and Mitigation – Water Appropriation and Discharge
4-149	4.5.2 LNG Terminal - LNG Terminal Operations - Routine Discharge of Condensate Water from the SCVs
4-219	Table 4.6.2-1 Summary of Potential Impacts and Mitigation Measures for Federally Listed Species Associated with the Bradwood Landing Project

Individuals

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IND51-1

The draft EIS states that about 160 gpm of condensate would be generated by the vaporizer, and this equates to 230,400 gallons per day. Meanwhile, the modeling done for the NPDES permit shows a figure of 0.24 million gallons per day or 240,000 gallons per day. This is not an inconsistency, but is rather just the result of rounding. To be conservative, the modeling of the discharge rounded 230,400 gallons per day up to 240,000 gallons per day to give a round number that can be more easily displayed. In addition, this represented the maximum value for the amount of condensate generated, based on a peak natural gas send out rate of 1.3 Bscfd. The section of the NPDES permit that shows the volume of water as 0.2 million gallons per day refers to the average flow of condensate generated, which is based on a natural gas send out rate of 1.0 Bscfd. If more significant figures were shown, the average flow would actually be slightly less than 0.2 million gallons per day, but to be conservative it was simply rounded up.

Individuals

52

12 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

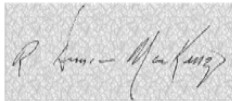
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Thank you for your attention to this matter, I remain...

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A handwritten signature in dark ink, appearing to read "R. Duncan MacKenzie", is written over a light gray rectangular background.

R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

K-897

IND52-1

Reference is made to the discussion of wind power as an alternative energy source found on page 3-5 and 3-6 of the DEIS. While it is acknowledged that wind power represents only a portion of the total Pacific Northwest energy portfolio, and requires load shaping from other sources of energy; the dismissive presentation of wind power in the DEIS is a) incorrect, b) is predicated on outdated information from seemingly a single source, and c) does not address the Pacific Northwest as a whole. A far more balanced picture is found in more contemporary information from the intergovernmental Northwest Power and Conservation Council [NWPCC].

Noted in the Northwest Power and Conservation Council document *"The Role of Renewable Sources in the Fifth Power Plan"* dated 5 October 2006 at page 6 of the report under the heading:

'CURRENT RENEWABLE RESOURCE DEVELOPMENT ACTIVITY'

"Over 2600 megawatts of generating capacity of all resource types will have been placed in service in the Northwest between adoption of the 5th Plan in December 2004 and the end of 2008. About 800 megawatts is operating, 960 megawatts under construction and 880 megawatts currently scheduled for completion by the end of 2008 (Figure 2). *About 1720 megawatts (65 percent) of the total are renewable energy resources. Nearly all of this (over 99 percent) is wind capacity.*"

(emphasis in italics added)

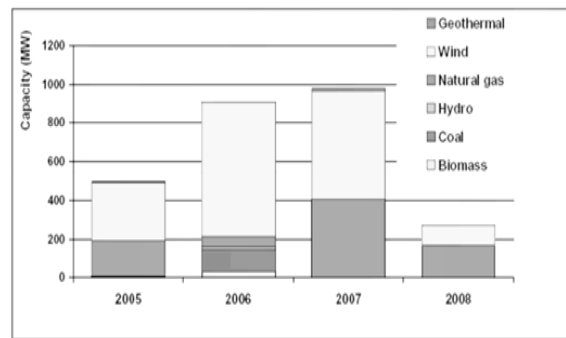


Figure 2: Northwest resource development 2005 - 2008

Individuals

IND52-1

Although wind power and solar power are renewable energy alternatives that are currently in commercial production and use, the amount of energy from local small-scale production could not provide the same amount of energy on a long-term basis as would be provided by the proposed project. Furthermore, renewable energy alternatives would not meet the stated objectives of the project. See also our response to comment PM1-12.

IND52-1
cont'd

As can be seen from the above, the 400MW, wind power figure noted in the DEIS is incorrect. Additionally, while the assertion on page 3-4 of the DEIS that most new electrical generation is from natural gas fired sources was true in 2003, this assertion has been rendered moot by the recent accelerated development of wind powered generation.

Noted in the Introduction to latest NWPCC Biennial Monitoring Report on the Fifth Power Plan dated January 5, 2007:¹

"The Plan found that the region had a surplus of generating capability and that the need for new generation from coal or natural gas likely would not occur until after 2012; after the 5-year action plan period."

And in the Summary,¹

"High energy prices and concerns about potential climate-change policy have also led to aggressive development of wind power in the Pacific Northwest in the two years since the Council adopted the Fifth Power Plan. New generation capacity and slow demand growth have increased the electrical supply surplus in the region, which further delays the need for new generating capability."

Finally, as noted in the latest NWPCC Energy Outlook:²

September 2007 Summary: The region's power supply is estimated to be about 2,300 average megawatts surplus (it takes about 1,000 average megawatts to supply a city the size of Seattle). The surplus includes about 2,200 average megawatts of uncontracted regional resources and only counts hydroelectric generation based on the driest historical condition. The likelihood of a significant electricity service disruption due to a lack of resources is forecast to be very low for the next 5 years.

- In view of the above it is recommended that FERC and its contract consultants re-evaluate for the FEIS:

a) the role of alternative energy sources in relation to the proposed project using more contemporary, and broad-based regional data, and

IND52-2 b) the public convenience and necessity of the proposed project in view of the projected regional surplus even under worst-case conditions.

Additional DEIS References:

5-17 5.1.12 Alternatives

- 1] <http://www.nwcouncil.org/library/2007/2007-4.pdf> Biennial Monitoring Report on the Fifth Power Plan, 5 January, 2007, document 2007-4, page 1
- 2] <http://www.nwcouncil.org/energy/powersupply/outlook.asp>

Individuals

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IND52-2

We briefly summarize project purpose and need in section 1.1. Section 3.1.1.3 discusses renewable energy sources. The Commission's determination of public necessity would be given in its Order for this project.

Individuals

53

13 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

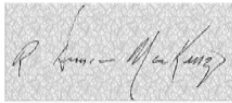
Re: Bradwood Landing LLC
Docket No. CP06-365-000 et. al.

Dear Ms. Bose:

Please enter the attached document containing my comments on the Draft
Environmental Impact Statement for the subject project into the public record.

Thank you for your attention to this matter, I remain...

Very truly yours,

A handwritten signature in dark ink, appearing to read "R. Duncan MacKenzie", is written over a light gray rectangular background.

R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

K-900

IND53-1

Reference is made to the water usage information presented in the DEIS on page 4-53 as Table 4.3.1-1

The submerged combustion vaporizers use a water bath surrounding the stainless steel LNG vaporizer tubes as a heat transfer medium. Noted in Table 4.3.1-1 and as found in the applicant's Resource Report 2, Table 2-1 "Construction Water Use" [FERC Accession Number 20060605-4005 CD-1] the Initial Charging of the SCV's water baths will require approximately 200,000 gallons of water. However, not found in the DEIS or any of the information available for public review is any accounting of the water required to refill a vaporizer unit (approximately 28,600 gallons) after it has been serviced, nor is the draining of the vaporizer tank taken into account in the noted DEIS Table 4.3.1-1 or Resource Report 2, Table 2-2. Reference is made to the following operational narrative text found in the applicant's Resource Report 13, at Section 13.7.3.4 on page 13-32 [FERC Accession Number 20060605-4005 CD-1]

"13.7.3.4 Operation and Control

The vaporizers are arranged in parallel. Under normal operation, only 6 units are in operation. The remaining unit, acts as a spare to enable ongoing maintenance, change out of water baths and to cover single unit downtime without impacting on terminal send-out capacity.

It is intended that the sequencing of the vaporizer duty cycles will be performed automatically within the plant DCS."

(Emphasis added in bold)

Identical language is also found in the "Air Quality Report" in section 2.2.6 'Vaporizers' on page 2-8 [FERC Accession Number 20070522-0112].

No schedule or other information as to the frequency of this maintenance procedure was found in the applicant's materials available for public review. Furthermore, it is not known if the applicant intends to sequester the water drained from the vaporizer tank and then restore it to the vaporizer tank after maintenance. Therefore, an accurate assessment of the water resource impact this procedure may have over the course of a year or the expected lifetime of the facility cannot be made.

Individuals

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IND53-1

The SCVs would be subject to various maintenance checks throughout the life of equipment. Draining of the water bath for maintenance inspections is expected to occur once per year. The unit would likely be refilled with the water produced from the other vaporizers.

IND53-1
cont'd

The National Marine Fisheries Service (NMFS) has also noted this operational aspect as found in "Request for Additional Information for the Bradwood Landing LNG Terminal..." [FERC Accession Number 20070511-5068] on page 10, lines 22 through 25.

- "22 The submerged combustion vaporizer (SCV) water bath would use 0.2 million gallons of
- 23 groundwater (page 2-11).
- 24 Explain whether the SCV water bath would need to be periodically drained and refilled.
- 25 Indicate proposed discharge site of any drained water."

The applicant has not responded to this question in either the initial response [FERC Accession Number 20070614-0147] to the NMFS request, or in supplemental responses [FERC Accession Numbers 20070710-0030, 20070814-0074, and 20071016-0234]. It is not known if this response is contained in the Non-Public document FERC Accession Number 20071016-0235. In a memo dated 08/29/2007 [FERC Accession Number 20070830-0035], it is noted that the dialogue between the applicant and the NMFS is ongoing, and that the NMFS has requested that the applicant reorganize and resubmit all information developed for each topic on the agenda. It is further noted in recent memo [FERC Accession Number 20071120-0083] that this item (SCV recharging for maintenance) is still outstanding.

- It is recommended that prior to preparation of the FEIS, NorthernStar Natural Gas fully identify and quantify all water useage (intake and discharge) to the Federal Energy Regulatory Commission.

FRANK EYKEL

ORIGINAL

199 Ostervold Road
Cathlamet, WA. 98612
360 849-4254
frankseykel@yahoo.com

FILED
OFFICE OF THE
SECRETARY

2007 DEC 10 P 2:22
FEDERAL ENERGY
REGULATORY COMMISSION

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC. 20426

Re: Docket No. CP06-365-000 et. al.

December 4, 2007

Dear Ms. Bose,

Thank you for the opportunity to comment on the FERC DEIS of the Bradwood Landing Project.

I would like to bring the following to the attention of staff,

IND54-1

1. 4.7.1.4. Recreation, Public Interest, and Special Use Areas.

Also pages, 2-9 Figure 2.1.2.1., page 4-426

Much liberty has been taken to determine the "Zones of Concerns" overlaps, which makes one wonder from what point they have been taken.

According to my calculations with the aid of NOAA Charts #18521, 18523 the results show that the following areas are well within Zone 1, represents 500meter (1650ft.)

Clatsop Spit, public beach access,
Hammond, OR. Waterfront and boat basin,
Tansy Point, Camuthers Park.

Entrance of the Skipanon waterway, which is the access to the Warrenton boat basin,
Astoria's downtown waterfront with many hotels, restaurants, tourist activities, etc.
Port of Astoria with the Cruise ship docks,
West mooring basin,

The designated anchorage areas 110.228 on both sides of the navigable channel.

Individuals

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IND54-1

The methods for determining the Zones of Concern are discussed in section 4.11.5.3. We disclose in section 4.7.1.4 that portions of the JBHNR and Astoria waterfront would be overlapped by Zone 1. Section 4.11.5.4 discloses that there are 22 structures overlapped by Zone 1 on Puget Island. However, we believe that Fort Stevens State Park (including Clatsop Spit), Hammond, the Warrenton waterfront (including Carruthers Park), and Skamokawa Vista Park are located within Zone 2.

K-903

Page 2.

IND54-1
cont'd

All public and private land on the Washington side of the river from Altoona, WA. up to the terminal, including Skamokawa waterfront with many residences, Vista Park, Boat launch, Price Island, the mouth of the Elchoman river, Julia Butler-Hansen MWR, and the Northwest portion of Puget Island with many residences.

Many of the waterfront access areas are used for recreation, e.g. camping, fishing or picnic.

IND54-2

Air Quality and Noise, page 4-382

With some forward thinking and the current focus on Global warming the applicant NSNG should be required to disclose the amount of CO2 being discharged. in part due to the SCV (Submerged Combustion Vaporizers) are the highest CO2 polluters of any vaporizer system. (see page 3-42)

To reduce CO2 emissions and eliminate warm water discharge into the river, the FERC should recommend or demand the use of STV vaporizers. (page 3-42)

Please hold the applicant to the highest standards and technology available.

Sincerely

Frans Eykel

Individuals

54

IND54-2

Section 4.10.1 has been updated to include the estimated greenhouse gas emissions resulting from the construction and operation of the project. Section 3.1.6.3 includes an analysis of the vaporization technologies, including STV, considered for the Bradwood Landing Project.

K-904

To: F.E.R.C
 Individual Testimony regarding the application by Northern Star to build a Liquid Natural Gas Facility at Bradwood, Or.
 December 13, 2007
 Dockets CP06-365, CP06-366, CP06-376, CP06-377

I am writing to encourage F.E.R.C. to deny the application by Northern Star for a Liquid Natural Gas facility in Bradwood, OR. I believe that Bradwood is an unsuitable location for environmental, safety and eminent domain reasons. Dredging of a prime salmon estuary is a major alteration to a pristine portion of the Lower Columbia River. The width of the Columbia and the distance between Bradwood and Puget Island is not sufficient to have a true exclusion zone. The safety response to a potential spill or fire cannot adequately protect the residents who live nearby this facility. The recent wind and rainstorms, and yesterday's major mudslide onto Hwy 30, near Clatskanie (not that far from Bradwood) have demonstrated how difficult (or impossible) it might be to respond to an emergency. Here is a link to video of the mudslide.

http://www.koin.com/global/video/popup/pop_player.asp?ClipID=2011903&h1=Update%3A%20Slide%20Closes%20Highway%2030&vt1=v&at1=News&d1=180434&launchPageAdTag=Homepage&activePane=info&playerVersion=1&hostPageUrl=http%3A//www.koin.com/&md=1241582

The location of this facility and running pipelines through private properties, State Forests, etc. is not an acceptable risk. Private land should not be taken away for the profits of a private corporation selling a foreign fossil fuel

Northern Star had hired an "army of lawyers" and produced some great 50 page Powerpoint presentations to present this project as being advantageous to the local Communities. The fact that the Palomar project is now openly acknowledged is a true picture of the intentions of Northern Star. They stand to make a huge profit selling an approved project to a company who will send a large portion of the gas to California. The promises of Northern Star do not translate to actions by the company who will build and operate this plant.

Gary Marzolino
 56 Fernhill Rd
 Cathlamet, WA 98612

Individuals

55

- IND55-1 See our response to comment FA1-24.
- IND55-2 Section 4.11 includes a discussion on modeling and the exclusion zones for the LNG terminal. Figures 4.11.4-1 and 4.11.4-2 show the thermal exclusion zones and vapor dispersion zones. Section 4.11.5.3 presents the hazards associated with a spill from an LNG carrier and describes the zones of concern and what communities would be affected by each zone of concern.
- IND55-3 See our response to comment IND22-20.
- IND55-4 No State Forest lands would be crossed by the pipeline. NorthernStar would seek to obtain an easement across landowners' property. Private land would not be taken away from landowners and, with few exceptions, a landowner would not be precluded from using their property in any way after construction of the proposed pipeline. See responses to comments PM2-4 and CO8-6.
- IND55-5 It is not the intention of either the Bradwood Landing Project or the Palomar pipeline project to send large portions of natural gas to California. See also our responses to comments PM1-23, PM1-24, and LA3-8.

ORIGINAL

12/3/2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street N.E.
Washington, D.C. 20426

Dear Secretary Bose,

We voice strong objection to your DEIS on the proposed Bradwood Landing terminal and processing plant -- 20 miles east of Astoria on the Columbia River (the project of NorthernStar Natural Gas, a Texas-based company that has never built a terminal or a pipeline). We also oppose the Oregon LNG (Leucadia Corporation of New York) proposed terminal -- in Warrenton on the Columbia.

We are equally against the proposed pipelines (Palomar -- NW Natural Gas with TransCanada) that relate to these proposed terminals and processing plants. Our objections are based on the following:

- IND56-1 • The intention of the above mentioned companies is mainly to supply California with LNG, imported to and transported throughout Oregon from places like Iran and the Soviet Union (largest world natural gas reserves, Oil and Gas Journal 12/8/06). LNG is a foreign supplied petroleum (oil and natural gas) product, perpetuating our reliance on foreign energy sources.
- IND56-2 • No natural gas from the pipeline would be available locally; it can't be tapped from a high pressure pipeline. Even if available locally, it would be much more expensive than domestic natural gas because of the cost of transportation, security and processing of imported gas.
- IND56-3 • Extraction of LNG from foreign lands, transportation and liquefaction adds 35-50% to greenhouse gas emissions. Imported LNG has a large carbon footprint and can't be seen as a viable 'alternative energy source'.
- IND56-4 • Liquefied Natural Gas (LNG) is super cooled to minus 261 degrees Fahrenheit into its liquid form. Potential leaks, spontaneous ruptures, earthquakes or terrorist attacks on a terminal or pipeline causes the pressurized gas to meet air and explode into eruptive fires that are impossible to put out and must be left to burn themselves out. We live by the old Tillamook burn area and would hate to see a repeat. Natural gas industry experts supported by peer reviewed studies and findings have stated that for safety reasons, no person should be within 900 feet or more on either side of a 36-inch natural gas pipeline where there is a rupture. Recently a pipeline exploded and started brush fires in Port Arthur, Texas. Two years ago in Washington State two boys were killed by an exploding pipeline.

If this is approved, you will be wreaking havoc on this beautiful waterways state. You will be lacing our estuaries, creeks, and rivers with 36" pipelines only 3 - 5 feet underground filled with dangerous, expensive, imported LNG. In Gales Creek you will be rubber stamping a pipeline that intertwines with Forest Grove drinking water. A past Republican Governor, who was far-sighted in caring for his beloved state, Tom McCall, said, ""Oregon is demure and lovely, and ought to play a little hard to get. And I think you'll all be just as sick as I am if you find it is nothing but a hungry hussy, throwing herself at every stinking smokestack that's offered."

Sincerely,

Norm and Nancy Monroe
18200 NW Timber Road
Forest Grove, OR 97116

Cc: Governor Kulongoski, Senator Wyden, Senator Smith, Congressman Wu, State Senator Elizabeth Johnson and State Representative Deborah Boone

Individuals

56

- IND56-1 The market for the natural gas from the Bradwood Landing Project is the Pacific Northwest not California. See our response to comment PM1-23.
- IND56-2 The Bradwood Landing pipeline would interconnect Northwest Natural's interstate system from which the natural gas would be transmitted to local distribution systems. The natural gas transmitted to the Williams Northwest pipeline also would be available for local distribution systems. The natural gas from LNG would be priced based on market conditions the same as other available natural gas.
- IND56-3 Section 4.10.1 has been updated to include the estimated greenhouse gas emissions resulting from the construction and operation of the project.
- IND56-4 LNG and natural gas pipeline safety is discussed in section 4.11.

ORIGINAL

P.O. Box 67,
Skamokawa, Wa. 98647,
Dec. 6, 2007.

Kimberly D. Bose, Secretary,
FERC,
888 First St., N.E., Room 1A,
Washington, D.C. 20426.

Re: Docket No. CP06-365-000 et al.

Dear Ms. Bose,

FILED
OFFICE OF THE
SECRETARY
2007 DEC 12 P 2 33
WASHINGTON FIELD OFFICE

IND57-1

Thank you for the opportunity to comment on the Draft Environmental Impact Statement of the Bradwood Landing Project. My comments particularly concern fish and commercial fisheries of the Columbia River. I would note that despite the fact that I provided Northern Star with a copy of my history of the Columbia River commercial fisheries (*Legacy and Testament*, the story of Columbia River Gillnetters, Pullman, Washington State University Press, 1994), they did not note it in their bibliography, nor refer to it in the text. This may explain the numerous mistakes contained in Vol. I of the EIS, noted in the next paragraph.

There are numerous errors of fact in the section on commercial fisheries on p. 4-120-121. In the second paragraph of p. 4-121, please note that spring chinook fishing may also occur in May, summer chinook fishing occurs in June and July, and August fishing for chinook is more than one or two days. Also omitted are other activities, such as snagging, which take place before fishing seasons in order to clear debris from the fishing grounds ("drift rights.") All of these need to be added to the paragraph. Further, in the next paragraph on sturgeon fishing, sturgeon fishing was not just a byproduct of the salmon gillnet fishery, but also has its own gear and been a significant component of the catch. The sturgeon caught in the lower river are used almost exclusively for food, not caviar. Due to the size of fish that may be retained, caviar is seldom found in them, being a product of larger and more mature fish. Current policy with both Washington and Oregon Departments of Fish and Wildlife is to extend the sturgeon season throughout the year, so that sturgeon catches occur from January to late October and early November. Sturgeon are a high value fish.

The third paragraph is also incorrect. Eulachon (smelt) are not used as bait in commercial sturgeon fisheries, only in recreational fisheries. The fourth paragraph indicates that terminal fisheries for salmon occur in Grays Bay in Washington; actually, they occur in Deep River, a tributary of Grays Bay.

IND57-2

These errors are of concern, because they have led to Northern Star's rather cavalier attitude towards the effect of their ship traffic on gillnet fishermen plying their trade. (pp. 4-329-430). The commercial fleet is not just based in Astoria, as stated on p. 4-329, but continues all the way to within a few miles of Bonneville Dam. There are fishing areas located within a mile of the Northern Star project. Reducing the fishery to "just a few days, occasionally even hours" does not take into account that fishing periods change dramatically from year to year and are entirely dependent on salmon run predictions. Further, it should be obvious, using Northern Star's assertion of a fishing season that lasts "just a few days, occasionally even hours," that

Individuals

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IND57-1

Section 4.5.1.1 of the EIS has been revised to address this comment.

IND57-2

Section 4.8.1.7 has been revised to state that the commercial fishing fleet is based out of various locations along the Columbia River. As stated in this section, commercial fishing along the Columbia River has been limited to a season lasting just a few days, occasionally evening hours in recent years and is not intended to imply that this schedule is standard for fishing from year to year.

K-907

K-908

- IND57-3 encountering a ship every 1.5 days, even if only for a few minutes (which is highly debatable and is only an unproven assertion of Northern Star), could cost fishermen substantial income in a time of reduced fishing periods. Thousands of fish are often harvested in each fishing period during peak periods of abundance.
- IND57-4 Northern Star also asserts that "drift rights ... do not have any legal recognition in Oregon and Washington," implying that they therefore do not have to pay attention to them, although they are negotiating with drift right owners in the vicinity of their plant. Oregon and Washington both issue permits to pull snags on drifting grounds, which indicates that they recognize where the fishing grounds are. Regardless of legal right, which is debatable in this area, Northern Star needs to recognize that the fishing fleet will be using certain fishing grounds during the seasons, will be snagging those grounds, and that its ships will be traversing those grounds. I provided a map of drift rights and fishing grounds to Northern Star at one of their public hearings, but I note that it is not part of their EIS. Their ship traffic will be affecting the livelihoods of several hundred people on the river, and they need to address this issue with more specific proposals. How are they going to notify fishermen of a ship, whether entering or exiting the river? Which drift areas will be most affected? What proposals are there to work with fishermen on traffic issues in narrower areas of the river?
- IND57-5
- IND57-6 Of more concern to me than these errors, which indicate a lack of understanding of the fishery and how the LNG terminal and ship traffic will affect it, is the lack of detail in plans for fish. The filling of the log pond described on pp. 4-139 --140, is just one example. The action is described as "permanent loss of habitat." Northern Star will "mitigate for...the permanent loss of habitat...by developing high quality replacement habitat in consultation with NMFS and ODFW." I see nothing in the Plan that indicates how and where that replacement will happen, nor any analysis of what kind of habitat the pond provides that can be "mitigated" by providing similar habitat elsewhere. I would point to a document by Charles Simenstad and Dan Bottom, Guiding Ecological Principles for Restoration of Salmon Habitat in the Columbia River Estuary, which states: "Protection of existing habitat is critical to the success of estuarine restoration" (Protect First, Restore Second), p. 2. The larger issues of the "lack of empirical data ...available to define the specific habitat needs of salmon within the Columbia River estuary" or ensuring that restorative measures "will be ecologically effective" that the document points out, are unaddressed by Northern Star.
- IND57-7 Similarly, Mary Austill Lott, in her M.S. thesis "Habitat-Specific Feeding Ecology of Ocean Type Juvenile Chinook Salmon in the Lower Columbia River Estuary (Seattle: University of Washington, 2004) indicates that shallow wetlands and emergent marsh habitats support a greater abundance of the food preferred by juvenile chinook salmon than forested or scrub-shrub wetlands, although these may have other uses by fish. It is critical to know the specifics of Northern Star's proposal for mitigation, and whether the company plans to provide identical habitat in an adjacent locale. It does not appear that Northern Star has analyzed the type of habitat it is permanently destroying, nor provided any specific information as to how it will mitigate that same habitat or where. Will the mitigation be located in the same area? What exactly is planned? What are the numbers and kinds of fish that will be affected, and how will their loss be compensated either in the same locale or elsewhere? The same insufficiency of information occurs in the discussions of mitigation of pipeline construction. There seems to be no actual data as to what fish are actually in the planned areas of impact, when they are there and in what numbers. 4-166-167
- IND57-8

Individuals

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- IND57-3 See our response to comment IND57-2.
- IND57-4 Section 4.8.1.7 has been revised to include additional information regarding drift rights, as described in Irene Martin's book "Legacy and Testament: The Story of Columbia River Gillnetters."
- IND57-5 The security escorts traveling with the LNG carriers would likely approach nearby boats to inform them of the security zone associated with the LNG carriers. Final details regarding the security zone would be included in the Vessel Traffic Management Plan. As discussed in the response to comment PM2-19, the security zones would not necessarily require that boats move away from the LNG carriers, but rather it is intended to establish the Coast Guard's authority in the area surrounding the LNG vessel to ensure safety during the transit.
- IND57-6 NorthernStar's *Preliminary Engineering Design Draft Mitigation Plan* describes both where compensatory mitigation is proposed and how mitigation would occur. We agree that the protection of existing habitat is important for estuarine restoration. As described in section 2.1.5, NorthernStar has proposed to preserve both the lower Svensen Island and Hunt Creek Mitigation Sites as part of its Compensatory Mitigation Plan. The adequacy of the compensatory mitigation is discussed in the response to comment FA2-10. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.
- IND57-7 As described in section 4.4.1, wetland habitats that would be impacted by the Bradwood Landing Project were classified according to the Cowardin et al. (1979) system. As described in section 4.4.2, upland habitats that would be impacted by the project in Oregon were classified based on the Oregon Habitat Mitigation Policy. Although the State of Washington does not have a similar habitat classification system, 18 priority habitats have been identified by the WDFW. These are described in section 4.4.2 and depicted in Appendix C of the final EIS.
- The adequacy of compensatory mitigation is discussed in the response to comment FA2-10.
- IND57-8 See our response to comment SA1-10.

IND57-9

As my final overarching comment, I believe that the salmon of the Columbia River have been suffering the "death of a thousand cuts." Each new dam, irrigation project, industrial facility and other construction has altered, degraded or removed habitat, producing a cumulative effect of altered habitat and water conditions that salmonids have had to try to adapt to. Their declining numbers should tell us that they are having trouble doing so. Northern Star points out that implementation of its SEI "is expected to result in a net benefit to fishery resources on the lower Columbia River." This implementation is entirely voluntary, and should not even be considered as a part of this application. A critical look at the project and its effects must take into account its damages to fish and fisheries and the very real risks involving construction and mitigation.

I may be reached at 360-795-3920; imartin@iinet for further information. Thank you.

Sincerely,



Irene Martin.

Individuals

57

IND57-9

As stated in section 4.6.3, the FERC would not allow construction to begin until after we have concluded formal consultation with the FWS and NMFS.

Assurance of implementation of the SEI is discussed in the response to comment FA4-12.

K-909

Individuals

58

14 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

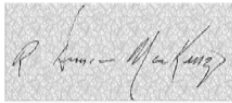
Re: Bradwood Landing LLC
Docket No. CP06-365-000 et. al.

Dear Ms. Bose:

Please enter the attached document containing my comments on the Draft
Environmental Impact Statement for the subject project into the public record.

Thank you for your attention to this matter, I remain...

Very truly yours,

A handwritten signature in dark ink, appearing to read "R. Duncan MacKenzie", is written over a light gray rectangular background.

R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

K-910

IND58-1

Reference is made to the information regarding cruise ship operations as noted on Table 4.8.1-5 on page 4-328 of the DEIS, and as discussed on page 4-332:

"Cruise Ships

During scoping, comments were received regarding potential project-related impacts on cruise ships that use the navigation channel of the Columbia River to reach Astoria. The Port of Astoria has been visited by cruise ships since 1996, and has invested more than \$10 million in improvements at Pier No. 1 to accommodate these vessels (Port of Astoria, 2006b). Eighteen cruises are scheduled to call on the Port during 2007 between April and November. The Coast Guard also recognized this issue, and its VSR contains the following conditions:

- when any cruise ship is moored at Astoria, LNG vessels would be restricted to transiting in good visibility (6 miles or more);
- any cruise ship at Astoria would require separate waterfront security when an LNG vessel is in transit in the vicinity; and
- a cruise ship and an LNG vessel would not be placed in a meeting situation.

We believe that with implementation of the conditions of the WSR, the potential for LNG marine traffic in the waterway to adversely affect cruise ships traveling to or docking at Astoria is extremely remote."

The presented information does not fully address the true scope of all cruise ship operations associated with the lower Columbia River affected by LNG carrier operations upstream from the Port of Astoria to river mile CRM38.

Two cruise line companies currently operate on the Columbia River between Portland and Astoria on a regular scheduled basis. Majestic America Line (formerly known as America West Line) operates the cruise ships: *Empress of the North* (223 guests/84 crew), *Queen of the West* (142 guests/47 crew), and *Columbia Queen* (150 guests/57 crew). The Cruise West division of West Travel, Inc. operates the *Spirit of 98* [96 guests], *Spirit of Discovery* [84 guests], and the *Spirit of Alaska* [78 guests]. These ships, which have been in operation for a number of years, carry tourists to several ports along the Columbia River adding not only to the economies of Astoria and Portland, but to these ports of call as well. The itineraries of the ships takes them not only past the Bradwood Landing terminal site, but places these ships in the traffic pattern of the lower Columbia River at times the LNG carriers might also be in transit.

The Majestic America Line Columbia River cruise "Northwest Rivers" has approximately eight to ten sailings per month. A review of the Majestic America schedule for 2008 notes a total of eighty (80) sailings starting in March and concluding in December. Cruise West's Columbia River schedule for 2008 has fifteen (15) sailings mostly in September and October.

Individuals

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IND58-1

See our response to comment PM2-17.

Individuals

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IND58-1
cont'd

The quantity of cruise ship calls noted on DEIS Table 4.8.1-5 as 26 in 2006 does not appear to include the port calls arising from the operation of the Majestic America Line or Cruise West ships.

The Economic Report prepared by the applicant's economic consultant does not address the tangible economic impact of the port calls, nor the jobs represented by the direct crew, administrative personnel or outside vendors associated with operations these ships.

Additionally, if as noted in the DEIS text shown above: *"a cruise ship and an LNG vessel would not be placed in a meeting situation."* has the applicant factored the movements of the noted vessels into the scheduling of construction dredging, maintenance dredging, or LNG carrier operations?

- In view of the significant potential economic and scheduling issues raised by the operation of these cruise ships, it is recommended that the Draft EIS be revised to accurately reflect ongoing cruise ship operations from Astoria to destinations beyond CRM38.

Additional DEIS References:

2-12	2.1.2.5	Current Marine Traffic on the Waterway
4-347	4.8.2.8	Recreation and Tourism
4-447	Table 4.12-1	Existing or Proposed Activities Cumulatively Affecting Resources of Concern for the Bradwood Landing Project
4-456 and 4-457	4.12.5	Socioeconomics - Transportation and Traffic - Ship Traffic
5-8, 5-9, and 5-12	5.1.7	Land Use, Recreation, and Visual Resources

K-912

Individuals

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14 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

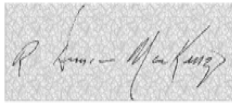
Re: Bradwood Landing LLC
Docket No. CP06-365-000 et. al.

Dear Ms. Bose:

Please enter the attached document containing my comments on the Draft
Environmental Impact Statement for the subject project into the public record.

Thank you for your attention to this matter, I remain...

Very truly yours,

A handwritten signature in dark ink, appearing to read "R. Duncan MacKenzie", is written over a light gray rectangular background.

R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

K-913

IND59-1

Reference is made to the discussion of Routine Discharge of Condensate Water from the SCV's found on pages 4-149 and 4-150. It is noted that the condensate discharge will be approximately 68°F and will contain a concentration of total dissolved solids about 10 times the concentration found in the river. It is assumed that the dissolved solids are primarily the reaction products arising from treatment of the condensate water to adjust the pH and are sodium carbonate and sodium nitrate.

The National Marine Fisheries Service [NMFS] has commented on this aspect in its "Request for Additional Information for the Bradwood Landing LNG Terminal..." [FERC Accession Number 20070511-5068] on page 10, lines 27 through 43:

"27 Condensate discharged to the Columbia River would be a constant temperature (68°F) and have
28 total dissolved solids content of about 10 times the concentration in the river (page 7-28). The
29 BA states that the discharge would not have a measurable effect on the total dissolved solids
30 content outside a mixing zone that extends about 10 feet from the diffuser (page 7-28).
31 • Explain how the mixing zone was calculated, and whether a mixing zone was also
32 calculated for water temperature.
33 • Indicate how many days per year (provide estimated range) discharged water would be of
34 a different temperature than the receiving waters. Indicate how many days per year it
35 would be warmer and how many colder.
36 • When receiving water temperatures are cooler than 68°F, explain why condensate
37 temperature cannot be reduced using the LNG to allow discharged water to more closely
38 approximate Columbia River water temperature.
39 • Indicate whether the dissolved solids would contain any contaminants.
40 • Indicate whether the condensate would be tested. If so, describe what elements,
41 compounds, or contaminants would be tested for.
42 • Explain what effects to pinnipeds, ESA-listed fish, and quality of EFH are expected
43 within the mixing zone."

The applicant has partially replied to the NMFS in a letter dated 6 July 2007 [FERC Accession Number 20070710-0030] on pages 25 and 26, that scaling down a heat exchanger system to use LNG to cool the discharge water is too expensive and not a feasible solution.

However, this argument is less than convincing as the proposed and permitted LNG terminal at Kitimat, B.C. will employ a covered settling pond to precipitate the dissolved solids, and an LNG/condensate water heat exchanger to hold the discharge water to +/-0.5°C of the receiving waters. Found in Appendix D on pages 217 and 218 of the Kitimat LNG Terminal - Environmental Assessment Report and Comprehensive Study Report prepared by the British Columbia Environmental Assessment Office dated 13 April 2006¹ is the following description of the system:

1] <http://www.ceaa-acee.gc.ca/050/documents/14504/14504E.pdf> attached as Exhibit 1

Individuals

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IND59-1

See our responses to comments PM5-59 and PM5-60.

IND59-1
cont'd

"Operation The primary water management issue during the operation phase is the characterization, treatment and disposal of wastewater generated from the Submerged Combustion Vaporizers (SCVs), which are the equipment that warms the LNG to allow vaporization (transformation of liquid to gas). The vapourizer consists of an enclosed water bath (25- 30°C) into which exhaust from a natural gas fired burner is allowed to percolate through and heat the water. The LNG (at -160°C) passes through a heating bundle (stainless steel tubing that is surrounded by the warm water bath) where it is warmed to approximately 5oC and regasified. The advantages of this system include:

- no water requirement except for initial fill;
- quick start up ability and tolerance for load fluctuation; and
- high thermal efficiency.

At commissioning stage, each vaporizer is filled with chlorine free potable water. The water specification requires the absence of dissolved matter, which may cause scaling or promote corrosion. Due to the condensation of the water vapour condensed by cooling the flue gas, excess water with some dissolved carbon dioxide (CO2) is produced. The volume of water produced by this condensation process is estimated to be 10 m3/h. In order to maintain the water level of the bath constant, an overflow rate equal to the condensing rate is maintained and the excess water is sent to a settling pond. When the natural gas is burned, the CO2 in the flue gas will dissolve in the warm water bath and produce a low concentration of carbonic acid (H2CO3) making the water bath slightly acidic. Therefore, means are required to control the pH of the water bath and effluent between 6.5 and 9. This will be achieved using an automatic neutralization process. Neutralization of the acidity will be achieved using caustic soda (NaOH) from a storage tank. Products of the neutralization process include water, carbon dioxide, sodium carbonate (350 mg/L average to 380 mg/L maximum) and sodium nitrate (30 mg/L average to 100 mg/L maximum).

The temperature differential between the ocean water and the discharged SCV effluent will also be controlled automatically. Using the cold temperature of the LNG, a heat exchanger will be used to adjust the temperature of the condensate water to within +/- 0.5°C of the ocean temperature prior to discharge from the settling pond into Emsley Cove.

The settling pond will be covered so only SVC effluent is in the pond and continuous, automated monitoring will be used to ensure that the pH and temperature of the water is acceptable for discharge. Water quality monitoring and testing in the settling pond will be incorporated into the EPP for the site. Testing procedures will ensure that the water released from the settling pond meets provincial requirements for release."

(emphasis in italics)

There is concern that the current design envisioned by the applicant does not address the long-term effects on the downstream river environment occasioned by a localized 'plume' of sodium carbonate and sodium nitrate sediment emanating from the outfall. The solubility of sodium carbonate in water is a function of water temperature. The noted average temperature of the river is not conducive to dissolving a substantial portion of the sodium carbonate discharged. The overall perceived effect would appear to be a continual rise of water alkalinity in the outfall and down stream areas of the river.

Individuals

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IND59-1
cont'd

As found in the United Nations Environmental Programme publication *SODIUM CARBONATE CAS N°: 497-19-8 SIDS Initial Assessment Report For SIAM 15*, Boston, USA, 22-25 October 2002 [attached as Exhibit 2] sodium carbonate in concentrations greater than 100mg/l will cause mortality in fish. However, for Amphipoda, salmon and trout, lethal effects were observed at 67-80 mg/l although these studies had a low reliability².

In view of the applicant's numerous press releases extolling its environmental responsibility and as is found at the bottom of page 4-150 "the applicant is committed to provide an overall net benefit to the environment of the lower Columbia River ecosystem.", the applicant's argument of expense found in the response to the NMFS is considered unavailing as a justification for ignoring practicable thermal pollution mitigation measures for this critical habitat area.

- In view of the potential thermal pollution of the receiving waters and the potential for long term discharge of alkaline sediment into the river over the operational life of the facility, it is strongly suggested that FERC recommend that the applicant:
 - a) Fully examine and address the long-term effects of alkaline buildup downstream of the SCV outfall, and
 - b) Review the Kitimat LNG system of discharge water treatment for incorporation of this system into the applicant's proposed facility design.

2] The study referred to in the UN document is a citation of McKee & Wolf (1963). Water Quality Criteria. California State Water Resources Control Board. Publication 3-A.

K-916

ORIGINAL

12/1/2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

RECEIVED
OFFICE OF THE
SECRETARY
DEC 13 P 2:53

Ms. Bose,

The following are my written comments on the Draft Environmental Impact Statement for Bradwood Landing, Docket No. CP06-365-000 et al:

- IND60-1 | Page ES-1 Define Pacific Northwest. According to Ken Zimmerman, a consultant for the Oregon Public Utilities Commission, 75% of this gas will be going to California.
- IND60-2 | Page ES-2 Identify the interstate pipeline to be interconnected with Bradwood. Two have been mentioned in different documents: The Williams Northwest line and the KB pipeline.
- IND60-3 | Page ES-2 No permit should be issued until the Final Pipeline Design Geotechnical Report is done. The only survey for landslide areas at this point has been done from the air. Bradwood proposes to cross landslide areas using HDD. They also propose to put monitors on the pipeline in these areas. How can this be accomplished without digging, thus causing a surface disturbance that could lead to further erosion and land movement?
- IND60-4 | Page ES-3 The proposed mitigation site on Delameter Creek does not meet "like for like" standards of the ESA.
- IND60-5 | Page ES-4 Apply dollar amounts to the negative aspects and impacts to the area. Only then can the determination be made that it will have a "beneficial impact on the local economy".
- IND60-6 | Page ES-5 The Emergency Response Plan and the Cost Sharing Plan should be spelled out in the DEIS so that communities can evaluate economic impacts.
- IND60-7 | Pages ES6-7 Where is the criteria used to evaluate the alternatives?
- IND60-8 | Page 1-4 An independent needs assessment should be done, not relying on the figures given by industry lobbyist, the Northwest Gas Association. The Review of Pipeline Utility Corridor Capacity and Distribution for Petroleum Fuels, Natural Gas and Biofuels in Southwest Washington, submitted to the Washington Legislature by ICF International on 11/17/2007 would be a better source.
- IND60-9 | Pages 1-8-9 The Biological Opinion should be a part of this document.
- IND60-10 | Pages 2-6-7 NorthernStar would offer "contract incentives" to suppliers to retrofit tankers so that they would comply with the ballast filtration system. What happens if they don't comply?
- IND60-11 | Page 2-13 The plan for the facility is clearly not in compliance with SIGTTO's requirement in Information Paper 14 that states LNG receiving facilities and moorages should not be located on the outside bend of a river. The project is also not in compliance for channel width. SIGTTO also mentions 4 tugs per tanker, not the 3 that NorthernStar will provide on a lease basis.
- IND60-12 | Page 2-25 The Williams Northwest pipeline system is currently fully subscribed at the interconnect point. Williams spokesperson, Michele Swaner was quoted on 11/27/07, saying they have long term contracts for supply and customers. How is NorthernStar going to utilize that system?

Individuals

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- IND60-1 | See our response to comment PM1-23.
- IND60-2 | The Executive Summary identifies the Williams Northwest pipeline as the terminus of the Bradwood Landing sendout pipeline. The project does not interconnect with the KB pipeline.
- IND60-3 | See our response to comment LA7-25. Installation of strain monitors and HDD boreholes would cause minimal surface disturbance.
- IND60-4 | See our response to comment FA2-10.
- IND60-5 | The Executive Summary is meant to be very brief, and cannot discuss any issues in detail. Our discussion of potential socioeconomic impacts associated with the proposed project is included in section 4.8.
- IND60-6 | See our response to PM1-1. NorthernStar is currently in the process of developing an ERP and Cost Sharing Plan in consultation with appropriate federal, state, and local agencies and has filed a draft with the FERC. See also our response to comment LA3-55.
- IND60-7 | The criteria used by the FERC to evaluate alternatives are discussed in the introduction of section 3.1 and in section 3.1.5.3.
- IND60-8 | See our response to comment PM1-8.
- IND60-9 | See our response to comments PM6-94 and FA2-24.
- IND60-10 | See our response to comment PM1-31.
- IND60-11 | The SIGTTO standards are taken into consideration and implemented as appropriate.
- IND60-12 | See our response to comment PM1-10.

K-917

K-918

IND60-13	Page 2-28 The Palomar Pipeline should be considered as an equal part of this project. That proposed pipeline would carry the gas to the TransCanada pipeline at Maupin, Oregon and south to California. One will not exist without the other.
IND60-14	Page 2-32 There are no guarantees that the plant will not be sold, either before construction or after, thus negating the Salmon Enhancement Initiative.
IND60-15	Page 2-42 This site is dredge spoils, vibroflotation will not be adequate protection from soil settling and liquefaction during a seismic event.
IND60-16	Pages 2-49-51 Waterbody Crossings. Landowners are currently operating under DNR rules disallowing activity within specified distances of creeks and rivers. Why should this pipeline be installed by the open trench method on tributaries to salmon bearing streams? Also, what happens in the event of a "frac-out" at a HDD site?
IND60-17	Page 2-62 Given the location of the facility, it will be impossible to make it secure. The surrounding hillside provides cover for any agent wishing to damage the plant.
IND60-18	Page 2-62 The Emergency Response Plan for pipeline emergencies needs to be made public. Nowhere in the DEIS is there a description of the environmental consequences in the event of a pipeline explosion.
IND60-19	Page 2-63 There needs to be a bond established to deal with the abandonment of the plant and the pipeline.
IND60-20	Page 3-1 How can it be a public convenience and necessity to issue a permit for a pipeline that has no interconnect with an existing pipeline?
IND60-21	Page 3-1 Nowhere in the FERC evaluation criteria is the impact on human beings discussed.
IND60-22	Page 3-2 By FERC's own reckoning, if the Palomar Pipeline is constructed it will function to provide gas to the northwest.
IND60-23	Page 3-2 Conserving gas should be the highest priority. Both Oregon and Washington have enacted laws to make our states more reliant on renewable energy in the near future.
IND60-24	Page 3-12 In October of this year the CFO of Sempna, who will operate the Costa Azul LNG plant in Baja California, stated that there will be no need for any other LNG facilities on the west coast; that they could accommodate all needs for LNG.
IND60-25	Page 3-45 Where is the data to support the assertion that the HDD of the Columbia River would be "unconstructable" at the Bradwood Landing site.
IND60-26	Page 3-51 Table 3.1.8-2 shows an alternative route at MP 33.9. Information here does not correspond with information in Table 4.7.3-7. Here it says the variation would be 300 ft. from several residences, while in the later table, it says 4.4 feet from the construction zone. Also the "soon to be abandoned power line right-of-way" is now under control of the landowner.
IND60-27	Page 3-52 Where does the "least environmentally damaging practicable alternative" fit into the Endangered Species Act?
IND60-28	Page 3-53 What is the true nature of the dredging? Is it for deepening the turning basin or offering a cheap fill needed to raise the grade of the facility site?
IND60-29	Page 3-58 The Coast Guard Water Suitability Report should be made public.
IND60-30	Page 4-11 The site is <u>conservatively</u> classified as a "High" hazard area relative to earthquake potential. Define "active fault".

Individuals

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IND60-13	As described in section 3.1.2.2, we consider the Palomar Project to be a separate undertaking from the Bradwood Landing Project. Neither project is inter-dependent on the other. If Palomar is not authorized or built, the Bradwood Landing Project could still go forward, and visa versa. Relative to the Palomar pipeline market, see our response to comment PM1-24.
IND60-14	See our response to comment FA4-12. The operator of the facility must adhere to all of the conditions of the Commission's Order.
IND60-15	Vibroflotation has been recommended by geotechnical engineers as an effective method to minimize the potential for liquefaction at the terminal site. NorthernStar would be required to demonstrate that the proposed ground improvements actually achieved the intended design values before receiving authorization to construct the remainder of the facility.
IND60-16	Waterbody crossings using open-cut methods as they relate to the WDNR's Forest Practice Rules are discussed in the response to comment PM4-11. NorthernStar's HDD Contingency Plan describes in detail procedures that would be followed in the event of a frac-out. Directions for accessing NorthernStar's HDD Contingency Plan via the eLibrary can be found in the response to comment FA3-13.
IND60-17	The Coast Guard has determined measures which will mitigate risks to the security of the LNG terminal. Also, section 4.11.8 provides a discussion on terrorism and security. It is possible that a release from the LNG storage tanks could be caused by an intentional act, such as a terrorist attack. Although an intentional breach scenario could result in greater thermal radiation in the immediate vicinity of the release, such scenarios are typically associated with the desire to inflict damage to major infrastructure and population and commercial centers
IND60-18	See our response to comment PM1-1 and LA3-55
IND60-19	See our responses to comments IND3-22 and IND49-2.
IND60-20	The Bradwood Landing sendout pipeline will connect to other pipelines, including the existing Williams Northwest system.
IND60-21	Impacts of the project on humans are discussed throughout the EIS under numerous resource topics, including land use, recreation, and visual resources, socioeconomics, air quality and noise, and reliability and safety.
IND60-22	While Palomar proposes to transport natural gas produced in Canada and the Rocky Mountains to the Portland metropolitan area, the Bradwood Landing Project would provide a new source of natural gas to the Pacific Northwest through the importation of LNG. The two projects are not mutually exclusive, and could both provide additional supplies of gas to the region from different sources. See also our response to comment PM1-24.
IND60-23	The EIS discusses conservation under section 3.1.1.2.

Individuals

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- IND60-24 NorthernStar believes that there is a need for an LNG import terminal to serve the Pacific Northwest. There are many independent studies, cited in section 1.1 of this EIS, to support the need for the Bradwood Landing Project. As explained in section 3.1.3.1, we do not think that the Costa Azul LNG import terminal in Mexico would provide natural gas to the Pacific Northwest, because it would mainly be serving markets in northern Mexico and southern California instead.
- IND60-25 The HDD crossing of the Columbia River from the Bradwood Landing LNG terminal was ruled out due to the width of the river at that location. In addition, a crossing of the river at Bradwood Landing would place the sendout pipeline in the town of Cathlamet, Washington. From there eastward to the proposed interconnection with the existing Williams Northwest system near Kelso, the route would have to traverse rough topography.
- IND60-26 Variation NS-8 in table 3.1.8-2 has been revised to more correctly state “The HDD entry pit work space for the alternative route variation would be *within* 300 feet from several residences...” Also the text has been updated to indicate the power line right of way is abandoned.
- IND60-27 The alternatives analysis was performed to fulfill the requirement of the NEPA not the ESA. However, our alternatives analysis did discuss potential impacts on federally-listed threatened and endangered species at other project locations. No alternative LNG terminals and associated sendout pipelines were identified that would not potentially impact ESA protected species.
- IND60-28 Dredging would be required to construct the maneuvering basin for the LNG terminal as described in sections 2.1.3.1 and 2.4.1.2.
- IND60-29 The WSR is public and can be found in Appendix H of the EIS.
- IND60-30 An active fault is generally considered to be a fault that has undergone movement during the Holocene Epoch (approximately the last 10,000 years).

K-920

IND60-31	Page 4-12 The upper 85 feet at the site would liquefy during an earthquake. Again, vibroflotation is no defense against liquefaction.
IND60-32	Page 4-22 The proposed pipeline would cross a seismic hazard area at the Cowlitz River. The liquefaction zone here is reported to be 100-125 feet deep. Further it states that in " recent history, no accounts of damage to any existing pipelines have been documented in the project area." This discounts the three explosions of the Williams Northwest pipeline in the past dozen years, first in Castle Rock, WA, secondly in Kalama, WA and lastly in Toledo, WA.
IND60-33	Pages 4-45-49 ESC not defined.
IND60-34	Page 4-121 Recreational fisheries deserve more consideration than one paragraph.
IND60-35	Page 4-139 The Bubble Curtain Contingency Plan needs to be approved before the final EIS.
IND60-36	Page 4-166 Bentonite would cover the spawning grounds of fish, some protected by the ESA, rendering them unusable.
IND60-37	Page 4-183 Produce the data to support the claim that most of the Chinook salmon spawning in Washington streams within the project area are either hatchery strays or first generation descendants of hatchery fish.
IND60-38	Page 4-256 The Cowlitz Indian tribe recently petitioned to have the eulachon (smelt) listed on the ESA.
IND60-39	Page 4-284 FERC finds the land-use laws of Oregon inconsistent with this development. Final decision of Clatsop County Commissioners is pending.
IND60-40	Page 4-302 Why does the pipeline route differ from the existing ROW of the KB pipeline?
IND60-41	Page 4-313 This project must abide by Cowlitz County's Critical Areas Ordinance Plan, currently being updated.
IND60-42	Page 4-313 Compensation must be required for landowners whose septic systems or water sources are compromised.
IND60-43	Page 4-316 Define "close proximity". The fastest growing area in Cowlitz County is Lexington, an unincorporated community of 7200 residents and the location of a planned elementary school, well within the thermal radiation zone.
IND60-44	Page 4-321 The potential impacts of LNG Marine Traffic go further upriver than Puget Island, WA. Shipping on the entire Columbia River system will be impacted, all the way to the grain shippers of Umatilla.
IND60-45	Page 4-328 The estimate of 1500 recreational boats on the Columbia between February and October is woefully low.
IND60-46	Page 4-337 The data cited by the Argonne National Laboratory is 17 years out of date.
IND60-47	Page 4-347 No mention of the stern-wheeler cruise ships that use the Columbia between Astoria and Portland.
IND60-48	Page 4-351 NorthernStar will not own the property where the pipeline is installed. How can they claim to pay \$740,250 in property taxes to Cowlitz County. That is a very specific number.
IND60-49	Page 4-426 The GAO has asked for a new Sandia study to be done addressing impacts of a cascading failure. This project should not go forward until that study is completed.

Individuals

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IND60-31	See our response to comment IND 60-15.
IND60-32	The reference to pipeline damage is meant to apply to damage resulting from lateral spreading. See also our response to PM2-16.
IND60-33	ESC refers to Erosion and Sediment Control. The Acronyms and Abbreviations section has been revised to include this definition.
IND60-34	Potential impacts on recreational fishing are discussed in section 4.7.1.4.
IND60-35	See our response to comment LA3-33.
IND60-36	NorthernStar's HDD Contingency Plan describes in detail procedures that would be followed in the event of a frac-out. Directions for accessing NorthernStar's HDD Contingency Plan via the eLibrary can be found in the response to comment FA3-13. Potential direct and indirect impacts on aquatic resources, including federally listed salmonids, are discussed in section 4.5.2.1.
IND60-37	All cited references are provided in Appendix H. Section 4.6.1.1 has been revised to include updated information on Chinook spawning in Washington streams in the vicinity of the project area.
IND60-38	As mentioned in the revised section 4.9.3, the Cowlitz Indian Tribe wrote a letter to NorthernStar indicating their support for the project.
IND60-39	See our response to comment PM1-9. On March 20, 2008, Clatsop County accepted NorthernStar's land use changes.
IND60-40	Realignment away from the KB pipeline route have been necessary at locations where the KB pipeline was constructed in areas containing geological hazards such as poor slope stability, or to reduce stream crossing impacts.
IND60-41	See our response to comment PM4-12.
IND60-42	See our response to comment PM2-4. Impacts on private water systems or septic systems are addressed in section 4.7.3.3.
IND60-43	Thermal radiation zones are used only for LNG facilities, and are not applied to natural gas pipelines. A discussion of natural gas pipeline safety is included in section 4.11.9.
IND60-44	See our responses to comments PM1-14, PM1-52, PM3-11, PM5-31, PM5-47, and others.
IND60-45	Section 4.8.1.7 has been revised to correct the number of recreational fishing boats.
IND60-46	See response to comment IND3-16.
IND60-47	See our response to comment PM2-17.
IND60-48	Property taxes for a piece of property are generally based on the actual use of the land. Therefore, NorthernStar would be required to pay property tax for the portion of a property crossed by the easement that it owns.
IND60-49	See section 4.11.5.3 for a discussion of the GAO February 2007 report on LNG spill studies, including the Sandia study.

- IND60-50 | Page 4-443 Table 4.11.9-2 shows outside force to be the highest cause of incidence. Later data shows corrosion to be the leading cause of pipeline accidents. In Cowlitz County, land movement is the only cause of the recent pipeline explosions.
- IND60-51 | Page 4-455 The statement that NorthernStar would have trained personnel and fire fighting equipment needs to be clarified. At the Clatsop County Planning Commission hearings, it was made clear that the personnel and equipment would be for the facility, not to come to the aid of surrounding communities.
- IND60-52 | Page 4-456 The estimates on ship traffic need to be taken in context. The Coast Guard is requiring the use of smaller (140,000 cm) ships, necessitating more trips to achieve full use of the facility. If the third tank is approved in the future, that will add to ship traffic. Given the "security" zones around the tankers, this will have major implications on Columbia River traffic.
- IND60-53 | Page 5-5 Additional study needs to be done on vegetation types. Douglas Fir plantations have been identified as "scrub-shrub".
- IND60-54 | Page 5-5 Who is responsible for surveying for noxious weeds on the ROW?
- IND60-55 | Page 5-17 Why should the public be responsible for any of the costs for safety and security at the terminal and near vessels that serve the facility?
- IND60-56 | Page 5-17 If equal weight is given to the "no action" alternative, it is clear that this is what would be best for the environment. Without the independent needs assessment and the independent economic assessment, there is no evidence supporting the positive aspects of this project.

Respectfully,

Gayle Kiser, landowner

2112 West Side Hwy.
Kelso, WA 98626

Individuals

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- IND60-50 | See our response for comment PM2-16.
- IND60-51 | NorthernStar filed a draft ERP which outlined its cost-sharing proposal to improve the resources available to local first-responders. This draft will be reviewed by the FERC and the Coast Guard. After consulting with appropriate local agencies about the draft ERP, we will request that it be revised by NorthernStar to meet our expectations and requirements, and provide the level of services necessary to protect local communities. This is further discussed in section 4.11.6.
- IND60-52 | The maximum number of annual LNG carrier trips would be 125 regardless of carrier capacity. If expansion of the facility requiring a third LNG storage tank is proposed in the future, an application for FERC authorization would be required, which would include an environmental review under the NEPA.
- IND60-53 | As described in section 4.4.2, upland habitats that would be impacted by the project in Oregon were classified based on the Oregon Habitat Mitigation Policy. Although the State of Washington does not have a similar habitat classification system, 18 priority habitats have been identified by the WDFW. These are described in section 4.4.2 and depicted in Appendix C of the final EIS. Because specific information on the Douglas fir population being described in the comment is not clear, it cannot be responded to.
- IND60-54 | To prevent and mitigate for the distribution of noxious weeds during construction and control noxious weeds that develop after construction, NorthernStar has agreed to implement measures as described in its *Noxious Weeds and Soil-borne Plant Disease Control Plan*. We have recommended that NorthernStar continue to consult with the COE, FWS, NMFS, Oregon and Washington Departments of Agriculture, and other appropriate resource agencies to revise its Plan. NorthernStar has agreed to monitor revegetation of non-cultivated areas during the first and second year after construction to determine whether the herbaceous vegetative cover or density in the construction area is similar to that in adjacent areas not disturbed by construction or if there are excessive noxious weeds. If there are excessive noxious weeds after the first or second growing season, an agronomist would determine the need for additional restoration measures that NorthernStar would implement, as necessary. The FERC staff would also conduct inspections to monitor the project for compliance with the Commission's environmental conditions and project mitigation measures proposed by NorthernStar or required by the regulatory agencies. Other federal, state, and local agencies with jurisdiction or permitting authorities would conduct oversight inspections and monitoring, to the extent deemed necessary by those agencies, in order to meet their regulatory responsibilities.
- IND60-55 | See our responses to comments PM6-24 and LA3-55.
- IND60-56 | Section 3.1.1.4 describes our conclusions regarding the no action alternative.

K-921

The Federal Energy Regulatory Commission has undertaken a deeply flawed process in evaluating the environmental impacts of Northern Star company's Bradwood Landing Liquid Natural Gas Terminal. The draft environmental impact statement (EIS) which FERC released in August, 2007, documents a failure to comply with the letter and the spirit of the National Environmental Policy Act.

There are two overarching problems: the failure to consider the cumulative impacts of all developments closely related to the proposed terminal, and the failure to consider alternatives, including the "no action" alternative.

IND61-1 | The Bradwood Landing draft EIS does not even mention the proposed Palomar pipeline, which will transport the imported fossil fuel from the Bradwood terminal to Central Oregon. Palomar is the subject of a separate EIS which just got underway in November, 2007. The impacts and hazards of the Bradwood terminal by itself are horrendous, and the bland statements that the hazards are negligible and the impacts can be mitigated are not convincing. Add the impacts of ripping a 200+ mile wound through Oregon's scenic and working landscapes, and the cumulative impacts are overwhelming. Then, add the danger of a flammable gas in a pressurized (but not odorized!) 36 inch pipeline running through earthquake and landslide-prone country. It is hard to imagine any amount of benefit which would outweigh these impacts and hazards.

IND61-2 | LNG proponents like to point out the safety record of terminals around the world. They don't like to talk about the record of leaks, explosions, fireballs, and fatalities associated with gas pipelines. Have you seen a picture of the explosion following the leak of a gas pipeline on the Umatilla Indian Reservation in Eastern Oregon in January, 1999? Check it out at <http://www.eere.energy.gov/tribalenergy/pdfs/umatilla.pdf>. Then just imagine that picture in the dry forests of the Coast Range or on the Mt. Hood National Forest in late summer, or near the school and among the houses, gardens, and farms in my community of Gales Creek.

IND61-3 | The other flaw in the Bradwood EIS process is the failure to honestly consider the alternatives. According to the White House Council on Environmental Quality, NEPA regulations require

"the EIS to examine all reasonable alternatives to the proposal. In determining the scope of alternatives to be considered, the emphasis is on what is 'reasonable' rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant."

Region X of the Environmental Protection Agency used this argument in urging FERC to combine the EIS process for the Palomar pipeline and the Oregon LNG Terminal and Pipeline, yet another EIS process which began in November 2007. The proposed Jordan Cove terminal on Coos Bay and its associated pipeline should probably also be included, since the ostensible benefits of the three projects all concern increasing the West Coast supply of natural gas.

Individuals

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IND61-1 | The Palomar pipeline was discussed in sections 2.1.6 and 4.12 of the draft EIS. We have moved our discussion of the Palomar pipeline to section 3.1.2.2 in the final EIS in response to comments on the draft EIS. As described in section 3.1.2.2, the Palomar pipeline is a separate project from the Bradwood Landing Project and its environmental impacts are being evaluated in a separate EIS to be prepared by the FERC.

IND61-2 | Pipeline accident data are discussed in section 4.11.9.2.

IND61-3 | The EIS does consider alternatives, under section 3.0. The no action alternative is addressed under section 3.1.1. The proposed Palomar Pipeline Project is discussed in the EIS under sections 2.1.6 and 3.1.2.2. As explained in section 2.1.6, we will be conducting a separate, stand alone environmental review of the proposed Palomar Pipeline Project, because it is an independent project not dependent on the Bradwood Landing Project. The Jordan Cove Energy LNG Project is discussed in section 3.1.3.4. As explained in that section, the FERC would also conduct a separate, stand alone environmental review of the Jordan Cove LNG Project, because it is not related to the Bradwood Landing Project. Section 1.1 of this EIS explains the need for the project, using several independent studies that examine future energy needs in the Pacific Northwest. While renewal resources and conservations are admirable approaches to meeting the future energy needs of the region, alone they cannot completely fulfill anticipated future demands, as discussed in sections 3.1.1.2 and 3.1.1.3 of this EIS. (See our response to comment PM3-56.)

IND61-3
cont'd

The "no action" alternative is dismissed with the statement that project's objectives of adding to the NW supply of natural gas would not be met, as if adding more fossil fuels to our region is in itself so desirable it needs no further justification. "No action" would of course have none of the terrible environmental impacts and hazards associated with construction of the terminals and pipelines. The downside of "no action," according to the proponents of these actions, is that we would not have enough energy to provide a "bridge" to a future of renewable energy to which even the most enthusiastic investors in fossil fuels must give lip service.

But what does this mean? Has the gap which must be "bridged" for Oregon or for the West, ever been quantified? The FERC staff member who chaired the November hearing on Palomar said that his agency is not responsible for energy planning or for determining the need for the projects which they assess. Who does have that responsibility? If no one does, how can a "no action" alternative be evaluated at all?

Suppose that we did determine that, if present trends in energy use and the pace of development of renewable energy in our region continued, there would indeed be a period of some years in which we would not have enough energy in Oregon or the West. Wouldn't we choose to take all possible action to change those trends rather than further endangering our Columbia River salmon? Wouldn't we invest in insulating our buildings more effectively rather than inflict a permanent fifty-foot-wide clear-cut swath through Northwest Oregon's public and private forests? Wouldn't we accelerate the pace of wind, solar, geothermal, and ocean energy development rather than assume the risk of a catastrophic pipeline explosion and fire in one of the many communities through which these pipelines will pass?

These are the real alternatives that would be considered in a credible EIS process which would meet the requirements of the law. Tweaks to the pipeline route, devising engineering solutions to landslide and earthquake hazards, or picking out one of these groups of speculators to get permission to ravage our River and our landscape for out-of-state profit are not alternatives at all.

Anne Berblinger
Gales Meadow Farm
Gales Creek Oregon 97117

IND61-4

My family's farm is one of many through which one or both of the pipelines are proposed to pass. I submitted the following to FERC on the specific effects of the LNG pipeline on Gales Meadow Farm:

The proposed LNG pipeline appears to run lengthwise through our farm, along the bottom of the hill on the east side of our field (the scale and resolution of the map available at the FERC hearing were not adequate to ascertain exactly where on our farm the pipeline would be constructed).

Individuals

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IND61-4

The proposed Bradwood Landing pipeline is not routed near Gales Creek, Oregon. The Gales Meadow Farm may be crossed by some other natural gas pipeline (such as Oregon LNG or Palomar) that is being studied in a different proceeding before the FERC.

IND61-4
cont'd

- ☐ A 150' construction easement would encompass all of our main cultivated field and most of our cultivated land.
- ☐ We would be out of business for an entire growing season.
- ☐ Our relationships with our customers, which we have been building for eight seasons, would be destroyed.
- ☐ 15+ years of building the soil, improving its tilth, and creating habitat for beneficial microbes, insects, other invertebrates, reptiles, and amphibians, would be destroyed by introducing heavy construction equipment onto our land, compacting the soil, and disrupting the soil structure.
- ☐ Our underground irrigation system, including our delivery pipes and our innovative subsurface drip tape would be disrupted.
- ☐ The drainage tile at the south end of our field would be destroyed.
- ☐ Our domestic well and the domestic well of a neighbor (which is on our property) would be impacted. We have an excellent well and good water quality, rare in the Gales Creek Valley.
- ☐ The conifer plantings we have established as a buffer with neighboring conventional farming operations (a condition of organic certification) would be cut down and we could not replace them.
- ☐ Almost certainly, our organic certified status would be lost for a minimum of three years, possibly forever.

IND61-5

- ☐ A rare and possibly endangered plant (*trillium parviflorum*) which grows on our property, and which we have carefully protected, would be impacted.
- ☐ In summary, construction of the proposed natural gas pipeline in the proposed alignment would destroy our small business.

Our family business has tried to do our share in reducing the use of fossil fuels and our carbon footprint. We invested, with the help of the Oregon Energy Trust, in a photovoltaic system which has produced almost 2500 KWH so far. This last summer, with the help of the USDA EQIP program, we switched from overhead sprinkler irrigation to drip irrigation, saving both water and the energy used for pumping. We deeply appreciate the public investments which enabled us to undertake these projects. The public and private tools to move us to renewables and to reduce our contributions to global climate change already exist! Let's get more money and staff into these programs, train more people and private companies to do the work, and encourage more landowners and businesses to take advantage of them.

Individuals

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IND61-5

Based on a review of the list of properties crossed by the proposed pipeline, it does not appear that any properties owned by the Berblinger family would be directly impacted by the proposed pipeline route. Therefore, impacts on the population of *Trillium parviflorum* are not anticipated.

Individuals

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17 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

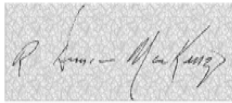
Re: Bradwood Landing LLC
Docket No. CP06-365-000 et. al.

Dear Ms. Bose:

Please enter the attached document containing my comments on the Draft
Environmental Impact Statement for the subject project into the public record.

Thank you for your attention to this matter, I remain...

Very truly yours,

A handwritten signature in dark ink, appearing to read "R. Duncan MacKenzie", is written over a light gray rectangular background.

R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

K-925

IND62-1

Reference is made to the ancillary Support Facilities associated with the LNG Terminal description as found in the DEIS on page 2-23 under section 2.1.3.6 Nitrogen System, and to the Pipeline and Associated Aboveground Facilities as covered in Section 2.1.4.

The applicant's Resource Reports 1, 11, and 13 note that a nitrogen system will be provided to produce nitrogen gas for purging pipes, process equipment, and vessels only. Nowhere in the DEIS, nor the publicly available Resource Report design materials reviewed is any mention of the need or method to be used to adjust the Higher Heating Value [HHV] of the imported gas to meet the transmission specifications required for interstate pipeline transmission. The only acknowledgement the applicant has shown with regard to the issue of HHV adjustment is found in a 25 July 2006 document from the applicant's lawyers [FERC Accession Number 20060725-5035] on pages 24 and 25 as follows:

"K. Gas Interchangeability and Gas Quality

.... Clearly, any re-vaporized LNG that is transported to the interstate pipeline grid must meet the gas quality standards of the interconnecting interstate pipeline(s). Any gas that Bradwood Landing transports or ships will be required to be capable of introduction into downstream systems in accordance with tariff requirements and FERC policies. At this point however, it is premature to discuss the potential supply arrangements for the imported LNG. Suffice it to say that the gas will meet the gas quality provisions contained in downstream pipeline tariffs. Bradwood Landing recognizes the importance of interchangeability, but submits that this concern does not require resolution prior to approval of the authorization it seeks."

With the exception of Trinidad and Tobago, LNG produced around the world has HHV values which range from 1100 to 1150+ Btu per cubic foot; far higher than natural gas from domestic sources. The potential supply market for the facility would not seem provide LNG of a sufficiently low HHV to accomplish in-tank blending. Furthermore, there is a tendency for the HHV values to increase over time through the transport and delivery cycle as "boil off" of the lighter hydrocarbons occurs. While liquefied natural gas can be supplied with the HHV adjusted by the supplier prior to shipment, it is a costly alternative and decreases the flexibility of the shipper to supply a wide market or divert a cargo to another receiver.

Individuals

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IND62-1

NorthernStar would have to comply with the emission limitations documented in an ODEQ Air Contaminant Discharge Permit for the terminal. If compliance testing indicates that the vaporizers are not complying with their source specific emission limitations, action would be required by the ODEQ to reduce the emission to comply or apply for a modification to the permitted emission limits to account for any increases.

IND62-1
cont'd

It should be noted that the current Williams Northwest Pipeline (the currently intended major transmission pipeline tie-in for the project) transmission specifications do not appear to have maximum HHV values, nor are maximum or minimum Wobbe Index values given, as traditional supplies from Canada have historically been within acceptable ranges¹. This fact may account for the applicant's apparent lack of address to this issue. However, if the National Gas Council Plus interim guidelines, developed in anticipation of increasing LNG imports, are adopted by Williams Northwest; then the HHV will be limited to a maximum of 1110 Btu/scf and the Wobbe index will be required to be +/-4% of historical values (the four year average has been 1351).

There are two aspects of this issue, which despite the applicant's protestations noted above, would appear to require resolution prior to approval of authorization or preparation of the FEIS.

- 1) Found on lines 30 through 36, page 1 of 3, of the Selas Vaporizer Data Sheet, [applicant's "Bradwood Landing Terminal Application for Air Contaminant Discharge Permit" pages 34 through 36 of 129 [FERC Accession Number 20070522-0112] is the composition of the fuel for the submerged combustion vaporizers and the HHV value noted as 1068 Btu/scf². In the absence of design information or mention of the manner HHV adjustment will be accomplished, how is the applicant capable of assuring the Oregon Department of Environmental Quality that the stated fuel composition and HHV are correct and will be held to the values stated? If these values cannot be substantiated, all Air Quality modelling and emissions data could then be called into question.

IND62-2

- 2) Has the attendant noise and potential cooling water demand of an air separation unit(s) of sufficient capacity for nitrogen injection, or compressor capacity for air injection adequately been accounted for in the applicant's submissions? The operational equipment list and associated noise data found in the applicant's Resource Report 9 [FERC Accession Number 20060605-4000] Section 4.3, page 9b-10 as Table 9B-5 makes no mention of this equipment. Additionally, no mention of equipment required for HHV adjustment is found in DEIS Section 4.10.2.2 at page 4-392, Table 4.10.2-4.

IND62-1
cont'd

- It is requested that FERC recommend that the applicant address the manner in which HHV adjustment will be accomplished to yield a suitable Wobbe Index and to insure that the anticipated emissions will conform to the submitted data contained in the ACDP and FEIS.

IND62-2
cont'd

- It is further requested that FERC recommend that the applicant review the application information as to noise and water resources arising from the associated HHV adjustment equipment for re-evaluation by FERC in its preparation of the FEIS.

Individuals

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IND62-2 See our response to PM6-80

Individuals

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- 1] Presentation *GAS QUALITY AND INTERCHANGEABILITY - Conference Call*, The Williams Companies - Northwest Pipeline, 23 January 2007, slides 7 and 8
<http://www.1line.williams.com/Files/Northwest/NWPGQPresentation-v2.pdf>
- 2] The fuel gas composition noted on lines 30 thru 35 appears to be similar to the composition of Bintulu-Heavy LNG as noted in the Whessoe, Ltd. Document W00031-563-PR-DS-007, page 2 of 2, lines 34 and 35. This document is included in the applicant's initial Section 3 application submission as FERC Accession Number 20060605-4000 CD 3 of 4.

17 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

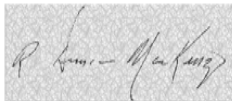
Re: Bradwood Landing LLC
Docket No. CP06-365-000 et. al.

Dear Ms. Bose:

Please enter the attached document containing my comments on the Draft
Environmental Impact Statement for the subject project into the public record.

Thank you for your attention to this matter, I remain...

Very truly yours,

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R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

Individuals

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K-929

IND63-1

Noted in the DEIS on page 4-346, and again on page 4-416 is the fact that the Portland and Willamette railroad tracks are adjacent to the facility and within the thermal exclusion zone. Also noted on pages 4-111 and 4-112 is the provision of a five (5) foot impoundment dike (containment berm) surrounding the LNG storage facility.

As found in Resource Report 13 [FERC Accession Number 20060605-4005 CD-1] the applicant notes specific compliance with codes and regulations that are applicable to aspects of the terminal's physical design.

13.13 REGULATORY COMPLIANCE

"A Code Compliance Tables completed by Whessoe are provided. Additional details of where the Project design complies with 49 CFR Part 193 and NFPA 59A are included in this Section 13.13."

13.13.1 49 CFR Part 193

"Table 13.13-1 lists the sections of 49 CFR Part 193 and the reference in this Resource Report 13 where each requirement is discussed. Some references are continued at the end of this section."

While the applicant has taken special care to point out compliance with one aspect of 49 CFR 193.2155 noted as:

13.13.3.3 193.2155 - Structural requirements

"The new LNG storage tanks are not located within a horizontal distance of one mile from the ends, or 0.25 mile from the nearest point of a runway." Page 13-60

A far more applicable aspect of this regulation is to be found in the complete text of the cited regulation at 49 CFR 193.2155 (a) (5) (ii) immediately prior to the above noted item, which states:

"49 CFR 193.2155 Structural requirements.

(a) The structural members of an impoundment system must be designed and constructed to prevent impairment of the system's performance reliability and structural integrity as a result of the following:

(5) If applicable, the potential impact and loading on the dike due to—

(iii) If the LNG facility adjoins the right-of-way of any highway or railroad, collision by or explosion of a train, tank car, or tank truck that could reasonably be expected to cause the most severe loading."

[45 FR 9203, Feb. 11, 1980, as amended by Amdt. 193-17, 65 FR 10959, Mar. 1, 2000]

Individuals

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IND63-1

See our response to comment PM1-7.

K-930

IND63-1
cont'd

As can be seen in the proposed site plans, the impoundment dike (containment berm) surrounding the LNG storage tanks is directly adjacent to the railroad right of way. However, not found in any of the design criteria considerations for the impoundment dike (containment berm) contained in the applicant's Resource Report 13, or any other publicly available material is any mention of conformance to the above noted regulation. While this information may appear in Table 13.13-1, this table has been designated CEII and is therefore unavailable for public review or confirmation.

- It is recommended that the FERC address and comment as appropriate regarding this deficient aspect of the project application.

Individuals

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K-931

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Date: 12-6-2007

ORIGINAL

FILED
OFFICE OF THE
SECRETARY

2007 DEC 14 P 2:36

FEDERAL ENERGY
REGULATORY COMMISSION

Magalie Roman Salas, Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street N.E.
Washington, D.C. 20426

RE: Northern Star Energy LLC, Bradwood Landing LLC,
Natural Gas Import Terminal facilities and associated
facilities in Bradwood, Clatsop County, Oregon
Docket Nos. CP06-365-000; CP06-366-000; CP06-376-000; CP06-377-000

Dear Secretary Salas:

This comment is being filed with the Commission as follows:

- IND64-1 I am truly concerned about this project. The pipeline will be within 100 ft. of my property. There will also be a valve located on my property. Will there be an alert system in case of a leak? How often will the line be checked? As for
- IND64-2 The valve, there is acknowledged concern about noise levels. Will there be a noise barrier around the valve? How often will it be checked & by who?
- IND64-3 More than an acre of land will be logged prematurely. Will we be compensated appropriately? Will NorthernStar pay for all of the logging process? We will not be able to replant that land.
- There are too many questions and concerns for this project to continue.

Yours truly,

(Signature) Brenda Scott
(Print name) Brenda Scott
(Address) 847 Eufaula Hts Rd
(City, state) Longview, WA

Individuals

64

- IND64-1 We discuss potential pipeline impacts on residences in section 4.7.3.3. We have recommended that the Commission Order contain a condition that NorthernStar would be required to file a plan outlining how it would mitigate impacts on any residence with 50 feet of the construction right-of-way. Pipeline safety is addressed in section 4.11.9. The pipeline would be installed according to DOT standards.
- IND64-2 Noise associated with the pipeline valves has been evaluated and is summarized in the draft EIS. Based on preliminary engineering estimates, some valves would likely require additional noise control measures, which may include an enclosure or noise barrier. We are recommending that NorthernStar verify compliance with our 55dBA criterion by submitting a post-construction noise survey.
- IND64-3 As discussed in section 4.7.3.1, an easement agreement between a company and a landowner typically specifies compensation for losses resulting from construction, including losses of non-renewable and other resources, damages to property during construction, and restrictions on existing uses that would not be permitted on the permanent right-of-way after construction. Typically, pipeline companies pay for the logging to clear the construction right-of-way through timbered areas, unless some other arrangements are made with the landowner.

K-932

my comments concern these questions::

- IND65-1 | 1.the disposal of any and all spurious(to the methane in the cargo) alcanes, (heptanes, etc.) since they may be separated, what process or procedure will effect this separation? fractionation? how will these byproducts be removed from the site? by rail? by barge? has this and its accompaniant security, etc. been considered or allowed for? this seems dangerous to my family and community,as well as other communities in columbia county as they,and we, all are proximous to the local R.R. line and the columbia river.
- IND65-2 | 2.the containment berm(s): how can they contain a volume of "spilled lng" when it will expand its volume up to 600 times when it escapes or pours out from a leak in the containment vessel(s) and is warmed by the ambient air or ground temperatures?
- IND65-3 | 3.the feasability re. the pipeline capacity: Williams pipeline officials have stated that there is no capacity for any more gas in their system.also ther are more than 10 communities or population clusters along the proposed pipeline route, what warning systems/shutoffs and how many will be installed along the pipeline route? how can the residents of the dikelands, essentially islands whose grade is below the river's,be protected from their lands filling up with gas from a spill? how could the residents evacuate, as they recently had to, when egress is severely limited by having only one highway(30),and the narrowness of the geography of the columbia river canyon?
- IND65-4 | 4.what "local" or "regional"needs will this gas serve? why can't the proposed pipeline serve each and every community it transits as a "regional need"?
- IND65-5 | 5.as recent federally named "disasters" involve the instability of the earth and rock in the area including adjacent identical geology, and identical unstable geology on the washinton side, does the terminal/refinery site and the route of the proposed pipeline to serve it and its terminations (emergent and submergent) adjacent to the columbia river constitute a constant danger to residents? has corrosion been considered? self-evident corrosion is in plain sight in the clatsankie and port westward areas.
- IND65-6 | 6:since all heavily-laden ships sail on the high tide,how will the order of departure be arranged with other departing cargo traffic? where will the "waiting" ships anchor?

patrickcunningham@lowergorgeousnews.com

Individuals

65

- IND65-1 | No byproducts would be generated by the regasification process that would require disposal.
- IND65-2 | As discussed in section 4.11.4, any spills at the terminal would be directed to 1 of 2 impoundment sumps. Vapor dispersion calculations were performed for both of the impoundment sumps to determine if there was a spill at the terminal, how far the flammable vapors would travel.
- IND65-3 | See our response to comment PM3-50.
- IND65-4 | Details on warning systems and emergency evacuation are provided in the ERP, which is currently under review.
- IND65-5 | Purpose and need are discussed in section 1.1. The Bradwood Landing pipeline would transmit the natural gas to the Northwest Natural and Williams Northwest pipeline systems. From there, the natural gas could be transmitted to local distribution systems already in place.
- IND65-6 | Landslide risk and mitigation is discussed in sections 4.1.3.3 and 4.1.4.3.
- IND65-7 | Mitigation for pipeline corrosion is addressed in section 4.1.4.3.
- IND65-8 | The coordination of ship arrivals would be made by the pilots. In addition, section 4.8.1.7 has been revised to include additional discussion regarding potential for navigational conflicts LNG carrier traffic may have with other commercial ships traversing the Columbia River Bar.

December 17, 2007

I am writing in opposition to the proposed LNG terminal and pipeline at Bradwood, Oregon. As the FERC knows from reading the testimony submitted to you, this project is foolhardy, dangerous, and a potential disaster for the Columbia River and its environs and people. LNG does NOT belong on the Columbia River.

The geologic, scientific, economic, and safety reasons to reject LNG are endless. Here are five reasons why you should say NO LNG in Oregon.

1. The report from Oregon's Department of Geology and Mineral Industries (DOGAMI) shows that careless, inaccurate, and misleading science has been used to justify Bradwood. Here are three of its most damning conclusions:

IND66-1 | ♦ "Erroneous technical statements within the DEIS raise overall concerns about the qualifications of the applicant (NorthernStar) with respect to technical and public safety issues."

IND66-2 | ♦ "The site has very poor foundation soils, is in a high seismic hazard area, and potentially subject to other severe geologic hazards. The role of the geotechnical and geologic hazard information and project members appears to be inadequate."

IND66-3 | ♦ DOGAMI says repeatedly that there is "no reference to a detailed study or evaluation by a qualified geologist or engineer" and no scientific data to support several specific statements.

IND66-4 | 2. The Knappa Fire District report raises further alarms. The Oregon fire district has "sole responsibility for emergency response and mitigation for incidents at Bradwood." Yet Knappa itself is only an intersection with hundreds of rural households spread out along Highway 30 and the Columbia River. It relies on volunteer firefighters and the help of volunteers and few paid firefighters from other fire districts – some of which are at least 30-40 minutes away.

After researching the four other LNG terminal facilities in the US, the fire district identified massive gaps in its resources needed to cope with simply the "predicted routine emergencies" at the terminal. Filling that gap will require more employees, vehicles, equipment, training, and a new fire station facility within 3 miles of Bradwood

Who is going to pay for all this? NorthernStar, the federal government, and the State of Oregon aren't offering any money, "Cost sharing" between NorthernStar and local governments and special districts is a joke. There is a massive disparity between the industry-subsidized financial resources of NorthernStar and the funds from a county of 38,000 people. Does the FERC expect Clatsop County taxpayers to pay millions of dollars to underwrite the LNG promoters' scheme?

Individuals

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IND66-1 See our responses to comments SA1-89 and SA1-93.

IND66-2 See our responses to comment SA1-4.

IND66-3 See our response to comment SA1-89.

IND66-4 See our response to comment PM6-24 and LA3-55.

K-934

IND66-5 3. Our recent hurricane - 36 hours of heavy rains and 90+ mph winds - left fallen trees blocking roads and highways, emergency communications down for days, and a massive mudslide covering the highway just a few miles from the road to Bradwood. Even if county taxpayers could afford to finance all the needed upgrades to the area's emergency forces, this hurricane demonstrated just how fragile our area's communications and transportation systems are.

Wiser heads than I are addressing the very real logistical environmental, geological, and construction issues regarding a terminal and pipeline that were raised by this storm.

IND66-6 4. As you might recall, the Columbia River shipping channel comes within a few hundred yards of the City of Astoria and is not much further away from other communities and residential areas downriver from Bradwood. The City Of Astoria's testimony to the Clatsop County Board of County Commissioners on October 22, 2007 said, "Until the full public safety impacts are specifically and precisely identified, and until these impacts are fully mitigated to the satisfaction of the City of Astoria and all affected communities, the project should not proceed forward."

IND66-7 5. NorthernStar's testimony at Clatsop County hearings was full of distortions, omissions, and outright lies. Please don't believe their "convenient fiction" that the Bradwood LNG gas will stay in California. It is insulting for NorthernStar and FERC to pretend that the proposed LNG terminals in Oregon will benefit the Northwest. The only pipeline with room for the Bradwood gas is the proposed Palomar Pipeline, which goes straight to California. At least Oregon LNG is willing to tell the truth: "The Pipelines to CA WILL Be Kept Full!" That is what Oregon LNG told the California Energy Commission on July 26, 2007.

IND66-8 It is outrageous that the federal government - Mr. Cheney, the FERC, the Dept. of Energy, and others - continue to promote LNG. It is a fossil fuel that largely comes from countries hostile to the United States and that is also sought after by China, India, and other countries. Will we soon be fighting wars over LNG?

I encourage the FERC Commissioners to draw on your political courage and principles. Speak up against LNG. Preserve Oregon's distinguished legacy of community, long-term vision, and respect for our people and world. Help our nation create a sustainable, innovative, and progressive energy future. Deny the NorthernStar application.

Sincerely,

Laurie Caplan
766 Lexington Avenue
Astoria, OR 97103
lcaplan@pacifier.com

CC: Senator Wyden, Senator Smith, Representative Wu, Representative Hooley, Betsy Johnson, Brad Witt, Debbie Boone, Columbia Riverkeeper, The Oregonian, The Clatskanie Chief, The Daily Astorian, Wahkiakum County Eagle, The Columbian, McMinneville NewsRegister, Longview Daily News

Individuals

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IND66-5 See our response to comment IND22-20.

IND66-6 NorthernStar has consulted with the City of Astoria and other local communities in developing its ERP. The FERC must approve the plan before NorthernStar could receive authorization to begin construction.

IND66-7 See our response to comment LA3-8.

IND66-8 Even the State of Oregon has acknowledged that LNG may play a role in the future energy mix for the Pacific Northwest. As explained in section 1.1, LNG may be needed to bridge the gap between domestic supply and future demands for natural gas in the United States. There are 15 nations that currently export LNG, and they contain 33 percent of the world's natural gas reserves. Right now the largest exporter of LNG to the United States is Trinidad and Tobago. The Bradwood Landing Project most likely would receive shipments from around the Pacific Basin, which could include Alaska and Australia.

K-935

Attachments: Knappa Fire District Report, City of Astoria testimony, OregonLNG presentation

Individuals

66

December 19, 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street N.E., Room 1A
Washington, D.C. 20426

Re: DEIS Comments on Bradwood Landing LLC - Docket No. CP06-365-000, et al.

Dear Secretary Bose:

Below are the many concerns I have with NorthernStar's Bradwood Landing project.

IND67-1 | This project may operate for as long as 50 years or more. NorthernStar has no plans for removal of the LNG terminal and pipeline upon abandonment if market conditions make the operation unprofitable or owners seek bankruptcy. (DEIS 2-63)

IND67-2 | The purpose of the project is to provide natural gas to residential and industrial customers in the Pacific Northwest. (DEIS ES-1) Identify what area is included in the "Pacific Northwest." NorthernStar has publicly stated several times that this natural gas will not be going to California. Beginning on page 54 of NorthernStar's application to the SEC, NorthernStar clearly states their intent and desire to get the gas to California.

IND67-3 | Cumulative effects of the pipeline with regard to conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, shoreline erosion and accretion, water supply and conservation (including wells, underground springs and drain fields), water quality, energy needs, safety, and consideration of property ownership are not addressed in the DEIS.

IND67-4 | There is no mention in the DEIS of impacts to city, county and state roads during construction of the pipeline.

IND67-5 | The proposed pipeline route crosses many slide areas. Cowlitz County has a lengthy history of landslides. "The proposed pipeline would cross 31 potential landslide areas." (DEIS 4-20) (DEIS 5-2) Years past there have been three explosions of the Williams line due to land movement, as well as their pipeline falling into the Toutle River last winter. The Kelso-Beaver pipeline is above ground with monitors for several hundred feet in an area near Lexington. A landowner in that area was actually forced to move his home due to land movement caused by the KB pipeline installation.

IND67-6 | The impacts to forestland would be great. A total of 229 acres of forestland would be cleared and 166 acres of ag land would be cleared using the proposed pipeline route. (DEIS 3-50)

IND67-7 | The secrecy of the actual pipeline route and secrecy of the landowner list does not allow the appropriate studies or analyses to be completed.

IND67-8 | The secrecy of the Emergency Response Plan does not allow citizens to review and comment.

Individuals

67

IND67-1 See our response to comment IND49-2.

IND67-2 The Pacific Northwest includes the states of Idaho, Washington, and Oregon. The target market for the gas is the Pacific Northwest, not California. See our responses to comments PM1-23 and PM5-78. .

IND67-3 Our discussion of potential cumulative impacts associated with the proposed pipeline is included in section 4.12.

IND67-4 A discussion of potential impacts on roads is included in section 4.8.3.7.

IND67-5 See our response to comment SA5-1. Geological hazards along the pipeline route in Cowlitz County, Washington are addressed in section 4.1.4.3.

IND67-6 Section 4.4.2.3 discusses measures that would reduce impacts on forest along the pipeline.

IND67-7 The pipeline route is not a secret. It is illustrated in Appendix B of this EIS. Nor is the landowner list a secret. Landowners are listed in Appendix A of this EIS. Our EIS included an appropriate analysis of pipeline route alternatives in section 3.1.8.

IND67-8 The ERP is developed under consultation with appropriate federal, state, and local agencies. NorthernStar would be required to submit its final ERP for review and written approval by the FERC before any final approval to begin construction. If the needed resources are not available and properly funded, operation of the project would not be approved. The draft ERP is not a secret. It was filed as part of the public record on March 24, 2008.

- IND67-9 | There are only three shut-off valves proposed on the Washington side of the pipeline located at mp26, mp31 and mp36 where it connects to Williams. (DEIS 2-27)
- IND67-10 | Even though an odorant is not required by law, the pipeline in Washington state would be a 30 inch pipeline at high pressure (possibly 1280 psi). (DEIS 2-27) NorthernStar publicly stated that adding an odorant is not cost effective. What about the safety of citizens living within the pipeline hazard zone.
- IND67-11 | The failure by NorthernStar to seriously consider other alternative pipeline routes is not mentioned in the DEIS nor in the Revised Oregon JPA. The method of research NorthernStar used to determine the pipeline route is not addressed.
- IND67-12 | There is no substantive risk assessment provided for the pipeline.
- IND67-13 | The safety hazards for introducing imported gas directly into the existing natural gas system are not addressed in the DEIS. The composition of LNG is different.
- IND67-14 | There is no mention of surge pressure control provided in the LNG pipelines. Per SIGTTO Standards, Site Selection and Design for LNG Ports and Jetties, Information Paper No. 14, page 25.
- IND67-15 | Pipeline safety is not clearly addressed. Section 192.615 "each pipeline operator must establish an emergency plan that includes procedures to minimize the hazards in a natural gas pipeline emergency." (DEIS 4-442) "No additional specialized local fire protection equipment would be required to handle pipeline emergencies." (DEIS 4-442)
- IND67-16 | There is no mention in the DEIS of the February 2001, Nisqually Quake northeast of Olympia, Washington that was felt locally and resulted in minor local damage. In DEIS 4-22 - Section 4.1.4.3 Geologic Hazards "Given that the proposed pipeline route does not cross any known active faults, earthquakes and associated seismic risk are not anticipated to have a significant impact on the proposed pipeline." There is no reference to studies performed at the University of Washington which indicate a strong possibility of a major quake along Western Washington/Oregon and affecting the entire region.

Yours truly,

Sandra M. Davis
1002 Abernathy Creek Road
Longview, WA 98632

Individuals

67

- IND67-9 | Pipeline safety is discussed in section 4.11.9. The pipeline must meet DOT standards, including spacing between MLVs.
- IND67-10 | See our response to comment PM5-81.
- IND67-11 | We considered alternative pipeline routes in section 3.1.8 of the EIS. While the project proponent selected its proposed pipeline route, we studied that route against several alternatives to see if any alternative would offer significantly less impacts on environmental resources.
- IND67-12 | See section 4.11.9.
- IND67-13 | Natural gas has varying characteristics depending on where it is produced. Natural gas from LNG tends to have a higher heat content than domestic natural gas. See also our responses to comments PM1-22 and IND33-27.
- IND67-14 | The SIGTTO standards are taken into consideration when applicable.
- IND67-15 | NorthernStar would be required to file an emergency plan for the pipeline before the FERC would allow construction to begin. See also our response to comment PM5-52.
- IND67-16 | The Nisqually earthquake has been added to section 4.1.3.3 as has a description of large subduction zone earthquakes in the region. As indicated in section 4.1.4.3, unless a pipeline directly crosses an active fault with a substantive amount of displacement or an area subjected to significant lateral spreading due to liquefaction, it is not particularly susceptible to damage during an earthquake.

K-938

Individuals

68

20 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

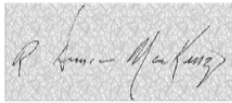
Re: Bradwood Landing LLC
Docket No. CP06-365-000 et. al.

Dear Ms. Bose:

Please enter the attached document containing my comments on the Draft
Environmental Impact Statement for the subject project into the public record.

Thank you for your attention to this matter, I remain...

Very truly yours,

A handwritten signature in dark ink, appearing to read "R. Duncan MacKenzie", is written over a light gray rectangular background.

R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

K-939

IND68-1 Reference is made to the operational noise aspects of the LNG terminal as found in the DEIS on page 4-392, Table 4.10.2-4. There appear to be a number of missing elements, notably the noise contributions from:

Nitrogen Package
Vapor Return Blowers, quantity unknown
Sendout Pumps, 5 units at 2335Hp each
In-Tank LNG Pumps, 6 units at 265Hp each
Air Separation Unit or Compressors associated with HHV adjustment if these are to be the HHV adjustment means to be used

The overall dBA figures given are uncharacterized as to whether the value is a single unit or multiple units and whether the figure includes the motor associated with a device or is the device alone. The quantity of units of a specific type is undocumented.

It is noted that the noise level of the SCV's is 118dBA. Does this level represent a single unit or the worst case of all seven units operating simultaneously? Additionally, not noted is information if this level is a generalized composite value comprising the numerous sources present on the SCV such as SCV Vaporizer Primary and Secondary Combustion Air Blowers, Blower Motors, Blower Intake and Exhaust Stack or a specific element.

The 118dBA noise level of the SCV is uncharacterized as to center octave frequency distribution and is an overall soundpower measurement only. If there is a significant low frequency component this will affect the overall perception of the noise.

IND68-2 The applicant's Resource Report 9 submission [FERC Accession Number 20060605-4000] Section 4.5 Sound Propagation Factors, page 9b-11 notes:

"3. Hills surrounding the facility were modeled from GIS contours at 20-meter height intervals to simulate shielding from the terrain at NSAs to the west of the facility."

This assumption ignores the fact that the closest inhabited areas are to the East of the site on Puget Island. The hills rather than shielding the shoreline area of Puget Island serve as a reflective surface instead; especially the rock faces at the south end of the site.

IND68-3 Finally, no mention is made of potential objectionable transient or repetitive noises such as venting, compressor operation, or noises arising metal expansion or contraction that may expected from the operation of the facility.

Individuals

68

IND68-1 See our responses to comments PM1-42 through PM1-47.

IND68-2 See our responses to comments PM1-42 through PM1-47.

IND68-3 See our responses to comments PM1-42 through PM1-47.

K-941

IND68-4

- The overall presentation of the Operational Noise aspects associated with proposed the LNG terminal is at best, cursory and does not include significant equipment elements. It is requested that FERC recommend the applicant provide a far more complete assessment of noise arising from operations at the site.

Individuals

68

IND68-4

See our responses to comments PM1-42 through PM1-47.

Individuals

69

20 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

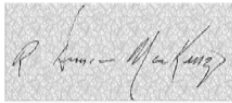
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R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

K-942

IND69-1

Noted in Section 4.11.2 of the DEIS on page 4-404, and found as Recommendation 82 on page 5-31 is the requirement that the final design incorporate redundancy for critical, hazard, sensor and systems. It is to be hoped that this redundancy will apply to the LNG storage tank level, temperature, density monitor system. This system is necessary to monitor and prevent the potential for LNG storage tank 'rollover'.

The applicant has sought to address this potential problem with instrumentation as found in Resource Report 13 [FERC Accession Number 20060605-4005 CD-1]:

13.8.8 Tank Instrumentation

"13.8.8.5 Density Monitoring

An independent level, temperature, density (LTD) system monitor, with density difference alarm, will be installed. The system will monitor the level verses temperature verses density profile. This device will be utilized to monitor for liquid stratification and potential rollover situations." Page 13-43

The issue here is that it would appear that the LTD monitoring system is nominated in the singular i.e. "An independent level, temperature,....". It is unclear from the narrative if there are other specific level, temperature, and density sensors acting in tandem. If this is a safety critical system, it should be considered in the context of a potential single point failure.

Additionally, the system would seem to be merely monitoring the conditions and annunciating an abnormal condition. It would be left to a human operator to initiate remedial action as found in the following narrative from the applicant's Resource Report 13:

"13.8.17 Procedures for Monitoring and Remediation of Stratification

The LNG tanks will be equipped with density monitoring instrumentation to indicate stratification and potential rollover problems, *and allow early operator action*. The LNG storage tanks will be capable of top or bottom filling from an LNG carrier to avoid stratification. In addition, facilities will be provided to circulate the stored product so that if stratification begins to develop, the tank contents can be thoroughly mixed. This will involve pumping LNG from the bottom of the tank and returning it to either the top or the bottom as needed." Pages 13-49 and 50

(Emphasis added in italics)

Individuals

69

IND69-1

The LNG tanks would be equipped with density monitoring instrumentation along with numerous other measurement devices which can be used to monitor for conditions which would lead to roll over. Monitoring equipment and early operator action are the most effective means of handling roll over conditions. Section 4.11.2 includes a condition requiring the final design to include a hazard and operability review of the completed design.

Individuals

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IND69-1
cont'd

It is possible the applicant may be seeking to exploit this phenomenon to reduce operational energy costs. As excepted from the following paper presented in the LNG – Control and Simulation sessions of the American Institute of Chemical Engineering 2006 Convention:

“LNG Rollover: Converting a Safety Problem to Tank Loading Operational Asset

Yan Jun Wang, Chemical Engineering, Mary Kay O'Connor Process Safety Center, College Station, TX 77057 and Harry West, Department of Chemical Engineering, Texas A&M University, College Station, TX 77057

“Rollover following density stratification in LNG storage tanks was considered a problem, which required careful monitoring following several unexpected rollover events in the 1970s. However today density stratification is routinely used to reduce high LNG boil-off gas rates, particularly when tank filling through the top loading nozzles is required for heavier LNGs. Thus boil-off gas compressor and pre-heater costs can be reduced both during and after unloading LNG Tankers.”

However, if the applicant intends to use this technique it should be fully disclosed in subsequent operational procedures, subjected to a Failure Mode and Effects Analysis [Hazards and Operability], and the operators properly trained in its implementation.

It is not possible for this writer to know if this perceived issue has been adequately addressed by the applicant in the documents “Supplemental Responses to Staff for Cryogenic Information Requests” [FERC Accession Numbers 20061026-0145 and 20061026-0146], as this information has been declared CEII.

- It recommended that the final design and operational procedures of the facility be fully vetted by competent peer review to ensure compliance with all applicable codes and standards.

K-944

20 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

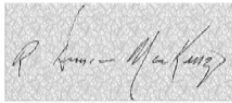
Re: Bradwood Landing LLC
Docket No. CP06-365-000 et. al.

Dear Ms. Bose:

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Environmental Impact Statement for the subject project into the public record.

Thank you for your attention to this matter, I remain...

Very truly yours,

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R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

Individuals

70

K-945

IND70-1 Noted in the DEIS recommendations on page 5-30 as item 66, is the provision of survey bench marks on the LNG storage tank foundations. It is assumed that these bench marks are to be used to monitor differential settlement or loss of planar orientation (tilt) of the storage tanks as found in Section 7.4.1 of the '*Draft SEISMIC DESIGN GUIDELINES and DATA SUBMITTAL REQUIREMENTS FOR LNG FACILITIES*' (January 2007).

However, since this recommendation appears outside of the cited scope this document's applicability to recommendations 43-56 as found on page 5-27, the inclusion of recommendation 66 could be viewed as ambiguous. Additionally, while the metrics of differential settlement and planar tilt are given in Section 7.4.1, a requirement for the applicant to address the procedures to be implemented in the event that limits are exceeded is left unstated.

IND70-2 The procedure for hydrostatic testing of the LNG storage tanks is detailed in the DEIS on page 4-72. The applicant proposes to test each tank individually so as to conserve test water. However, it is perceived that while this test protocol will provide information reflecting the scenario of one tank empty and one tank full; it may not accurately reflect the soil structure interactions arising from the scenario of both tanks imposing full loads to the site soils.

IND70-1
cont'd

- It is suggested that for the FEIS, FERC consider including recommendation 66 within the scope of recommendations covered by the noted seismic guideline document, and require that the applicant furnish procedures to address the manner in which corrective mitigation for settlement and planar tilt limit exceedance will be performed.

IND70-2
cont'd

- It is suggested that FERC and its outside consultants review the testing protocols envisioned by the applicant for the hydrostatic testing of the LNG storage tanks in view of the unique seismic characteristics of the site.

Individuals

70

IND70-1 A settlement monitoring system would be installed to measure and record inner and outer container movement during construction and the hydro test. Section 4.11.2 includes a condition requiring NorthernStar to report any abnormality of significant magnitude to FERC staff immediately, which would include tank settlement measurements exceeding the design limits.

IND70-2 The LNG storage tanks would not be hydrostatically tested at the same time. If the same water could not be used to test both tanks, it would be because the second tank would not be ready to test when the first tank test is finished.

K-946

December 20, 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street N.E., Room 1A
Washington, D.C. 20426

Re: DEIS Comments on Bradwood Landing LLC - Docket No. CP06-365-000, et al.

Dear Secretary Bose:

IND71-1

Clatsop County hired an "independent" company to assess the safety needs and costs of implementation for the importation of LNG on the Columbia River. In their report to the county dated July 2007, PBS&J, the company hired by Clatsop County to undertake this analysis, reported:

"The ERP (Emergency Response Plan) should plan for the worst events, even if the probability of their occurrence seems low. Clatsop County residents need to be assured that appropriate measures can and will be taken to deal with catastrophic events (such as a major explosion) if there is credible evidence that such an event could occur." (Public Safety Assessment, p.10, July 07.)

The most recent update from PBS&J is dated November 2007. It was jaw dropping for me to work my way through this report and realize the gaping holes in the ERP and the complete lack of a cost sharing agreement. The realities of this written report are in direct conflict with the oral report given by Northern Star at the Clatsop County Commissioners public hearing on November 19, in which they claimed to have a cost share agreement in place.

In my analysis of the PBS&J November 2007 report I am especially alarmed regarding these major areas of concern:

Columbia Memorial Hospital, Astoria, OR

- Columbia Memorial Hospital is the only hospital in Astoria and the only hospital between Astoria and the proposed Bradwood Landing LNG site 25 miles up river. CMH would be responsible for the treatment of burn victims resulting from a fire associated with an accidental or intentional spill of LNG during transportation up the Columbia River, transferring from the ships to the plant and/or storing at the Bradwood regasification plant.
- Columbia Memorial Hospital is NOT a designated burn center. This fact is never addressed in the PBS&J reports.
- At the minimum CMH should be requesting funding, facilities, equipment, personnel and training to become a designated burn center. CMH has requested nothing as reported in the PBS&J Nov. 07 report, no upgrades nor cost sharing. In fact, Appendix A: Meeting attendees (Nov. 07) lists no one attending from CMH.

Individuals

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IND71-1

See our responses to comments IND60-6 and LA3-55.

K-947

IND71-1
cont'd

- In addition it seems prudent and responsible to plan for the transport of potentially large numbers of burn victims to Portland or other designated burn centers. We should see requests for additional ambulances, helicopters and helicopter landing pads. No such requests appear anywhere in the PBS&J Nov. 07 report.

It is noteworthy that Peter Hackett, an employee of Bradwood Landing, is on the board at CMH and that Northern Star has made substantial contributions to CMH Foundation.

Lack of a signed Cost-sharing Plan

The Fire Chiefs in our communities took this responsibly seriously, including undertaking their own studies to compare our fire fighting resources and response time to a major incident with other communities of similar size. The discovery that our rural communities are in no way prepared to deal with LNG should surprise no one.

"Knappa has a 15 minute response time and Astoria has a 30 minute response time, which are five to nearly 10 times greater than the average 3.5 minute response time for Cove Point, Newport and North Bay." (p.29, Nov. 07)

While Knappa Fire district did an excellent job of identifying their needs, their concerns have not been adequately addressed by Northern Star:

Knappa Fire District has requested 8 full time employees and 6 Interns. Bradwood Landing LLC resource proposal for Knappa Fire district is 1 FTE (Trainer). Knappa Fire District has also requested a fire station within 3 miles of Bradwood facility and the Bradwood Landing LLC resource proposal includes zero fire stations within 3 miles of Bradwood Facility.

"The local emergency response community was not in agreement on the amount of resources that would be needed to respond to a fire associated with the LNG terminal. As a result no agreements were reached on the resources needed to respond to a fire at the Bradwood LNG Terminal. Currently, there is not a signed mutual Cost Share agreement between all parties." (ERP Revisions and Response Resource Cost Share Report, p.21-22, Nov. 07.)

Lack of an Evacuation Plan

- The Downtown waterfront of Astoria containing both the retail business section and private homes, is well within the burn zone of a vapor cloud fire from a passing LNG tanker.
- Astor Elementary School houses 400 students in grades 1, 2 and 3. It is a three story building facing the Columbia River with the outdoor playground on the river side. Astor sits on a hill and there are no structures, hills nor trees between the school and the site line to the main channel of the Columbia River.
- LNG tankers should not be allowed to pass within the vapor burn zone of a public school. If someone were foolish (or greedy) enough to allow this – what is the evacuation plan for 400 children with little or no notice of a vapor cloud fire?

These requests seem to be bare minimum requirements if this hazardous industry is to be allowed into our communities.

Individuals

71

Respectfully,

Cheryl Johnson
44183 Peterson Lane
Astoria, OR 97103

Individuals

71

K-949

William P. & Marjorie A. Castle
Beverly A. Beal

DEIS Comments Bradwood Landing LNG Permit Application CP06-365

NorthernStar Natural Gas, Inc.

212 Whitewater Road Longview, WA 98632
12/20/2007

Individuals

72

William P. & Marjorie A. Castle
212 Whitewater Road
Longview, WA 98632

Beverly A. Beal
30 Monroe Rd.
Cathlamet, WA

December 20, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Re: NorthernStar Natural Gas, Inc.
Bradwood Landing LNG Terminal Permit Application
Filing CP06-365-00 et al

Ms Bose:

Attached are our comments in response to the Draft Environmental Impact Statement for the proposed Bradwood Landing LNG project of NorthernStar Natural Gas, Inc. Please note there are key points, issues, misinformation and missing data that need to be addressed prior to the final EIS being issued. Our comments include, but are not limited to, the following:

1. *Questionable location of HDD drill site on both sides of Columbia River from Port Westward into Cowlitz County, Washington*
2. *Lack of study and/or consideration of road bearing limits on primitive public roads in Cowlitz County*
3. *Geo-hazard concerns for Cowlitz County including*
 - a. *Seismic fault lines*
 - b. *Identified landslide areas*
 - c. *Previous pipeline failures due to ground shift*
4. *Lack of independently identified need for LNG in the Pacific Northwest*
5. *Negative impact on regional economics due to hampered ship traffic*
6. *Lack of financial solvency of NorthernStar Natural Gas*
7. *Lack of pipeline safety and emergency response measures for SW Washington*
8. *Failure of NorthernStar to recognize and follow permit application process in Cowlitz County*

Individuals

9. *Failure of NorthernStar to communicate with landowners*
10. *Inaccurate information and maps contained within DEIS WITH the knowledge of the Federal Energy Regulatory Commission*
11. *Inaccurate identification and reporting of residences, out-buildings and private water supplies along proposed pipeline route*
12. *Failure of the United States through the FERC to hold all LNG applicants to the same level of standards as those recognized and used throughout the world LNG industry. It is through the strict adherence to these standards the impeccable record of the industry was achieved.*

With our comments are several attachments that include the full version of public comments during the week of November 5, 2007. We feel the information contained within the full version is important and should be included with this document.

To place the DEIS of a project of this magnitude out for public comment without securing independent, complete and verifiable documentation for need as well as holding the applicant accountable for each and every step of the process including filing for all local, county, state and federal permits, along with providing true, accurate and up-to-date reports, routes, maps, models, etc. goes beyond reason. For a federal agency charged with "regulating" the energy industry, what has occurred is a free-for-all at the expense of the public, and, most especially, the private landowner. To hear an agent of the FERC tell a crowd of people at the recent scoping meeting held in Molalla, Oregon, that FERC's job is to permit the projects and the market will determine which terminal(s) will be built, shows a lack of direction and guidance as well as indicates a need to reign in the power of the FERC. If this were to be truly "regulated" regional studies would be conducted and an independent "needs assessment" completed rather than an energy speculation land grab. It is disappointing to see our federal government revert back to colonial times where search and seizure was the rule and a person's home free for the taking by the king's men.

It is our sincere hope the Federal Energy Regulatory Commission will look carefully at this project and make the obvious decision that Bradwood, Oregon and the Lower Columbia River are the wrong place for an LNG terminal of any kind.

Thank you, again, for this opportunity to comment on this highly important document.

William P. Castle

Marjorie A. Castle

Beverly A. Beal

Individuals

	Concern	DEIS Citation	Comments	Related Documents
IND72-1	1. Columbia River HDD Site Location			
	o February, 2007 recommendation by URS to move drill site not heeded by NorthernStar nor the FERC	Page 4-19 Section 4.1.4.3 Geologic Hazards Table 4.1.4-3 "One or more of the following: (1) reroute to the west to stay on ridge; (2) extend the Columbia River HDD crossing by about 0.5 mile to MP 20.3; or (3) install the pipe by the HDD method between MPs 19.8 and 20.3."	URS determined the drill site location was within a high incidence area for landslides and recommended alternative locations	Geohazard Report, March 2007
	o Same as above		Again, URS recommendations for relocation of Columbia River drill site	Supplemental Cowlitz County Geohazard Report
IND72-2	o Lack of positive or proper communication from NorthernStar that drill site was to be moved. o FERC knew of conflict with site location prior to issuance of DEIS	Again, refer to Table 4.2.4-3	November 8, 2007, Gary Coppedge shared information concerning location of Columbia River drill site. Mr. Coppedge stated maps on NorthernStar website were 2 years old and not correct. Further stated NorthernStar does not know where the drill site will be located due to communication, pipe lay-down and HDD site issues at Port Westward with the Port of St. Helens.	Note: Old Mill Creek Road was officially changed to Whitewater Road in January, 2007. All official maps reflect former name.
	o Mill Creek Drainage System o Last native salmon run on Columbia River		Mr. Coppedge related drill site would move west (by our estimation 950 to 1350 feet) of originally proposed site putting new location in a different drainage system and impacting Mill Creek, the last native salmon run on the Columbia River. New location would be in known wetland area with a creek, multiple springs and wetlands related habitat. This should require new studies into environmental issues including wetlands, habitat impact, fish and wildlife impacts, etc. Final DEIS should not	http://maps.google.com/maps?f=q&hl=en&geocode=&time=&date=&tttype=&q=212+old+mi+116.477051&sspn=6.526117,20.43457&ie=UTF8&t=p&om=1&l=46.195577;-123.177595&spn=0.012744,0.039911&z=15&iwloc=addr

Individuals

72

IND72-1 See the response to comment PM1-38. Geological hazards along the pipeline are discussed in section 4.1.4.3.

IND72-2 The proposed location for the pipeline crossing of the Columbia River has not been revised since the issuance of the draft EIS. Based on the project alignment sheets and as shown on the topographic Pipeline Location Maps (included as Appendix B), the proposed exit site for the HDD drill would be located in the drainage system associated with Abernathy Creek, not Mill Creek. The species and life stages of federally listed salmonids known to occur within Abernathy Creek are described in section 4.6.2.3. Potential impacts on aquatic resources (including salmonids) due to the proposed crossing of the Columbia River are discussed in section 4.5.3.1.

Finalization of the pipeline route is typically not complete until shortly before the initiation of construction activities. Therefore, we have recommended in section 2.2.2 that final routing and design information be filed with the Commission prior to pipeline construction.

IND72-2 cont'd	<ul style="list-style-type: none"> Mill Creek not included in DEIS nor any studies whatsoever by NorthernStar or any other environmental agency conducted and included. 		<p>be considered until pipeline route is finalized and appropriate studies conducted with all associated agencies given time to review and comment. It is apparent by the lack of information in the DEIS that other agencies were not informed of the HDD site change nor given a chance to investigate or comment as evidenced by NorthernStar's recent responses to additional information requests.</p>	<p>Letter to USFWS dated October 15, 2007 from NorthernStar</p>
	<ul style="list-style-type: none"> Perpetration and perpetuation of a lie! 		<p>NorthernStar continues to supply maps and information based on the original pipeline route. As recent as October 15, 2007 NorthernStar has misled governmental and/or public agencies with incorrect information OR Gary Coppedge (November Public Comment hearings) and Sy Garrett (Clatsop County Commissioner Hearing October 29th, 2007) have purposely lied to at least 4 landowners about the location of the HDD site.</p> <p>Same day Paul Friedman began telling people NorthernStar would provide them with information on location of pipeline route on private property to which NorthernStar could not comply because they stated their maps were no longer correct.</p>	<p>Page 1-1 "From Port Westward, a horizontal direction drill (HDD) will take the pipeline under the Columbia River into Cowlitz County, Washington to an HDD exit point just north of the mouth of Mill Creek</p> <p>Map on Page 58-HDD not changed</p> <p>Notes from November 5, 2007 mtg between NorthernStar, NMFS & NRG (representing FERC on the BA)</p> <p>Map Page 60—no change in location of HDD and in direct opposition to conversations with Sy Garrett in October and Gary Coppedge in October and November, 2007</p> <p>See attachment 1 FERC Public Comments November 8, 2007 Knappa, Oregon</p>

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IND72-3 The pipeline route is shown on the maps in Appendix B.

IND72-4

2. Roads	Load Limitations		
<ul style="list-style-type: none"> o Road Modifications o Primitives Public Access Roads in Cowlitz County, WA o Lack of load bearing studies on Cowlitz County public and/or private roads. 	<p>2-35 Paragraph 1 "Modifications or improvements to existing roads used to access the project would not be required."</p> <p>Paragraph 3 "NorthernStar would access the construction right-of-way via 32 existing public and private roads that intersect the right-of-way. The majority of roads are classified as dirt roads."</p> <p>Table 4.7.3-3 Page 4-308</p> <p>Table 4.2.3-2a "NorthernStar would use existing access roads that would not require modification or improvement and would, therefore, not represent additional soil impacts."</p> <p><u>Impacts and Mitigation 4-98</u></p> <p>Paragraph 3 "NorthernStar would use existing access roads, which would not require modification or improvement and would, therefore, not represent any additional impacts on wetlands."</p> <p>4-305 Paragraph 4 "NorthernStar would access the construction right-of-way via existing public and private roads that intersect the right-of-way. Modifications or improvements to support the expected loads would not be required."</p> <p>P4-353 Paragraph 2</p>	<p>Since the majority of Cowlitz County is considered "rural" it must be brought to the attention of the FERC that, like Clifton Road, many roads in this county are narrow and to the point of some being single to 1-1/2 lanes rather than the standard 2 lanes. Yes, these are public roads with some even paved.</p> <p>One particular road is Whitewater Road (formerly known as Old Mill Creek Road). This is the planned access road to reach the proposed Columbia River HDD site. Whitewater is a paved road to the end of the county access, barely 1-1/2 lanes in width and is the only access in or out for approximately 20 homes. It is considered hazardous, has blind spots and curves with no room on either side for turnouts. What shoulder there is, is soft and narrow. Whitewater Road will be heavily used for at least 37 days during the drilling process. No road studies have been conducted to determine the ability of this road, or any road in Cowlitz County, to sustain the weight of the 3 tractor trailers to haul in the drill rig let alone the amount of other rigs to bring in support equipment as well as the tremendously increased amount of daily truck traffic.</p> <p>The county road portion of Whitewater ends at a private gate but Whitewater Road continues on as a private home-owners association road to 20 private parcels. Recent utility work to install new power cabling is testament to what minor traffic of heavy trucks and equip can, and will do to this road bed.</p> <p>Twenty families depend on Whitewater Road as their only access in and out—there is no other access.</p> <p>No safety measures to warn residents of traffic from either direction on the public portion of this</p>	<p>See attachment 2</p> <p>FERC Public Comments</p> <p>November 5, 2005</p> <p>Clatskanie, Oregon</p>

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Section 4.8.3.7 has been revised to include additional discussion of NorthernStar's requirements regarding local road permits and our recommendation that NorthernStar revise its final traffic management plan to include measures to reduce impacts on narrow roads (including Whitewater Road, also known as Old Mill Creek Road) that would be used to access the construction right-of-way.

IND72-4 cont'd		"NorthernStar would use existing public and private roads that intersect the right-of-way to obtain access during construction. Load limits on public roads would be observed to prevent damage to the road surface, road bed, culverts, and bridges. Access road modifications proposed by NorthernStar are limited to grading and the addition of gravel to prevent rutting.	road is mentioned in the DEIS. We all travel this road slowly and cautiously because we realize the danger. That same caution cannot be guaranteed by NorthernStar, Northwest Natural Gas and/or the company they actually hire to construct the pipeline. Load bearing and traffic studies on public and private roads should be conducted prior to release of FDEIS as has been done with Clifton Road	Cowlitz County Public Works 2008-2013 Transportation Improvement Program http://www.co.cowlitz.wa.us/publicworks/roads/2008%20-%202013%20TIP%20Project%20Summary.pdf Slide 12
	IND72-5	<ul style="list-style-type: none"> o Road Traffic o Closures of roads due to pipeline construction 	<p>Page 4-343 Section 4.8.2.7 Road Traffic</p> <p>Page 4-352 Section 3.8.3.7 Paragraph 1 "Construction of the pipeline facilities could affect transportation and traffic in the project area by increasing the number of vehicle trips per day on area roads as a result of commuting and construction vehicle traffic as well as temporarily closing some minor roads during pipeline construction."</p>	<p>What is the definition of "minor". Due to the rural aspects of Southwest Washington and Northwest Oregon, those "minor" roads are the only access to many homes. The closure of those roads to landowners, emergency vehicles and/or delivery/medical services for even a brief period of time could create severe hardship especially on the elderly. There are no alternative routes for many locations. You close these roads and people are stranded either in their home or away from it.</p>
	IND72-6	<p>3. Trespass/Vandalism</p> <ul style="list-style-type: none"> o Cost to landowners o Loss of privacy o Personal liability expenses 	<p>Page 4-457 Section 4.12.6 Cultural Resources "Increased access by rights-of-way and service roads would</p>	<p>Who pays for damages? Who pays for personal injury? Who pays the increased insurance rates? Access to the KB Pipeline easement has already</p>

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- IND72-5 As discussed later in section 4.8.3.7, if an open-cut crossing were to require extensive construction time, provisions would be made for temporary detours or other measures to allow for the safe flow of traffic during construction.
- IND72-6 NorthernStar would ensure the security of its permanent pipeline right-of-way. Section 4.8.3.3 has been revised to address potential trespass along the pipeline right-of-way and measures that could be implemented to discourage ORV use and access.

IND72-6 cont'd		increase potential for trespass and vandalism."	<p>proven to be a burden to landowners</p> <ul style="list-style-type: none"> • Hunters • 4-wheeling • Hikers • Teenage parties • Vandalism • Theft • Fires • Squatters, etc. <p>The landowners are left open to risk and required to assume the burdens of that unwanted risk.</p>	
	IND72-7	<p>4. Residential</p> <ul style="list-style-type: none"> ○ Inaccurate survey and tally of homes, outbuildings along pipeline route ○ Inaccurate measurements of closeness of buildings to and within work areas 	<p>2-53 Residential Areas</p> <p>Paragraph 1“NorthernStar’s proposed construction work area (i.e., construction right-of-way and extra work areas) would be located within 50 feet of eight residential structures and three mobile homes. The locations of these residences are discussed in detail in section 4.7.3.3”</p> <p>“If construction requires the removal of private property features, such as gates or fences, NorthernStar would notify the landowner or tenant before construction.”</p>	<p>Much of NorthernStar’s research is obsolete. Information is lacking location of other privately owned buildings, i.e. barns, pump houses, etc. Multiple homes and outbuildings were constructed prior as well as after filing of application in June, 2006. Maps continued to be used by NorthernStar are obsolete. Example: Our barn is on the maps, well within 10 feet of the proposed work area and NOT listed in this section. Neighbor’s barn not identified nor shown, yet within work area.</p>
	IND72-8	<ul style="list-style-type: none"> ○ Loss of rights of landowners 	<p>“After construction, the property would be restored as requested by the landowner, <i>provided it does not interfere with NorthernStar’s standards regarding right-of-way restoration and maintenance and is compatible with existing regulations.</i> Property restoration</p>	<p>Ambiguous statement. Does not include major features of private property including outbuildings. Implies removal will happen whether fairly negotiated or negotiated at all. NorthernStar would be given full rights to remove whatever they deem necessary. When would landowner be notified? How long prior to construction—minutes, hours, days? Why the tenant? They have no power to make decisions for the landowner. Clarification of landowners’ rights needs to be</p>

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IND72-7 Section 4.7.3.3 has been revised to update the status of residences near the proposed pipeline route and our recommendation that NorthernStar prepare site-specific residential construction mitigation plans for all residences within 50 feet of the construction right-of-way.

IND72-8 As discussed in section 4.7.3.1, the new easements that NorthernStar would need to acquire to construct and operate the proposed facilities would convey both temporary (for construction) and permanent rights-of-way to NorthernStar and would give NorthernStar the right to construct, operate, and maintain the pipeline facilities. NorthernStar would negotiate a one-time payment for each easement. An easement agreement between a company and a landowner typically specifies compensation for losses resulting from construction, including losses of non-renewable and other resources, damages to property during construction, and restrictions on existing uses that would not be permitted on the permanent right-of-way after construction. The acquisition of an easement is a negotiable process that would be carried out between Northwest and the landowner and is beyond the scope of this EIS.

IND72-8 cont'd	<ul style="list-style-type: none">o Ambiguous determination of standards.	would be in accordance with any agreements between NorthernStar and individual landowners.” 3-36 3.1.5.3 Site Review Population Centers/Residences “Similarly, alternative LNG terminal sites were considered preferable if the location did not require LNG ships to transit near residentially and commercially developed shorelines.”	included. Loss of landowners’ rights—NorthernStar’s standards for right-of-way restoration. Clarification of “NorthernStar’s standards” is needed in this section. Who determines NorthernStar’s standards? Why aren’t county, state or other standards used? Can NorthernStar’s standards be changed at any time? Who regulates them?									
IND72-9	<ul style="list-style-type: none">o Population density within rural areas should not be the determining factor of “acceptable risk” for loss of life		Astoria is commercially and residentially developed. LNG ships will place the downtown area of Astoria within the blast zone. Puget Island is a residentially developed shoreline with homes well within zones of concern. Residences are closer than ½ mile from the terminal and less than ¼ from the tanker when moored.									
IND72-10	<table><tr><th>5. Water Supplies</th><th></th><th>Wells</th><th></th></tr><tr><td><ul style="list-style-type: none">o Inaccurate reporting of locations of private wells</td><td>Page 4-56 Public Water Supply and Wells “NorthernStar conducted a search for records of public and private water wells along the proposed pipeline route (ODEQ, 2006a; WDE, 2005a). The water well databases do not provide exact coordinates for each well but instead give the location by township, range, section, and quarter-quarter section. The well location is specified as the center of the quarter-quarter section. The</td><td>Recording of wells at the County Hall is a recent development and was designed to ensure water was available prior to homes being built. Many private wells exist in Clatskanie County that are not registered and, therefore, not a part of NorthernStar’s permit application. Our own well was only recently recorded even though it was drilled in late 1988. Therefore, NorthernStar truly has no idea where wells may be located along the pipeline route and whether those wells will be disturbed or not. Basically, according to the referenced section, NorthernStar accessed the easiest information and</td><td>See Attachments 3 FERC Public Comments November 7, 2007 Longview, Washington Attachment 4 FERC Public Comment November 5, 2007 Clatskanie, Oregon Available for research---</td></tr></table>	5. Water Supplies		Wells		<ul style="list-style-type: none">o Inaccurate reporting of locations of private wells	Page 4-56 Public Water Supply and Wells “NorthernStar conducted a search for records of public and private water wells along the proposed pipeline route (ODEQ, 2006a; WDE, 2005a). The water well databases do not provide exact coordinates for each well but instead give the location by township, range, section, and quarter-quarter section. The well location is specified as the center of the quarter-quarter section. The	Recording of wells at the County Hall is a recent development and was designed to ensure water was available prior to homes being built. Many private wells exist in Clatskanie County that are not registered and, therefore, not a part of NorthernStar’s permit application. Our own well was only recently recorded even though it was drilled in late 1988. Therefore, NorthernStar truly has no idea where wells may be located along the pipeline route and whether those wells will be disturbed or not. Basically, according to the referenced section, NorthernStar accessed the easiest information and	See Attachments 3 FERC Public Comments November 7, 2007 Longview, Washington Attachment 4 FERC Public Comment November 5, 2007 Clatskanie, Oregon Available for research---			
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IND72-9 Population density is just one factor in evaluating LNG terminal sites for suitability. For example, in our alternatives analysis, we viewed the Bradwood Landing site as more favorable than the Tansy Point site based on the lower population density. In sections 4.7 and 4.8, our EIS acknowledges that populations at Astoria and Puget Island would be within the Zones of Concern for LNG marine traffic going to the Bradwood Landing LNG terminal. However, there are no residences within 0.5 mile of the proposed LNG terminal.

IND72-10 See our response to comment PM5-73.

IND72-10 cont'd	<ul style="list-style-type: none"> Proximity of developed springs to work areas 	<p>wells identified within any quarter-quarter section crossed by the pipeline are listed in table 4.3.1-2."</p>	<p>took a stab in the dark for the rest. The question then becomes, "How many wells did they miss because they weren't willing to check additional, publicly available records or contact landowners?" Because NorthernStar has not walked the proposed route nor completed required surveys, they have no idea where springs are located, including a developed one INSIDE the work area and within feet of the proposed Columbia River HDD. This particular spring is hand dug and provides a source of water throughout the year to the owners.</p>	<ul style="list-style-type: none"> Cowlitz County Health Department Public Records of Well Water Quality Testing Filings and public records of local well drilling operators
IND72-11	6. Pipeline Safety			
	<ul style="list-style-type: none"> Lack of concern over possible pipeline failure 	Page 4-442	<p>In the DEIS Pipeline Safety is basically mentioned only in regards to laws and the Pipeline Safety Act of 1968. In fact, the term "pipeline emergency" is only mentioned once.</p> <p>Part 192 of the law explains area classifications based on population density in the vicinity of the pipeline with "vicinity" defined as 220 yards on either side along 1 continuous mile of pipeline. Areas are divided into "classes" depending on the number of buildings. Most of the pipeline route is designated class 1 (less than 10 buildings) and class 2 (10 to 46 buildings) for a total of 33.3 miles. No homes within that distance are considered HCA, or High Consequence Areas, meaning our Federal Government considers those living in Class 1 and 2 areas "acceptable risks" in case of pipeline failure. Additionally, on page 4-442 it is clearly stated, "No additional specialized local fire protection would be required to handle pipeline emergencies." Southwest Washington is an area where 3 pipeline explosions have happened in less than 20 years, with 2 of those events happening in Cowlitz County, all due to ground shift issues and each within short miles of this proposed pipeline.</p> <p>Absolutely no mention of Williams NW pipeline issues—multiple leaks and explosions resulting in the emergency shutdown of the 24-inch line and transfer of capacity to the parallel 30-inch line. How many people in this room are even aware the smaller Williams line running through Cowlitz County has been abandoned because repairs are too costly and there is no need for its additional capacity? The remaining operational 30-inch line was exposed during heavy rains last winter and floated in the Toutle River.</p> <p>When national figures are used in support of a regional issue, at best, those figures</p>	
	<ul style="list-style-type: none"> Classification based on population density in determination of safety zones 	page 4-440 Section 4.11.9.2		
	<ul style="list-style-type: none"> Williams Pipeline failure 	Pages 4-442 to 4-444 Pipeline Accident Data		
	<ul style="list-style-type: none"> National data vs 	Section 4.11.3 on page 4-444		

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IND72-11 See our responses to comments PM5-52 and PM2-16.

IND72-11 cont'd	regional reality	Impact on Public Safety	should be considered skewed. Regional topography, climate, seismic activity, winds, etc. create issues specific to a region. What happens in even in Southwest Washington is not the same as what happens in the high plains area of central and eastern Washington. Therefore, using a figure of a potential fatality every 2,762 years is ludicrous. Tell that to the families of the 13 people who died as a result of the El Paso pipeline explosion in the 90's. The force of explosions associated with that disaster was strong enough to set off 3 seismic readings that were used as evidence in wrongful death lawsuits against El Paso.
	<ul style="list-style-type: none"> Ground shift 	Ground shift is enough of a concern in this area that Mike Haywood of NW Natural Gas, NorthernStar's "partner", has told more than one landowner that following the KB Pipeline is not an option along most of the route for that exact reason. No human life is an acceptable risk and for this data to be left out or generalized is unacceptable. Thank	
IND72-12	7. Need		
	<p>Many others are including the "Need" for LNG in their comments so we will keep ours brief.</p> <ul style="list-style-type: none"> Over reliance on a trade organization rather than an independent research document to determine "need" in the Pacific Northwest. Definition of Pacific Northwest used by NorthernStar and NWGA includes Nevada and all of California Number of proposed pipelines from the 	<p>Page 1-3 Purpose and Need</p> <p>"In a recent study, the Northwest Gas Association (NWGA) warns that existing gas supplies and infrastructure are adequate over the next few years, but will fall short of meeting peak demand conditions by 2010 under a high growth demand scenario or under a base-case growth scenario with extreme cold weather (NWGA, 2006)."</p> <p>Pacific Northwest, as defined by NWGA and NorthernStar Natural Gas includes Washington, Oregon, Idaho, Nevada and California</p> <p>If need was so urgent in the Pacific Northwest,</p>	<p>Why is the FERC relying on NWGA, an industry trade organization whose membership includes Northwest Natural Gas—partner to NorthernStar?</p> <p>Put forth independent studies which unequivocally determine the need for LNG in the Pacific Northwest excluding California since NorthernStar has publicly stated on the record, NO gas will go to California.</p> <p>http://www.ogi.com/display_a_rtile/314312/7/ONART/none/</p>

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IND72-12 See our response to comment PM1-8.

IND72-12 cont'd	Rockies to interconnect in Malin, OR		why are there now two pipeline proposals to bring domestic gas from the Rockies to the west	Trasp/1/El-Paso-plans-680-mile-Ruby-gas-pipeline/
	o Future purpose of KB Pipeline	"delivering natural gas to the Wauna Mill, Oregon and the PGE Beaver Power Plant at Port Westward, Oregon;"	<ol style="list-style-type: none"> 1. Ruby Pipeline (El Paso) to Malin, OR announced December 4, 2007 2. Bronco Pipeline (Spectra) to Malin, OR announced November 14, 2007 <p>If the purpose of this pipeline is to provide gas to the Beaver Power Plant at Port Westward, what is the continued purpose of the KB Pipeline where 79% of the pipeline's capacity is currently subscribed to Beaver Power.? The KB Pipeline was built to supply Beaver—that's why it is called the Kelso/Beaver (KB Pipeline). If gas is to be diverted from the KB line, what is the plan for KB and why isn't that plan included in the DEIS?</p>	http://www.spectraenergy.com/businesses/projects/bronco/
IND72-13	8. Seismic Activity and/or Faults			
	o No reference to Nisqually Quake	<p>Page 5-1 Section 5.1.1 Geology Paragraph 2</p> <p>"The proposed Bradwood Landing site can be characterized as a "High" hazard area relative to earthquake potential"</p> <p>Page 4-22 Section 4.1.4.3 Seismic Related Hazards Paragraph 3</p>	<p>No studies past 1996 are cited indicating a lack of use of current research available Many studies are currently underway and/or recently completed through the University of Washington, USGS, and Batelle Research Center in Seattle</p>	<p>Please see Attachment 5 FERC Public Comments November 6, 2007 Cathlamet, Washington</p>
	9. Financial Stability and Partnership with Northwest Natural			

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IND72-13 See our response to comment PM3-31.

IND72-14	<ul style="list-style-type: none"> Questionable financial stability 	<p>None—no consideration as to the financial viability of this corporation has been taken into consideration.</p> <p>Nowhere in the DEIS is there reference to whether this company will be able to meet their financial obligation or measures included to make sure they DO meet their financial obligation.</p> <p>No performance bond requirements to be found.</p> <p>No bonds to support mitigation measures</p> <p>No financial responsibility measures and/or requirements</p>	<p>For a company to suddenly form in the business friendly state of Delaware with a \$1000 to its name; get permission to conduct business in the State of Oregon; have no source of business income yet file applications to build and operate 2 LNG receiving terminals—all within 4 years—while having no cash flow and depending totally on private investments from its officers along with a high interest loan from MattlinPatterson should be of concern to the federal government. The fact the IPO application with the SEC has been pending for over a year should also raise a warning signal.</p> <p>How will this company cover all their promises? What is actually required to be in place so private landowners, after being drug into court, will actually receive fair compensation and not be left with a gaping trench across their property?</p> <p>What guarantees to each of the counties get, in writing from the government that NorthernStar will not declare bankruptcy part way through construction and walk off leaving the counties with the mess?</p>	See Attachment 6 Letter to Clatsop County November 21, 2007
	IND72-15	<p>10. Misc. Comments</p> <p>Industry wide SIGTTO Standards not used in the US and particularly this project.</p> <p>Lay-by area for LNG tankship moorage when congestion, emergency or weather cause pier use issue</p> <p>Payola</p> <p>Tax-deductible obligation fulfillment</p>	<p>Not mentioned</p> <p>No accommodations mentioned</p> <p>Though these comments are listed as miscellaneous, they are as important as the others. Nothing about this project is unimportant including the use of payola to garner support.</p> <p>Emergency mooring—no mention is made in the DEIS as to what is to happen in the case of weather, traffic, waiting for turn at terminal pier, or an emergency and a LNG tankship needs to layby in the river. Will that be at Astoria with all the other ships? Will it be somewhere along the transit route, thus causing delays of other ships? Will it be in the turning basin, again, causing shipping delays? Where will this occur? This lack of</p>	<p>See attachment 7</p> <p>SIGTTO Page 18 "Provide escape routes in case a ship is unable to berth."</p>

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IND72-14 See our response to comment FA2-35.

IND72-15 See our response to comment IND60-11.

IND72-15 cont'd			information is against international industry standards.	
IND72-16	Tug assistance—number of tugs, size of tugs vs size of ship and horsepower necessary per tug.		Two 60-ton Bollard tugs will assist with transport of LNG carriers in the Columbia River channel. No limitation on size of carrier is mentioned, however, SIGTTO standards strongly suggest otherwise. Though the combined tonnage may cover the standard, having less than the required number of tugs may hamper control in an emergency. It is also important to note the tonnage of 120 to 140 is for carriers up to 135,000 m ³ , smaller than NorthernStar's anticipated carrier size.	Section 8.1.2 Page 14 SIGTTO
IND72-17	Bradwood terminal location won't meet internationally accepted standards.		Spending a small amount of time reading the SIGTTO standards creates a better understanding as to how the industry attained its safety reputation. Why the United States chooses not to follow the same standards is beyond reason. If they did, we wouldn't be commenting on this DEIS for this terminal would not pass.	
IND72-18	Buying support		Sponsorship of, and participation by invitation only full expense paid golf tournaments for Union representatives, financial gifts to local charities and foundations, and glitzy ad campaigns have not gone unnoticed. Dividing communities and pitting friends and neighbors against each other should never happen. Nor should it go unnoticed that tactic of donating large sums of money to a community foundation then dictating how that money will be spent—emergency services NorthernStar promised to provide. Instead they make a full tax-deductible donation and have that pay for their obligations. A classic case of corporate America having its cake and eating it too.	

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IND72-16 See our response to comment IND60-11.

IND72-17 See our response to comment IND60-11.

IND72-18 Most of this comment does not address environmental issues, and is outside the scope of our EIS. If the project is authorized and built, NorthernStar would have to provide funds for local governments as part of the cost-sharing portion of its ERP. It has also volunteered to fund the SEI. NorthernStar has elicited some support among local communities, in part, because it would provide a new source of natural gas to the Pacific Northwest, it would hire local workers, and its project would have economic benefits for the region as explained in section 4.8.

**Comments Submitted by Jerry Havens on
Bradwood Landing Draft Environmental Impact Statement
Docket No. CP06-365-000 et al.**

December 20, 2007

Due to time limitations on my presentation at the 11-08-07 FERC hearing in Knappa, Oregon, I here repeat the text of my comments at the hearing and add specific questions regarding the determination of vapor-cloud exclusion zones which I did not have time to present, as well as add comments relating to marine (shipping) safety issues that I believe should be considered in the process of siting the proposed Bradwood Landing terminal.

Comments on Vapor Cloud Exclusion Zone Determinations

IND73-1

Recent events indicate to me that FERC's compliance with the Congressional mandate to consider remote siting of LNG terminals in order to protect public safety is being based largely on exclusion (safety) zones required by U.S. Department of Transportation regulation 49 CFR 193. As a result, the establishment of such exclusion zones, which are mandated for land-based facilities only, has become the key method by which sufficiently remote siting is insured. I believe that such methods as have been approved by FERC in the DEIS for Bradwood Landing do not and can not insure the public safety as intended.

Presently, only two models are approved for determining vapor cloud exclusion zones for LNG terminal applications. The DEGADIS model, of which I am a co-author, was developed with support of the U.S. Coast Guard and the Gas Research Institute. Approved for use in the federal regulation in the early 1990's, DEGADIS does not account for any holdup of LNG vapor by dikes or other obstructions (to flow). Because of the need for models which can account for such complicated effects (the real world), the FEM3A model was developed as a result of a ten-year-long research effort supported by the Gas Research Institute and a consortium of international LNG interests, for which I was the Principal Investigator. FEM3A, approved in 2000, is clearly specified in 49

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IND73-1

We have updated the text in section 4.11.4 for clarification.

K-964

IND73-1

cont'd

CFR 193 as the model that must be used if vapor holdup by impoundments or vapor fences is to be taken into account.

As described in the Bradwood Landing DEIS, the applicant attempts to take the (vapor-holdup) effect of the impoundment into account without using the only permissible method (FEM3A) for doing so. Instead, it uses DEGADIS coupled with an absurd assumption that the LNG vapor evolved from a spill would accumulate in the impoundment without mixing with air. In effect, the applicant assumes that zero LNG vapor would be released from the impoundment during the first several critical minutes after a spill, when the rate of vapor generation from the spilled LNG is the greatest. This assumption has the effect of substantially reducing the calculation of the size of the vapor exclusion zone. And -- most important -- the assumption has been proven to be wrong. Experiments have conclusively shown that the LNG vapor does not simply remain in an impoundment until the volume of the pure, unmixed and unwarmed vapor exceeds the volume of the impoundment. But that absurd and demonstrably wrong assumption is the basis for the calculation of the vapor exclusion zone in this case. To be reasonable, the calculation must be redone, either using DEGADIS without attempting to take the effect of vapor holdup in the impoundment into account, or by using FEM3A, which correctly factors in the effects that the impoundment does have.

I also believe that the vapor cloud exclusion zones determined in the DEIS fail importantly to provide for public safety as intended by 49 CFR 193 in two other ways:

- The design spill used by the applicant here has been arbitrarily specified as the breakage of a 6-inch line on the cargo unloading line for the facility, with a ten-minute duration spill of 140,320 gallons, while the impoundment volume into which the spill would occur has been sized (and therefore deemed credible) to account for a ten-minute duration spill of 529,091 gallons resulting from a full rupture of the ship unloading line. My review of eleven other environmental impact statements shows DEIS approval for design spills from the ship unloading line ranging from 28,900 gallons (Keyspan) to 812,000 gallons (Trunkline). I do

Individuals

73

IND73-1
cont'd

not understand how FERC can approve such a large variation in the design spill which determines the extent of the vapor cloud exclusion zone. After all, the ship unloading lines, as well as the arrangement of the smaller lines serving the unloading line, are all based on similar technology and design specifications. Since the vapor cloud zone determinations are directly related to the size of the spill, the lack of consistency shown in the design spills selected by the various applicants could have the appearance of simply determining the size of the spill that the property line distance allows.

- The determination of the vapor cloud exclusion zone has been made assuming a wind speed of 2 m/s. This assumption is not conservative; although allowed by 49 CFR 193, the basis for this assumption predates scientific findings that 2 m/s wind speed cannot be assumed to be worst case. As both theoretical models and experimental evidence indicate, because of increased air mixing with evolved LNG vapor (air entrainment) at higher wind speeds, the maximum downwind safety zone can occur at a wind speed higher than 2 m/s (4.5 mph), and such higher wind speeds are not an unusual condition. In this regard, I point out that the fire radiation exclusion zone is required to be determined, as Bradwood Landing appears to have done, for the wind speed that maximizes the exclusion zone. The same reasoning is applicable to the determination of the vapor cloud exclusion zone.

Finally, regarding the vapor cloud exclusion zone determinations described in the Bradwood Landing DEIS, I would appreciate FERC's clarification of the methods used to determine the vapor cloud exclusion zone of 243 feet cited on page 4-418 -- by providing the values used for thermal conductivity, density, and heat capacity of the (concrete) material composing the sumps into which the design spills occur.

Continued -

Individuals

73

Comments on the Potential for Cascading Failures of LNG Ship Containments

IND73-2 Having visited the proposed Bradwood Landing site and the shipping route thereto, the latter coming into close proximity to the city of Astoria while passing under the Astoria bridge, I believe that serious consideration should be given to recommendations to Congress by the Government Accounting Office (*MARITIME SECURITY – Public Safety Consequences of a Terrorist Attack on a Tanker Carrying Liquefied Natural Gas Need Clarification*, GAO-07-316, February 2007) to determine the potential for cascading failures of the LNG containments (tanks) that might follow a terrorist attack. The GAO has called the cascading failure issue the leading unaddressed priority need for LNG safety research associated with LNG shipping. If an LNGC were to be attacked in the proximity of the bridge at Astoria, and cascading failures of the ship's containments were to occur, it could result in a hydrocarbon pool fire on water with magnitude beyond anything that has been experienced to my knowledge, and in my opinion could have the potential to put people in harm's way to a distance of approximately three miles from the ship. I believe that the parties that live along the Columbia river where this threat could affect them deserve to have a rational, science-based determination made of the potential for such occurrences, no matter how unlikely they may be considered.

Individuals

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IND73-2 As discussed in section 4.11.5.3 of the EIS, cascading damage was evaluated in the Sandia Report and, while possible under certain conditions, is not likely to involve more than two or three cargo tanks, and is not expected to increase the overall fire hazard by more than 20 to 30 percent. The majority of the GAO expert panel agreed with Sandia that cascading events are not expected to significantly increase the overall fire hazard, and the majority felt the Sandia calculations were either accurate or overly conservative. We have updated the text in section 4.11.5.3 for clarification.

I moved my family to Astoria two years ago in large part for the safety and security we found this region to hold. The slow pace of life, the strong sense of community, the avid artistic culture, the practically unspoiled scenery, and the romanticism of the "working river" with anchored ships and fishing boats in the river every day were also large draws. As a businessman and investor for the past 40 years, I knew this to be a place in which local investment opportunities would be helpful, profitable, and numerous. We thought we had found paradise, somewhere we could settle in, help with the raising of our grandchild, and enjoy the rest of our years.

We are now living in fear that a LNG facility could be soon approved 30 some miles upriver from our home, requiring a ship loaded with potentially explosive materials to pass by just about every day. These LNG tankers will not only compromise the feeling of safety in town and along the river, they also will help destroy the economy of fishing, recreation, and tourism that our area's inhabitants have worked so hard over the last decade to strengthen. Bringing LNG to a facility upriver will make this wild area a possible terrorist target, and will require the clearing of most of the river, bridge, and downtown Astoria every time a ship passes by. What fisherman, kayaker, or sightseer wants to deal with that inconvenience?

This proposed LNG facility at Bradwood Landing would be being placed at "the holy grail" of salmon rearing habitat on the already damaged, salmon-deficient Columbia River. There just is not better habitat for that period of the salmon's life anywhere on the river anywhere, nor can it be mitigated in any true sense. Destroying it would be devastating; going through with this proposal on these grounds should be illegal.

Not only would a LNG facility be disastrous for Astoria, smaller communities, and all surrounding residents of the plant and river, but the associated pipelines that would have to be built in order to make a new facility viable could be possibly even more detrimental to our environment, spanning hundreds of miles through prime farmland, vineyards, forests, and public lands. This pipeline would cross hundreds, if not thousands, of streams, adding silt to our already damaged waterways. There is just no way for responsible pipe installation to occur on the entirety of the line; there would not be enough profitability for the pipeline company if it were to put in the hours needed to ensure the lack of destruction to the environment.

The DEIS is insufficient and flawed for this project. It does not adequately study the effects on endangered wild salmon and steelhead. It does not adequately study the potential effects on the safety of surrounding communities. It does not adequately study the history of landslides in the direct vicinity of the proposed Bradwood Landing LNG site. It does not adequately study the impacts to the wetlands and river, nor does it study and ask to change the mitigation plans sufficiently. FERC should not approve this project as it stands, as reported in the DEIS.

If we must create LNG receiving and processing facilities, why not place them offshore, where no one could be harmed, where terrorists would not be tempted to attack, where vital river, estuarine, and wetland life is not to be affected? I wish that you, employees of FERC, would use the full scope of your power and choose to site these plants in appropriate locations, and not just where the big money corporations think they can get away with it. LNG, in responsible locations, wouldn't be so bad.

Individuals

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- IND74-1 The safety/security zone around the LNG ships would have a minor impact on recreational river use. Also see our response to comment PM6-48.
- IND74-2 As described in section 4.6.3, the FERC would not allow construction to begin until after we have concluded formal consultation with the FWS and NMFS.
- IND74-3 The Bradwood Landing pipeline would be 36.3 miles long and would cross 94 waterbodies. Impacts and mitigation associated with waterbody crossings are described in detail in section 4.3.2.4 and 4.5.3.1. To minimize impacts on surface waters, NorthernStar would adhere to the protective measures specified in its pipeline ESC Plan for construction in Oregon and its SWPPP for construction in Washington, as well as our Procedures and applicable permits. In addition, to ensure impacts on aquatic habitats are minimized, we have recommended that NorthernStar continue to consult with the COE, NMFS, FWS, and appropriate federal and state agencies to finalize its Waterbody and Wetland Construction and Mitigation Procedures Plan that describes the specific methods of in-water habitat mitigation to be conducted.
- IND74-4 See our response to comment PM4-20. Impacts associated with landslides are addressed in section 4.1. Impacts on wetlands are addressed in section 4.4.1. Impacts on salmon are addressed in sections 4.5 and 4.6. Safety is addressed in section 4.11.
- IND74-5 We evaluated offshore alternatives in section 3.1.4.

IND74-6

We, Oregonians, do not appreciate being practically forced to house this facility and pipeline. And all for the use of Californians, who denied projects being proposed there, and for the pocketbooks of greedy energy speculators from Texas. We do not want this project here. We have overwhelmingly come out against LNG on the Columbia River. And we will fight this project to its death.

Do the right thing: Deny Bradwood LNG and its associated pipeline.

Individuals

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IND74-6

The project is intended to serve the Pacific Northwest, not California. See our response to comment PM1-23 .

As a public citizen that you, FERC, represent and have responsibility for in this area of energy and its safety, I strongly recommend you DENY the Bradwood Landing LNG facility proposal by NorthernStar, on the grounds that the DEIS is insufficient and flawed.

After reviewing your 600-page Draft Environmental Impact Statement on the Bradwood project, I found that you severely shorted the study with regards to some serious impacts to the local area. These impacts are as follows:

- IND75-1 | • Conflicts between LNG tankers and other boats, including those in our bustling fishing and tourism industry, on the Columbia River;
- IND75-2 | • Existing geologic hazards at the Bradwood terminal site, including frequent history of landslides, the soft ground associated with wetland areas, and the great possibility of a major earthquake and tsunami in the near future, and along its pipeline route;
- IND75-3 | • Potential damage from LNG tanker fuel oil spills or tank breaches, affecting tens of thousands of local residents, historic areas, and river species, including several already endangered;
- IND75-4 | • Threats to a fishing- and tourism-based growing economy;
- IND75-5 | • The dependence of the Bradwood terminal on a second pipeline, the Palomar Gas Transmission line, which would rip through the heart of Oregon's farm and forest lands, and to which this project cannot be connected, as they are "separate", though Bradwood LNG cannot function without this future pipeline.
- IND75-6 | The DEIS is fatally flawed for this project for the above reasons, as well as for the fact that the area upon which this LNG facility would be placed and the portion of the river that would be damaged by the turning around of huge tankers CANNOT BE PROPERLY MITIGATED. This area is prime habitat for young salmon, habitat that cannot be found anywhere else on the Columbia River, nor can it be formed by human hands somewhere else. There are some (many) things that just cannot be mitigated; some things nature just does a thousand times better. We cannot allow this area of our already damaged river to be destroyed.
- IND75-7 | I, and thousands of others in Astoria and surrounding communities, strongly feel that you, FERC, need to do your own analysis on the economic impact, the environmental impact, and the validity of this Bradwood LNG site without the Palomar Pipeline. Should you find any impacts to be insufficiently studied, or that the LNG facility would be moot without its supposedly unassociated Palomar Pipeline, I urge you to extend the public comment period, propose further studies, and insist upon this project being decided upon only in connection with the Palomar Pipeline.

Individuals

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- IND75-1 | See our responses to comments PM1-14, PM1-52, PM3-11, PM5-31, PM5-47, and others.
- IND75-2 | Geologic hazards and mitigation are discussed in sections 4.1.3.3 and 4.1.4.3.
- IND75-3 | LNG releases from LNG ships are addressed in various places throughout section 4.0. Section 4.11.5 specifically address spills from LNG carriers, the distances the hazards from these spills would extend (Zones of Concern), the carrier routes, and the communities that would fall in these Zones of Concern.
- IND75-4 | A discussion of recreation and tourism associated with the Columbia River and areas surrounding the proposed LNG terminal and natural gas pipeline is included in sections 4.8.1.8, 4.8.2.8, and 4.8.3.8. We concluded that the project would not have any significant impacts on fishing and tourism.
- IND75-5 | See our response to comment LA3-8.
- IND75-6 | The adequacy of mitigation is discussed in the response to comment FA2-10.
- IND75-7 | The Bradwood Landing Project has its own sendout pipeline and is not dependent on the Palomar pipeline, which is a separate project. The Commission will make its determination of economic viability and public need in the Order for this project. See our response to comment LA3-8.

IND75-8 | The DEIS does not include plans already in place to protect the river and the estuary, including several endangered species recovery plans. Should mitigation plans and efforts be found to be sufficient to not encroach upon these existing plans, they should be made binding, and not kept voluntary. And they should be seriously followed up on, with requirements for approval upon completion of these mitigation efforts. We cannot allow the river, estuary, and endangered species to be further destroyed in any capacity by this project.

IND75-9 | Though I do have some doubts about LNG as a "clean energy source for the future" in general, I do feel strongly that this Bradwood Landing LNG facility proposal is not a good one for Oregon. The siting of this facility is not smart, being some 38 miles upriver, and in prime habitat for already endangered salmon rearing. Should we need LNG, let's site it closer to the mouth of a river, not in close range to large population centers, and in already industrialized areas. Or preferably, offshore.

Please do your jobs and deny this facility's proposal on the grounds that its siting creates too many problems and affects too much of an already hurting ecosystem.

Individuals

75

IND75-8 | Section 4.12.2 has been revised to include a summary of plans currently in place to protect the lower Columbia River. The assurance of the Compensatory Mitigation Plan and SEI are discussed in the response to comments FA2-10 and FA4-12, respectively. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.

IND75-9 | Alternative onshore LNG terminal locations closer to the mouth of the Columbia River are discussed in section 3.1.5 and offshore alternatives are discussed in section 3.1.4.

21 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

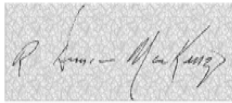
Re: Bradwood Landing LLC
Docket No. CP06-365-000 et. al.

Dear Ms. Bose:

Please enter the attached document containing my comments on the Draft
Environmental Impact Statement for the subject project into the public record.

Thank you for your attention to this matter, I remain...

Very truly yours,

A rectangular area containing a handwritten signature in dark ink. The signature appears to be "R. Duncan MacKenzie" written in a cursive style.

R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

Individuals

76

IND76-1

Noted in the DEIS recommendations on page 5-31 as item 81, is the following text:

"Drawings and all information shall be clearly legible on 11- by 17-inch paper and the piping legend and symbology shall be in accordance with accepted practice. "

The Commission's recommendation is well founded. Many of this applicant's submissions (e.g. the P&ID drawing included in the applicant's "Bradwood Landing Terminal Application for Air Contaminant Discharge Permit" [FERC Accession Number 20070522-0112]) would appear to have been executed with a dull crayon and reproduced in a manner that renders the drawing or information all but illegible. Please refer to Exhibit 1 attached.

In this instance, it is unrealistic for the Oregon Department of Environmental Quality, the agency charged with the review of the applicant's ACDP permit, to make an informed decision without accurate, legible information.

- It is suggested that FERC and other affected agencies reject any information submitted in which any presented information, data, or designs are occluded, illegible, or ambiguous in design intent.

Individuals

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IND76-1

We discuss that NorthernStar must obtain an air quality permit from the ODEQ in sections 1.3 and 4.10.1. The ODEQ would be responsible for review of any permit application it receives.

21 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

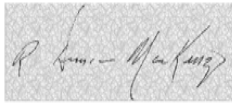
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R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

Individuals

77

IND77-1

Notably absent from the DEIS is any discussion or evaluation of the potential consequent effects on aquatic species and habitat occasioned by the discharge of regulated air pollutants from the facility returning to the watershed and river as acidic rainfall. Indeed, the discussion of rainfall in the area of the facility is limited to the brief acknowledgement of the potential for high rainfall characterized in the first paragraph of Section 4.4.2.1 on page 4-108 as:

"The waterway for LNG marine traffic would be located within the Coast Range ecoregion. This ecoregion consists of highly productive, rain-drenched coniferous forests that cover the low mountains of the Coast Range."

and, as noted in Section 4.10.1.1 Waterway for LNG Marine Traffic/Climate,

"Rain and drizzle, with fog and low clouds, are frequent from the late fall to early summer months."

This last sentence is somewhat of an understatement as this region of the river experiences an average of approximately 80 inches of rainfall yearly.¹ The western slope of the coastal range mountains in the area can experience up to 200 inches of rainfall per year.² The statement regarding climate information noted in Section 4.10.1.2 on page 4-371 as:

"The National Weather Service (NWS) maintains a climate station at the Astoria Regional Airport in Astoria, Oregon, located in Clatsop County and the Kelso-Longview Regional Airport in Cowlitz County, Washington. Climate data from these stations are available from the Western Regional Climate Center from January 1, 1899 to the present. *These data should be representative of conditions in the area of the proposed terminal.*"

(emphasis noted in italics)

is incorrect as it ignores the unique micro-climate of the region. Astoria receives an average of 67 inches of rain per year, and Longview/ Kelso only 46 inches per year.

Found in the applicant's "Bradwood Landing Terminal Application for Air Contaminant Discharge Permit" (ACDP) [FERC Accession Number 20070522-0112] on page 40 of 129 is the fact that an estimated 122.6 tons of nitrous oxides, and 199.6 tons of carbon monoxide will be discharged from the facility each year. Refer also to Table 4.10.1-6 on page 4-374 of the DEIS. Since discharge level of these criteria pollutants is above the 100 ton/year threshold level the applicant must file for a Title V Air Contaminant Discharge Permit with the Oregon Department of Environmental Quality as is noted on page 4-375 of the DEIS.

Individuals

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IND77-1

The climate information documented in the Section 4.10.1 of the EIS is representative for the region where the project would be located.

EPA's Acid Rain Program, an emissions trading program targeting coal-fired power plants, has reduced emissions of sulfur dioxide and nitrogen dioxide through capping emissions and allowing affected facilities to buy and sell emission credits. The proposed project is not subject to the requirements of the Acid Rain Program. Therefore, wet and dry deposition modeling was not conducted and is considered to be outside the scope of the EIS.

IND77-1
cont'd

The PSD impacts of Carbon Monoxide and Nitrogen Oxide were estimated by the applicant's consultants and found to be within the limits allowed. However, no modelling of dry or wet deposition of nitrogen was done.

In view of the higher than assumed rainfall in the area of the proposed terminal, and the significant level of a criteria pollutant discharge which forms a major constituent of acid rain; it is suggested that this aspect of the DEIS is flawed. The approach taken in the DEIS to this issue as merely one of Air Quality ignores the impacts arising from acid rain contributions to the watershed of the area.

- It is recommended that FERC and its contract consultants review the climate data used on a more site-specific basis, which takes into account the local micro-climate.
- It is further recommended that dry and wet nitrogen deposition modelling be done to assess the biological impacts arising from acid rain in the region. Modelling should be performed not only for short-term effects, but cumulative effects arising from operation of the facility over its expected usable life span.

1} <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wa1205>

CATHLAMET 6 NE, WASHINGTON (451205)

CATHLAMET 6 NE Weather station, 6.05 miles from Cathlamet

Period of Record Monthly Climate Summary

Period of Record : 6/17/1959 to 6/30/2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average													
Total Precipitation (in.)	11.86	8.82	8.16	5.89	3.90	2.94	1.20	1.94	3.64	6.90	11.97	12.35	79.57
Average													
Total Snowfall (in.)	3.8	1.8	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.2	9.1
Average													
Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.

Max. Temp.: 0% Min. Temp.: 0% Precipitation: 98.6% Snowfall: 97.6% Snow Depth: 96.2%

<http://www.wrcc.dri.edu/htmlfiles/wa/wa.ppt.ext.html>

Maximum rain fall 106.67 inches 1996

2} http://www.ocs.oregonstate.edu/county_climate/Clatsop_files/Clatsop.html

Individuals

21 December 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

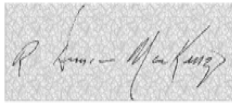
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R. Duncan MacKenzie
30099 Maple Drive
Rainier, OR 97048

Individuals

The rationale behind the NEPA process - that agencies should be fully informed of the environmental consequences of their actions before making a decision - is especially important when dealing with an issue such as invasive species, where problems are often unanticipated side effects of otherwise desirable actions.

IND78-1

The DEIS briefly addresses the introduction of exotic or invasive organisms to the region in Section 4.5.1.1 on page 4-124. Noted also in Section 2.1.1.5 on page 2-6 is the following statement regarding the handling of LNG carrier ballast water:

"Ballast water is typically only discharged during loading operations at the LNG export terminal or during mid-ocean ballast water exchanges during the transit from the import terminal to the export terminal. No ballast water would be discharged near the LNG import terminal."

However, apart from a description of the screened water intake for ship ballast and cooling water found on pages 4-144 and 4-145 to "minimize" entrainment of biota; there is nothing found in the DEIS that addresses the potential environmental consequences of ballast water exchange or dumping of the estimated 6.3 billion gallons¹ in open ocean exchange or foreign ports.

The International Maritime Organization has adopted the *International Convention for the Control and Management of Ships Ballast Water & Sediments* (13 February 2004), a voluntary standard dealing with ballast water management. However, it is important to recognize two shortcomings of the open ocean exchange procedure. First, the ability to safely conduct ballast water exchange depends upon weather and sea surface conditions, and it is not always possible to perform an exchange. Second, there will still be some residual density of uptake biota in the ballast tanks following exchange, rendering the process is only partially effective.²

Reference is made to NEPA and to the provisions of Executive Order 13112 dated 3 February 1999, Section 2 (1), (2), and especially (3) which states:

"(3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States *or elsewhere* unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions."

(emphasis added in italics)

Individuals

78

IND78-1

Section 4.5.1.1 has been revised to include additional information on the potential for introduction of aquatic species to the lower Columbia River system.

IND78-1
cont'd

- It is suggested that FERC and its contract consultants re-examine the remedial measures proposed for the prevention of exotic and invasive species to the waters of the Columbia River estuary. The Oregon Department of Environmental Quality has already submitted comment on the lack of efficacy of these proposed measures.

IND78-2

- It is strongly recommended that FERC and its contract consultants review the consequences arising from the dumping of up to 6.3 billion gallons of Columbia River water in the middle of the ocean, or a foreign port, which may lack facilities to sequester and treat the ballast water.

- 1] Bradwood Landing LNG Import Terminal CP06-365-000 Draft Environmental Impact Statement, page 4-67, [FERC Accession Number 20070817-4000]
- 2] National Ballast Information Clearinghouse, *Present Ballast Water Management Practices*, <http://invasions.si.edu/nbic/managementpract.html>

Individuals

78

IND78-2

Additional information on the potential for the introduction of invasive species to the lower Columbia River through hull fouling has been added to section 4.5.1.1. We believe that this discussion is relevant to the lower Columbia River, the open ocean, and waters at the LNG export facility.



ORIGINAL

Captain Warren G. Leback
Apt. J102
900 Hollinshead Spring Road
Skillman, New Jersey 08558
40° 27'N - 74° 40'W

December 12, 2007

Federal Energy Regulatory Commission
888 First Street NE Room 1A
Washington, DC 20426

Attention: Kimberly D. Bose
Secretary

Subject: Bradwood Landing LNG
Project, Bradwood, Oregon
Docket: CP06-365-000

RECEIVED
OFFICE OF THE
SECRETARY
FEDERAL ENERGY
REGULATORY COMMISSION
2007 DEC 18 P 2 58

Gentlemen:

IND79-1

Please be advised that I support the application and approval of NorthernStar Gas Company's Bradwood Landing LNG Project.

My support is based on my review of the project and my background and experience as Vice President El Paso LNG. In addition to being Vice President El Paso LNG Co., I was Vice President and Director El Paso Marine Co. which operated nine (9) LNG carriers six (6) American flag and three (3) Liberian flag but all nine (9) vessels employed American citizen crews.

El Paso Marine Company recruited crews, provided LNG training prior to assignment to the vessels with specific retraining points. Training covered the use of navigation, engine room and control simulators with emphasis on the type of vessels, routes and ports. Crew training is essential.

El Paso LNG Chairman, President and Executive Officers were dedicated to a safe efficient operation. This dedication was from the Chairman down to and through the ship crews.

NorthernStar Gas Company's dedication to a safe efficient operation follows that of El Paso LNG Company.

Individuals

79

IND79-1

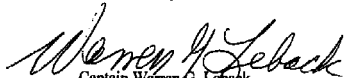
Comment noted.

Page 2

FERC should approve the application and such approval should be timely.

I remain...

Sincerely,



Captain Warren G. Leback
former Vice President
El Paso LNG Company
former Maritime Administrator
1989 - 1992

Individuals

79

December 19, 2007

1 –copy ATTENTION: Gas Branch 3, PJ11.3

TO: Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington DC 20426

FROM: Paul Sansone and Susan Vosburg
9922 NW Gales Creek Rd.
P.O. Box 6
Gales Creek, OR 97117

CONCERNING: Bradwood LNG Terminal
Reference **Docket No. CP06-365-000** on the original and
1 –copy ATTENTION: Gas Branch 3, PJ11.3

Public Comments Regarding Proposed Project

IND80-1

The pipelines that connect the proposed Bradwood LNG Terminal are integral to the feasibility of the project. It is unreasonable to assume that the two projects can be considered separately. The Governor of the State of Oregon stated in his cover letter to the FERC concerning the State's FERC review:

“Liquefied Natural Gas terminals also introduce a companion suite of issues associated with natural gas pipelines that carry LNG from terminals to service areas, sometimes at great distances. The social and environmental impacts of these pipelines are of as much concern to the State as the terminals themselves. Accordingly, Oregon agencies have also identified and evaluated the environmental and social impacts of these pipelines through federal and state permitting processes.”

We specifically request FERC to include all the comments from the Palomar Gas Transmission Project, FERC Docket No. PF-7-13-000, into the Bradwood LNG Terminal review Docket No. CP06-365-000.

The following Outline of Concerns, are related to the pipeline that is proposed to carry re-gasified LNG from the proposed Bradwood Terminal to the trans-Canadian pipeline in Central Oregon.

Individuals

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IND80-1

As described in section 3.1.2.2, we consider the Palomar Project to be a separate undertaking from the Bradwood Landing Project. Neither project is inter-dependent on the other. If Palomar is not authorized or built, the Bradwood Landing Project could still go forward, and vice versa. Comments on the Palomar pipeline project are available for public review via the FERC's eLibrary under the Palomar pipeline Docket Number (PF7-13-000). We will not duplicate them under the Bradwood Landing Docket Number.

K-982

Page 2

IND80-2 In addition to these concerns, I feel that FERC has needlessly subjected the citizens of Oregon to a review of a proposal whose need has not been quantified. I formally request that FERC stop the review of all LNG related proposals in Oregon, and perform a programmatic EIS that includes a comprehensive needs analysis. The Governor agrees with the necessity of first determining a societal need before proceeding with a FERC project review. Again quoting the Governor's same letter to FERC:

"The need for the facility has not been established and the alternative analysis is inadequate. The DEIS does not adequately analyze market data and natural gas supply trends to support the claim by the developers that additional supplies of LNG are needed in the Pacific Northwest. Nor does the DEIS contain a comprehensive list of alternatives that include no action, energy conservation, expansion of existing infrastructure, and potential new sources of natural gas, including domestic, continental and offshore supplies."

IND80-3 The current FERC review process is not being conducted in a fair and open manner. In fact, it appears as though the process has been designed to separate potential opposition to the LNG projects proposed in the State of Oregon. The separation of the Bradwood LNG Terminal proposal from the Palomar Pipeline has prevented those property owners affected by the pipeline from having timely notification and a reasonable chance of participating in the EIS of the Bradwood Terminal. Only the extension of the review process requested by Congressman Wu has allowed any comment. I have documented to both Congressman's Wu's office and Senator Ron Wyden's offices numerous ways that the FERC review process has been flawed in its execution.

We believe that FERC is not justified in continuing to review any of the three LNG terminals and their related pipelines until it has completed a programmatic EIS with a comprehensive energy needs analysis that clearly and scientifically proves that any of the proposed projects are needed for the future energy needs of the State of Oregon.

FERC must also commit itself to conducting said programmatic EIS in a manner that is responsive and open to public comment. Public input should be solicited in public hearings that are held Statewide, publicized at least several months in advance, and are inclusive of all the stakeholders in the State.

Sincerely,

Paul Sansone and Susan S. Vosburg

Individuals

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IND80-2 See our response to comment IND52-2. We review alternatives in section 3.

IND80-3 As explained in section 3.1.2.2, we consider Palomar to be an independent project, to be reviewed separately from the Bradwood Landing project. Separate proceedings for the Bradwood Landing and Palomar projects do not preclude an interested party in participating in both.

K-983

Outline of Concerns

- I. Geology and soils, and other hazards:
 - a. Pipeline follows the Molalla seismic fault, one of the most active faults in Oregon.
 - b. Much of the valley bottom is comprised of sandy and loamy soils that liquefy during earthquakes.
 - c. Flooding, stream channel changes and landslides are known hazards along Gales Creek. Up to six feet in stream levels can occur in as little as a twenty-four hour period. In the 1996 flood, a large landslide dammed Gales Creek at peak flood stages exceeding the 100-year flood plain. The creek jumped its normal channel and moved up to 300' in places scouring a new channel several hundred feet wide and up to 16' deep. The proposed location of creek crossing is highly vulnerable to similar changes. The bridge crossing Gales Creek at Clapshaw Hill Rd. was heavily damaged by this flood and is in proximity to the proposed creek crossing.
- II. Water and Aquatic Resources
 - a. The mid and upper reaches of Gales Creek Valley is a sensitive aquifer. Low producing wells and pockets of brackish water will make existing water wells highly susceptible to damage from pipeline construction.
- III. Vegetation and Wildlife
 - a. Pipeline construction and ongoing right-of-way will create greatly increased weed pressure on existing farms and forestry operations. These weeds will greatly increase the cost of normal farm and forestry operations.
 - b. Pipeline rights-of-way will become refuges for the Willamette Valley Pocket gopher because standard control measures will not be possible. Rodent elimination tools utilize propane and oxygen to create concussion killing with blasts to the tunnel networks.
- IV. Threatened and Endangered Species
 - a. Gales Creek is critical habitat for endangered fish including Steel head trout and Coho salmon which having spawning beds at the proposed locations of crossing Gales Creek.
 - b. Gales Creek is of critical importance to the Tualatin River drainage because of the loss of habitat from construction of Scoggins Reservoir and the loss of breeding habitat in the upper Scoggins drainage. Clean Water Services is attempting to reduce water temperatures, which would rise from removal of riparian trees.
 - c. Sensitive flora includes: Nelson's Checker-mallow (*Sidalcea nelsoniana*) is a threatened plant that is growing along the proposed pipeline route. Kincaid's Lupine (*Lupinus sulphureus* ssp. *Kincaidii*) is also growing in the proposed pipeline route.
 - d. Bald eagles hunt and nest along Gales Creek and are a threatened species.

Individuals

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Individuals

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K-985

- V. Land Use
 - a. Pipeline rights-of-way are highly disruptive to farms and forestry operations. Conflicts include: limitation of equipment crossing pipeline rights-of-way, change of field layout, imposition of barriers to normal operations, inability to grow crops requiring sub-soilers or deep spading, compaction of soils and mixing of soil horizons lessening soil fertility.
 - b. Construction damage to existing drainage tiles, disruption of drainage systems and loss of neighboring productive farmland.
 - c. Conflict and damage to existing in-ground irrigation systems including mainlines, control wiring, and valves. Systems typically 2-4' deep and proposed routes would bisect many existing systems.
 - d. The economic loss of thousands of acres of prime forestland in direct conflict with Oregon State-wide land use planning goals, local zoning, and governmental tax base and past tax incentives to encourage conservation.
 - e. The economic loss of thousands of acres of prime farmland is in direct conflict with Oregon Statewide land use planning goals, local zoning, and government tax base and past tax incentives to encourage conservation.
 - f. Extreme Fire Hazard
 - No local fire suppression capacity for increased risk
 - Proposed pipeline location very near site of largest forest fires in Oregon history (Tillamook Burn).
- VI. Socioeconomic
 - a. Loss of Forestry and Farms jobs vs. temporary construction jobs
 - b. Furthering dependence upon imported fossil fuels instead of building a renewable energy infrastructure.
 - c. Democratic processes have been damaged by the manner that the FERC review process has been conducted. The problems include: uneven notification of affected property owners and stakeholders. The misleading newspaper publication of notices concerning the FERC meetings. The splitting-up into different FERC reviews of the two pipeline proposals and the two LNG plants proposed to supply these pipelines. The extremely short lead times of the meeting notifications. The moving of proposed pipeline locations and the non-availability of maps showing proposed locations.
 - d. FERC should be required to restart the review process with all the proposed projects bundled into a single review to achieve a comprehensive analysis of the projects combined impact.
- VII. Air quality and noise
 - a. The upper and middle reaches of the Gales Creek Valley are subject to extreme air inversions during heat waves in summer and during cold snaps in winter. A pipeline leak during these periods would trap large quantities of gas close to ground level with the possibility of asphyxiation of local

residents, including an entire elementary school located in the middle of the inversion zone.

VIII. Reliability and Safety

- a. A single pipeline accident during high fire danger periods could spark a cataclysmic conflagration capable of destroying 100's of billions of dollars in timber that comprise the Tillamook Forest.
- b. A single pipeline leak with out odorization during an air inversion could kill hundreds of young children.

IX. Cumulative Impacts

- a. Construction of the proposed pipeline would enable the construction of LNG plants on the Columbia River. The combined project would significantly disrupt commerce on one of the region's most valuable waterways, negatively impacting major shipping ports supporting the local economy. A few hundred temporary construction jobs gained would significantly impact fishing, forestry, farming, shipping and related employment. The importation of more fossil fuels from politically unstable sources of supply would make the Country less economically and politically secure.

Individuals

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December 25, 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street N.E., Room 1A
Washington, D.C. 20426

Re: DEIS Comments on Bradwood Landing LLC - Docket No. CP06-365-000, et al.

Dear Secretary Bose:

IND81-1 In the Waterway Suitability Report for Bradwood Landing LNG dated February 28, 2007, the U. S. Coast Guard reports that the Astoria-Megler Bridge will NOT be closed when LNG tankers pass under it. As reported on March 6, 2007 in a Summary of Key Findings of Publicly Available Summary of the U.S. Coast Guard Waterway Suitability Report for Columbia River LNG (for Bradwood LNG) states: "This raises serious concerns, given that at other LNG import sites like Boston Harbor, bridge closure is an integral part of LNG safety measures when an LNG tanker passes under a bridge. Because of the clear risks of terrorist attack that LNG tankers could face when passing under a high-traffic bridge, Astoria will either be put at increased risk of accident if the bridge is not closed, or deal with the type of significant traffic management delays that face cities such as Boston that have LNG ports now face."

IND81-2 Also, "...while we can only speculate about what information is contained in the non-public portions of the WSR, it is reasonable to assume that materials kept secret contain additional and specific information about the actual vulnerabilities of the proposed LNG projects."

Yours truly,

Sandra M. Davis
1002 Abernathy Creek Road
Longview, WA 98632

Individuals

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IND81-1 See our response to comment PM6-97.

IND81-2 The SSI portion of the WSR contains information on security measures that would mitigate risks to the LNG terminal and marine waterway.

December 24, 2007

Kimberly D Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Reference: Docket No. CP06-365-000 et al.

Type of Submission: Comment on Filing

Please accept my comments outlined herein on FERC's Draft Environmental Impact Statement, Bradwood Landing Project, August 2007.

Among the multitude, there are at least three critically important issues that must yet be fully evaluated and documented for agency and public review in the Draft EIS (DEIS):

- IND82-1
- IND82-2
- IND82-3
1. All Salmonids federally/State-listed as threatened or endangered, and their critical habitats, are of paramount importance to the Columbia River Basin. Northern Star's (FERC's) proposed dredging and disposal will have significant adverse environmental effects that have yet to be given high priority, field-documented and evaluated for the DEIS.
2. Northern Star's hydrodynamic model, used by FERC without qualification to conclude that dredging and maintenance of the ship turning basin will not affect river conditions, has significant discrepancies and is not reliable. Independent expert peer review is at least required.
3. Side-slope adjustment following dredging will migrate transversely away from the toe of the dredging footprint over time, eroding critical shallow water habitat for endangered salmonids along and into the Bradwood shoreline. NS recognizes this resulting erosion in their Hydrodynamic report, but FERC has yet to mention or document this serious impact for DEIS review. A deep shoreline bank protection system, e.g., rock riprap or sheet pile, would be required to protect the LNG site against worst case conditions.

Comments on the three above issues are outlined below:

1. THREATENED/ENDANGERED SPECIES/HABITAT PROTECTION

Protection of threatened/endangered salmonids and their critical habitat is of paramount importance. The DEIS should include comprehensive detailed and site-specific field and literature documentation of seasonal and long-term occurrence and uses to be affected by LNG development at Bradwood. Although 700,000 cubic yards (cyds) of dredging would occur in water deeper than the so-called 'shallow water habitat' horizon of -20 ft., benthic, rearing and migration values in even deeper waters are significant to species

Individuals

- IND82-1
- IND82-2
- IND82-3
- See our response to comment PM3-68.
- See our responses to comments IND82-3 and IND82-5.
- We have recommended in section 4.2.2.2 that NorthernStar prepare a plan to monitor the side slopes of the maneuvering area after dredging and implement mitigation measures if necessary. Should the project be approved, our recommendation would become a condition of the authorization.

propagation and recovery. All should be thoroughly and specifically documented and evaluated. For example:

- IND82-4 ☐ River flow through Clifton Channel feeds the entire Cathlamet Bay protected sensitive critical estuarine habitat area about 20+ miles downstream to Tongue Point. Dredged removal of 700,000 cyds at its upstream mouth would open Clifton Channel to diverting increased downstream flow from the main channel, which would increase current velocities and resulting long-term erosion downstream through the Channel and Cathlamet Bay. Contrary to Northern Star's assertion that this area is geophysically stable, reliable science-based study documents that this important backchannel estuarine habitat area is in long-term erosion trend, with progressive loss of shallow- and mid-water habitat, marshes, wetlands and riparian zones critical to all species (e.g., Lower Columbia River Bi-State Program, Tetra-Tech, 1996; CREST/CRDDP, 1983; Graves, et. al, 1995; Thomas 1993: none of which are referenced in FERC's NS DEIS). Loss of critical estuarine habitat is not a minor factor.
- IND82-5 ☐ A principal factor in long-term erosive loss of this critical estuarine habitat is that large annual Columbia River freshets (floods) no longer occur due to upstream flow regulation (dams). The associated historic annual sediment flood-deposition into the braided shallow water Clifton Channel/Cathlamet Bay backchannel system is lost, but natural flow-related current-driven sediment transport processes continue by gradually eroding the bed and banks. This erosion trend is moderated by whatever natural sediment bedload moving down the main River is still diverted into and through Clifton Channel/Cathlamet Bay. The proposed LNG deepened ship basin will create a classic 'sediment-trap' for deposition (entrapment) of natural River bedload sediment transport now moving downstream through the area into Clifton Channel/Cathlamet Bay, thereby requiring its maintenance dredging and removal from the ship basin. Interception and removal of this important sediment source at the head of Clifton Channel would further starve the remaining downstream system of its natural bedload sediment source, and aggravate erosion trends in Clifton Channel/Cathlamet Bay. This would not be a minor impact.
- IND82-6 ☐ Any change in flow through Clifton Channel and Cathlamet Bay will also impact critically important salinity intrusion patterns in the lower estuary habitat, which will affect threatened/endangered salmonids. This effect should be evaluated and documented for the DEIS.
- IND82-7 ☐ Considering there are only two sides to the Columbia River, then the Oregon side immediately along Bradwood shoreline must provide the rearing and migration route for half (50+%) of the juvenile threatened/endangered salmonids in the Columbia Basin. Even more than half, since the important Willamette River stocks also migrate along the Oregon shore. It is of paramount importance for the DEIS to fully describe, with specific and detailed data from field and literature studies, the seasonal and long-term use of this specific critical habitat pathway by

Individuals

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- IND82-4 The amount of material to be dredged from the maneuvering basin for the Bradwood Landing Project represents less than 1 percent of the total material dredged for the navigation channel from the mouth of the Columbia River to Portland. Therefore, we do not believe that impacts further downstream from about Clifton Channel would be distinguishable.
- IND82-5 As described in section 4.2.2.2, significant changes to the overall bed conditions in the Clifton Channel are not anticipated as a result of the proposed project. However, as discussed in section 4.5.2.1, additional analysis of potential impacts on salmonids from alterations to sediment transport and deposition (including alterations to Clifton Channel) will be included in the revised BA and EFH Assessment.
- IND82-6 Potential impacts on salinity levels due to the LNG ship berth and maneuvering area are discussed in the response to comment IND100-2.
- The EIS is a summary document and based on CEQ guidelines presents a full and fair discussion of significant environmental impacts. Because alteration of salinity levels is not expected to be significant it is not discussed further in the EIS.
- IND82-7 Additional information has been provided in section 4.6 describing juvenile salmonids that rear in the vicinity of the LNG terminal site. Potential impacts on aquatic resources (including salmonids) due to dredging, alteration of shallow water habitat, and shoreline modification are included in section 4.5.2.1. Further discussion of salmonid occurrence within the project area as well as potential impacts from construction and operation of the project will be included in the revised BA and EFH Assessment.

IND82-7 | these species, and the potential impacts upon them of Bradwood dredging and shallow water and shoreline modifications.

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2. HYDRODYNAMIC MODEL [Refer: NS "Hydrodynamic and Sediment Transport Assessment, May 24, 2006 (West, 2006)"]

IND82-8 | Northern Star proposes to remove 700,000 cyds of natural shoaled sediment by deepening the upstream entrance to Clifton Channel from the main Columbia River channel. This shoal is a classic point-bar formed upstream from the pile-dike (M38.26) and dredged material deposition island (O-38.3) placed by the Corps of Engineers at the mouth of Clifton Channel. These flow control structures are long-maintained by the Corps to help control loss of main River flow to the Clifton side-channel. Maximizing main channel flow by controlling flow loss to side-channels assists the Corps by reducing maintenance dredging of the federal navigation channel.

Northern Star conducted a mathematical model study to make findings about the potential effects on River/Channel hydraulics that would result from dredged-enlargement of upstream mouth of Clifton Channel to the main channel (NS above, West, 2006). Their findings concluded that:

- ☐ Removing part of the existing shoal by enlarging the entrance connection of Clifton Channel to the main Columbia River by dredged deepening for the ship turning basin will reduce flow into Clifton Channel by about 5%. (Note: this finding of a flow reduction by channel enlargement is contrary to expected effect when deepening a side-channel entrance from the main channel.)
- ☐ And then, that mooring a large ship there, which blocks and therefore reduces that now enlarged flow cross-section, will even further reduce flow into Clifton Channel by about another 2%.

These findings are contradictory to river hydraulic experience. First, removal of the shoaled control-entrance to Clifton Channel by dredging would be expected to lessen existing flow control and allow increased loss of main channel flow into Clifton channel. Secondly, their model results indicate that both the dredged deepening of the channel entrance and then blocking part of that enlargement with a large ship will each reduce flow into Clifton Channel; this is an apparent contradiction in model results (i.e., both enlarging and then reducing the flow section each reduces flow into Clifton Channel). There are other apparent discrepancies in their model results. For example, the model predicts that the flood-tide flow (i.e., upstream-directed flow as each tide rises) in Clifton Channel will increase by more than 20% in the face of increased upriver runoff flow from 125,000 cubic feet per second (cfs) to 210,000 cfs. That isn't possible; Clifton Channel flood-tide strength should decrease with increased upriver runoff. As the Columbia River runoff flow increases into the estuary (e.g., upriver flooding/freshets), the tidal component at any given point in the River decreases. There is much available River and

Individuals

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IND82-8 | See our responses to comments IND82-3 and IND82-5.

IND82-8

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even other model data to verify that, but instead the Northern Star model has contradictory results.

Neither the Hydrodynamic Report, nor FERC in using its results, make any mention of these apparent significant contradictions, nor of any verification with real River behavior. What the Report did say, however, is that "...there is some discrepancy in the simulated stages and velocities with the observed stages and velocities" (Hydrodynamic report, p. 59). Initially, the discrepancy between model and observed river velocity was more than 30% (p. 58, table 11); this is a large discrepancy which tends to invalidate a model. By test-adding more main river flow to the mathematical model than observed, velocity discrepancy was reduced to about 10%; although the substituted flow increase was not real (observed), it gave better model answers for Northern Star. Yet with these and other discrepancies, NS and FERC use model results to conclude that Clifton Channel flow will be reduced---by less than the magnitude of the initial and the remaining model discrepancies. This is not a verified reliable model for the conclusions reached by FERC, especially when used to justify your conclusion that flow changes from dredging will not adversely affect threatened/endangered salmonids or their habitat.

Specifically, the Northern Star model results are not a reliable basis on which to assure that there is no risk of adverse impacts to threatened/endangered salmonids or the critical shallow water habitat of Clifton Channel and Cathlamet Bay.

The US Army Corps of Engineers has historically controlled main river flow away from side-channels, such as Clifton Channel at hundreds of sites---on the Columbia River, the Missouri River, the Mississippi and others, to divert flow into the main channel to help maintain deeper waters for navigation. And not even once did they do that by deepening the entrance to a side-channel carrying flow away from the main channel. Studies (e.g., expert modeling, including movable bed physical models), long-term experience and common sense told them to instead close the side-channel flow off with structures or fills. That is exactly the purpose for Corps placement of the pile-dike and dredged material fill at the upstream mouth of Clifton Channel to form the point bar which controls flow loss to Clifton Channel. Yet Northern Star and FERC now propose to enlarge this partially blocked channel opening by dredged removal of part of the point bar. If dredged-deepening the upstream entrance to side-channels is the answer to diverting side-channel flow into the main channel, that is cheap and the Corps could save millions of dollars a year by instituting the Northern Star/FERC practice of simply dredging deeper entrances to the side-channels, everywhere, including on the Columbia River, ---and all of the expensive flow control structures/fills would be gone. That will not happen because deeper side-channel entrances enable flow loss from the main river, which results in increased maintenance dredging and public costs to maintain the federal navigation channel. The DEIS should correlate its findings with river experience and expertise.

A independent expert professional and public review is required of Northern Star's entire Hydrodynamic and Sediment Transport Assessment model and its findings. This should be completed before advancing any considerations or decisions to accept or apply its results as any basis to permit the proposed dredging and risk its impacts to the critical

Individuals

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IND82-8 | shallow water habitat of Clifton Channel and Cathlamet Bay. The DEIS should document and present the results in the DEIS for agency and public review and comment.
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3. SIDE-SLOPE ADJUSTMENT

IND82-9 | In hearings which I attended and as presented by FERC in the DEIS document, Northern Star plans to dredge a 700,000± cubic yards ship basin in water deeper than 20 ft. Their premise is that offshore water deeper than -20 ft. is not used by ESA-listed juvenile salmonids, and therefore is not a significant habitat concern for dredging (that conclusion is not correct; even deeper habitat is important). It was stated that the average dredging cut will be about 8 to 10 ft., with a cut side-slope of 3 ft. Horizontal to 1 ft. Vertical (1V:3H). It is not identified that this average cut of 10± ft. means that the dredge cut varies from zero-ft. where it connects to the -43 ft. Federal channel, to about 20± ft. along its interior sides. A 15 ft. to 20 ft. cut is a very large cut. FERC does not provide site bathymetric (depth) data describing the dredge cut or adjacent fringe area, but should.

This steep 1V:3H cut will not stand. Instead, the river natural hydrodynamic and gravity forces will cause the disturbed bedform to seek its equilibrium by transverse side-slope adjustment migrating into the dredging footprint over time. Natural riverbed slopes in this area appear to vary from, say, a steeper 1V:20H to flatter than 1V:50H [from latest Corps of Engineers hydrographic cross-line survey CL-36-361 (3/21/07)]. The dredge-disturbed bedform side-slope adjustment would spread the 1V:3H cut-slope toward shore beyond the initial and maintained dredge footprint and into adjacent critical shallow water habitat depths less than 20 ft.

Such side-slope adjustment following dredging in an uncohesive riverbed is normal and expected. For example, in its federal channel deepening project, the Corps of Engineers estimates that such side-slope adjustment of even the relatively minor 3 ft. cut will contribute to long-term maintenance dredging volumes greater than the initial project dredging, with the transverse slope adjustment spreading laterally beyond the channel boundaries. Their past experience is that such side-slope adjustment from even minor dredge cuts can extend more than 1000 ft beyond the dredging footprint (USACE Columbia River Channel Improvement Study, FEIS, August 1999, pg. 6-2). A 20 ft. dredge cut at Bradwood is far more significant and will result in a more aggressive lateral side-slope adjustment. Northern Star properly acknowledges that such transverse side-slope adjustment will occur, and that its effects “...are likely to extend all the way to shore and eventually lead to increased shoreline erosion” (Northern Star’s Hydrodynamic and Sediment Transport Assessment report, 5/24/06, pg. 22). However, neither FERC nor NS accounts at all for this in its dredging footprint (i.e., 1V:3H side-slope) or volumes, shoreline and shallow water erosion, or its potential impacts on critical habitat. This is a critical omission that should be corrected for the DEIS. Nor is this important effect on actual basin enlargement and resulting hydrodynamics apparently reflected in the as-built model bathymetry---which could invalidate model results.

Basic factors at Bradwood:

Individuals

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IND82-9 | See our response to comment IND82-2.

IND82-9
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- ☐ Side-slope adjustment by transverse migration back into the new (and maintained) dredged cut will occur over time. This process is normal, expected and already well-recognized by both Northern Star and the US Army Corps of Engineers.
- ☐ After dredged removal, side-slope adjustment will continue until the river bedform again reaches its natural slope in equilibrium with River hydrodynamic forces at that site.
- ☐ The side-slope adjustment period may go on for 5 to 10 years or more.
- ☐ Natural bedform slopes in the Northern Star dredging area are in the order of 1V:20 H to flatter than 1V:50 H.
- ☐ Dredge-cut side slope adjustment will eventually erode to the shoreline in sandy areas, resulting in erosion of shallower habitat areas and sandy shoreline.
- ☐ Past Corps experience documents side slope migration resulting from even minor channel dredging extending more than 1000 ft. away from the dredged cut.
- ☐ Northern Star proposes to dredge to -43 ft. depth within about 300 ft. from the sand-fill Bradwood beach and shoreline.
- ☐ Based on the Corps cross-line survey(s), Northern Star dredged cut will be as much as 15 to 20 ft. deep along the Bradwood shoreline.
- ☐ FERC and Northern Star do not provide bathymetric data for either the dredging area or shoreline fringe upon which to identify or judge potential side-slope adjustment into shallow water and shoreline habitats.
- ☐ FERC and Northern Star identify a 1V:3H construction side-slope, but do not identify any post-dredging natural side-slope adjustment of this steep construction slope to the shallower shoreline.

The dredged cut side-slope of 1V:3H assumed by Northern Star and FERC cannot stand over time. Although Northern Star acknowledges this, both FERC and Northern Star omit it from their project plans. The cut side-slope will migrate transversely back into the dredged cut over time until the resulting eroding bedform in the fringe area reaches its natural side-slope equilibrium with river hydrodynamic forces at that site.

For example, a 1V:3H side-slope for a maintained 18 ft. dredged-cut to -43 ft. would extend 54 ft. ($3 \times 18 = 54$) beyond the (toe of the) dredging footprint to daylight at a local sediment surface of -25 ft. ($43 \text{ less } 18 = 25$). While eventual side-slope adjustment erosion back to the natural river bedform for this area of, say, 1V:20H, would extend 860 ft. ($20 \times 43 = 860$) away from the dredging foot-print or more than 500 ft. into the existing Bradwood riparian shoreline, eroding shallow water habitat and shoreline in-between. Lesser side-slope adjustment to a steep 1V:10H slope would extend 430 ft. ($10 \times 43 = 430$) beyond the dredged toe, or more than 100 ft. into the Bradwood shoreline 300 ft. away. That Bradwood shoreline and the LNG site is historic erodable river sediment infill.

Except for the agreed engineering certainty that transverse side-slope adjustment will occur upon dredging, there is no accepted methodology or modeling to accurately predict the eventual equilibrium side-slope resulting from dredging the 15 ft. to 20 ft. cut within $300 \pm$ ft. of the Bradwood shoreline in the variable setting of tides, range of river flows, seasonal bedload movement, local hydrodynamic factors, and nearshore wave and wake

Individuals

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IND82-9 cont'd	<p>effects in the lower Columbia River.. But it will be flatter than FERC's 1V:3H, and could approach the existing local steeper natural side-slope of about 1V:20H over time.</p> <p>Erosion of the riverbed fringe area to the shoreline by transverse side-slope adjustment beyond the dredging footprint is serious for at least five important points:</p>
IND82-10	1. Although the dredging takes place in water deeper than -20 ft. depth, the resulting transverse side-slope adjustment will erode and remove significant area of existing critical shallow water habitat area less than 20 ft. deep along the Bradwood shoreline fringe.
IND82-11	2. With side-slope adjustment (bedform erosion) from dredging, Bradwood shoreline will require erosion protection, e.g., rock-riprap and/or sheet piling, to protect the upland LNG site, including from worst case scenarios. This hard-boundary fix will in turn amplify hydrodynamic erosion effects on shallow water habitat nearshore (e.g., turbulent reflection of wave/wake energy), as well as remove the ecologically important (e.g., for juvenile salmonids) existing natural riparian shoreline. For long-term shoreline protection and LNG site safety, bank protection installation may need to reach as deep as the proposed dredged bottom at -43 ft.
IND82-12	<p>3. Transverse side-slope adjustment into the dredged prism will further enlarge the flow section at this site, allowing increased main River flow into Clifton Channel. This would increase river velocities and erosion potential (sediment transport) there and downstream through existing shallow water critical habitat areas already experiencing erosion losses.</p> <p>4. Enlargement of the flow section resulting from side-slope adjustment should be considered in the as-built bathymetric parameters for Northern Star's hydrodynamic model assessment. It was not. Omission tends to invalidate model results used by FERC and Northern Star to justify their finding that main River flow into Clifton Channel, and therefore any associated erosion potential there and downstream, will actually decrease by dredged enlargement of the connection between the Channel and the main River flow.</p> <p>5. Any change in main river flow into Clifton Channel will affect flow downstream through the critical shallow water estuarine habitat of Cathlamet Bay. Changes in river flow through this important backchannel reach would alter existing estuarine salinity intrusion patterns and related ecology in this protected sensitive habitat area.</p> <p>FERC should fully identify, evaluate, and document for public review and comment in the Draft EIS (DEIS), all field and technical findings for the recognized side-slope adjustment, which Northern Star states will occur, as a result of Bradwood dredging. It is an important issue that would have significant adverse environmental impacts on riparian shoreline and critical shallow water habitat for endangered salmonids, as well as for site safety.</p> <p>GENERAL COMMENT</p>

Individuals

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IND82-10	See our response to comment IND82-2.
IND82-11	See our response to comment IND82-2.
IND82-12	See our responses to comments IND82-2 and IND82-4.

IND82-13 | Additionally, I am concerned about both the tone and lack of quantitative information in the DEIS which seem to indicate that it is not yet ready for agency and public review and comment. So many critically important issues are left with vague or incomplete documentation and/or a "...we believe" (we being FERC) statement. Slanted words such as 'only' are used to diminish the reviewer's perception of magnitudes that instead should be simply and accurately specified in the DEIS; this implies attempting to lead a reviewer to FERC's favorable view, which seems inappropriate in an objective federal EIS. And in places, lack of understanding, data and/or expertise on significant environmental issues/impacts are substituted by FERC 'recommendations' (but not requirement) to Northern Star for some future study, planning and/or design. When and if that further important work is eventually documented, it should be included in the DEIS for agency/public review and comment. For one example, even the critically important Biological Assessment and specific mitigation plans for impacts to endangered salmonids and habitat haven't been completed nor yet made available for DEIS review. That is absolutely fundamental to project consideration at the DEIS stage. It seems as though FERC is offering a vague and incomplete DEIS with the expectation that agency and public review will limit its final EIS. That should not be the case. I urge you to modify the DEIS approach to first be expertly and technically complete, and then be objectively issued for agency/public review and comment. It is not a simple benchmark to be checked off as a completion.

Thank you for the opportunity to review and comment at this stage of a DEIS for your Bradwood LNG project.

Respectfully,

John Vlastelicia
32710 Callahan Rd.
Scappoose, OR 97056.

Individuals

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IND82-13 See our responses to comments PM1-2, PM3-46, PM6-94, and FA2-24.

To: Kimberky D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St., N.E., Room 1A
Washington< D.C. 20426

From: Carolyn Eady
793380 Hwy. 202
Seaside, OR 97138
(503) 755-2617

Date: 12/24/2007

Re: Bradwood Landing: Draft EIS (CP06-365-000 et al.)

In late October, I sent a 13 page document (plus attachments) outlining my concerns with the Proposed Bradwood LNG facility. (Memo to FERC from Carolyn Eady, October 22, 2007) Since then, two issues have arisen that deserve further comment.

1. Extreme Weather

On pages 10 and 11 of my earlier memo, I described my concerns related to the impact that extreme weather would have on the proposed facility. I did not know then that the worse was soon to arrive. On December 2nd and 3rd, the North Coast area of Oregon had the most extreme weather in its recorded history – a hurricane with winds well over 100 miles per hour and heavy rains extending for many hours.

The area is still trying to recover. Hundreds of homes and business were damaged or destroyed; millions of board feet were blown down or snapped off in the western part of the county; all communications, including cell phones, were out for days; and power was out for 3- 5 days or longer. (Hospitals were dependent on ham radio operators for any communication with the outside world.) Utility crews came in from surrounding states to help rebuild the transmission, fiber optic cable and power systems. Many highways were closed for days, including all roads leading to and from Portland due to sinking, flooding and/or downed trees. The Coast Guard closed the entrance to the Columbia River. Two of the three weather buoys off the coast were destroyed.

Individuals

About a week after the storm, the heavy rainfall was blamed for a major mudslide that inundated U.S. Hwy. 30 west of Clatskanie. (See picture on page 4.) It took several days before a house and many feet of logs and mud could be cleared and the highway opened for traffic. During that time, Wauna Mill employees and others who lived on the other side of the slide, were forced to take the Westport ferry to get around it.

IND83-1 Given the critical nature of the proposed Bradwood LNG facility and its dependence on sophisticated systems and trained personnel for safe operation, I urge you to get a response from the applicant that answers the following:

- ☐ Describe in detail how this facility would have been able to function safely in the conditions I described.
- ☐ Would they have an independent power source that could maintain all critical functions for 5-7 days, with no supplies or contact from the outside?
- ☐ Would they have adequate provisions to operate for a week with the staff on duty when the storm hit?
- ☐ What assurance do we have that their 36 inch high pressure line could withstand a slide similar to the one that occurred on Hwy. 30?

Whether it is due to global warming or just a change in the weather pattern, severe storms seem to be occurring more frequently. It is critical that the applicant make provisions for these types of events.

2. Pipeline

IND83-2 This past summer, a separate FERC application was filed for the Palomar pipeline, a proposed pipeline that is suppose to connect with Bradwood's. In the November 27, 2007 issue of the *Daily Astorian*, Joe Desmond, Northern Star vice president of external affairs, said the Bradwood project doesn't need the Palomar gas line because it has its own pipeline – that hooks into the Williams Northwest system. However, Michele Swaner, spokeswoman for the Williams system made the following statement:

Her company doesn't have room for all the gas Northern Star plans to import to its Bradwood facility. Physically, we're capable of receiving it, but it would take the place of all the other gas supplies flowing in that system both north and south. We have long-term agreements in

Individuals

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IND83-1 NorthernStar is in the process of developing an ERP which contains contingencies for weather-related events.

IND83-2 See our response to comment PM1-23 and our discussion on purpose and need in section 1.1 regarding the market for the Bradwood Landing natural gas. As discussed in section 1.0, the Williams Northwest pipeline would have capacity for the natural gas from the Bradwood landing pipeline project. As described in section 3.1.2.2, we consider the Palomar Project to be a separate undertaking from the Bradwood Landing Project. Neither project is inter-dependent on the other. If Palomar is not authorized or built, the Bradwood Landing Project could still go forward, and vice versa.

IND83-2
cont'd

place....We're unlikely to disrupt the relationship we already have with our customers right now. She added that even with the projected declines in supply from Canada and the Rocky Mountains, there's not enough demand for gas in Oregon and Washington to absorb the full volume from Bradwood. But she said there is demand for that volume in California.

This report clearly reveals two facts: 1) This facility is *not* being built to serve Oregon and Washington, thus seriously questioning FERC's assessment for the need for such a facility in Oregon. If California has a need, then the facility should be located in California. 2) If the Palomar pipeline is a key to the successful operation of Bradwood, then its consideration by FERC should be part of the Bradwood application.

Thank you for your consideration of these additional issues.

Sincerely,

Carolyn Eady

CC: Governor Kulongoski
Attachment

Individuals

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December 20, 2007

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE, Room 1A
Washington, DC 20426

Docket No. CP06-365-000

Comments on Bradwood DEIS

Carol Carver, 541 West Birnie Slough Rd, Cathlamet, WA 98612

IND84-1 | In general I am gravely concerned that many issues are simply “recommended” or are postponed for accomplishment until well after the permitting or construction, for example:

- In section 4.11.6, Emergency Response: The Emergency Response Plan should be completed and approved PRIOR to issuing the permit, rather than as written in the DEIS, prior to initial site preparation. FERC is considering approving a permit for a large LNG facility that will be located within 1/2 mile of people’s residences, not to mention the moving Zone 1 that will follow the ship 38 miles up the river. The ERP should be written and approved, including evacuation plans, **before** permitting takes place. FERC’s use of the word “recommendation” should be replaced with “shall”. In 5.1.11, last paragraph.

IND84-2 | □ In section 4.11.4 thermal exclusion zone is described using the on-land tanks as the center from which distances are calculated. FERC should also require that similar calculations occur, using the docked ship as the center. Until the ship is off-loaded and after it is docked, it is in effect a storage tank that is located much closer to the residences on Puget Island than are the on-land storage tanks. Homes on Puget Island are one-half mile from the Bradwood’s shore.

Individuals

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IND84-1 | If the project were authorized, the ERP would need to be approved by the FERC before NorthernStar would be given approval to begin construction. See also our response to comment PM1-1.

IND84-2 | See our response to comment PM1-3.

- IND84-3 □ 4.3.2.3, page4-75, Northern Star references the City of Portland's Stormwater Management Manual for calculating stormwater runoff volumes. We have at least twice the amount of rain as Portland. FERC should check to be sure rainfall in the neighborhood of 60-90 inches yearly was used in this calculation, not Portland's rainfall.
- IND84-4 □ 4.8.2.4 Property Values: concludes that the presence of an LNG facility does not have significant positive or negative impact on property values. Why is the research done for Harpswell Maine by Prof George Tulley of Univ. of Chicago and RCF Economic and Financial Consulting not quoted, in which he finds a "dramatic (negative) impact on property values in proximity to LNG terminals"?
- IND84-5 □ 4.1.3.3 Geologic Hazards: section delineates that soil will liquefy in the event of a large seismic event to a depth of 85 feet. However there is no recommendation in relation to the soil level actually dropping after such an event. Professor Atwater of the University of Washington has documented a 3-foot drop in soil level after the last major seismic event in the vicinity of Bradwood, in the 1700's, which he feels the area is overdue to experience once again. What would be the consequence of a 3 foot drop in soil level after soil liquefaction and why is this not addressed in the DEIS? Does the conclusion that soils will liquefy to 85 feet include the fill that is planned for the site?
- IND84-6 □ On page 4-31, Figure 4.2.2-1 is a mistake indicative of the generally sloppy manner in which the DEIS compares to information submitted in various other ways by Northern Star: on this page the mighty Columbia River is labeled "Willamette" River. If you going to propose changing our way of life in so many ways that it completely wearies me to consider them, at least get the name correct of the river on which this facility is proposed.

Individuals

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IND84-3 See our response to comment PM1-4.

IND84-4 See our response to comment PM1-5.

IND84-5 See our response to comment PM1-6.

IND84-6 This figure has been revised to correct the typographic error.

December 22, 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First ST NE, Room 1A
Washington, DC 20426

Re: Draft Environmental Impact Statement
Docket Nos. CP06-356-000 et al.

Dear Secretary Bose:

I am submitting this letter to express my concern over the review process involving two liquid natural gas (LNG) terminals near Astoria and the pipelines which are planned to run through our neighborhoods, farms and timber lands in Oregon.

As you are aware, three LNG projects are planned in Oregon, two on the Columbia River and one in Coos Bay on the Southern Oregon coast.

The Palomar pipeline is a joint venture of NW Natural Gas and TransCanada, which operates a large pipeline going from Canada to northern California. This pipeline would transport natural gas from the proposed Bradwood Landing LNG import terminal 20 miles east of Astoria on the Columbia River. It would be 36 inches wide and would travel about 120 miles from the terminal to Molalla, and from there another 110 miles east to Maupin (Wasco County) to connect to a large interstate TransCanada pipeline to California. The pipeline would run through the Oregon Coast Range to the community of Timber, along Timber Road to Glenwood, through the Gales Creek Valley, passing just west of Forest Grove, and through or near Gaston, Yamhill, Carlton, and Woodburn before ending in Molalla.

The Bradwood Landing LNG terminal and processing plant is a project of NorthernStar Natural Gas, a Texas-based company that has never built a terminal or pipeline. As you know, FERC has already reviewed their draft environmental impact statement (DEIS) and issued the opinion that the project would have *"limited significant environmental impacts"*, posing *"no unacceptable environmental problems."*

Individuals

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As you or your consultants are obviously not aware, or chose to ignore, the Bradwood Landing LNG terminal would create significant environmental impacts on Oregon and the Columbia River as outlined in the following bullets:

- IND85-1 * The Columbia River bar is one of the most dangerous in the country and this river is used extensively by other commercial river traffic, commercial fishermen, recreational boaters and scenic tour businesses. Adding supertankers filled with LNG, which carry 30 million gallons of LNG poses a considerable risk to existing river traffic, public safety, and the environment. Accidental groundings, capsizing, and wrecks requiring rescue and clean up missions are common place events on this river bar annually. Adding these LNG supertankers to the volume of river traffic already using this tributary would add incalculable risks to public safety and the environment.
- IND85-2 * The dredging required to construct this LNG terminal would drastically increase pollution and sedimentation within the river causing un-repairable damage to already threatened and decreased salmon and steelhead runs as well as significantly disrupting feeding and nesting habitat for migratory bird populations. Planned dredging of 700,000 cubic yards and the 'blender action' of these huge supertanker props as they use this stretch of river would have a devastating effect on fish populations and other aquatic life in this critical river channel.
- IND85-3
- IND85-4 * Other threats created by this LNG terminal include potential leaks of LNG and other pollutants into the river and/or surroundings from the supertankers at the terminal, the potential of explosions and fire at tanker docking stations or in/or around the terminal which would potentially cause catastrophic pollution in the river around Bradwood Landing all the way down river to the mouth of the Columbia.
- None of the above cited risks are improbable and any one of them would be devastating to the Columbia River eco system, to the population surrounding this terminal and to the Oregon economy.
- IND85-5 A shorter, 35-mile pipeline is included in this project; would go under the Columbia River to Kelso, Washington where it would connect to the Williams pipeline that supplies Washington and Oregon. Many of the above cited concerns for the Bradwood Landing terminal would also apply to this pipeline which is proposed to cross the Columbia River system.

The only reason to build the western half of the Palomar pipeline is to

Individuals

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- IND85-1 See our response to comment PM6-48.
- IND85-2 Based on the results of testing conducted on the sediments to be dredged, dredging would not release contaminants into the river. Dredging would have localized and short-term turbidity and sedimentation impacts.
- IND85-3 Propellers of the LNG carriers would not have a devastating effect on fish in the turning basin. Sections 4.5 and 4.6 contain detailed discussions of potential impacts on fish and wildlife associated with the removal of 700,000 cubic yards of sediment for the maneuvering area and ship berth. As discussed in section 2.1.5, NorthernStar's revised Compensatory Mitigation Plan will be included in the FERC's revised BA and EFH Assessment. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.
- IND85-4 See section 4.3.2.2 for a discussion of LNG spills and resulting impacts on water quality.
- IND85-5 As explained in section 3, the Bradwood Landing pipeline would be shorter than the pipelines proposed by either Palomar or Oregon LNG. The environmental impacts associated with the Bradwood Landing pipeline are addressed in the EIS.

K-1003

- IND85-6 connect the Bradwood terminal to the TransCanada pipeline so that gas can go to California. As noted above, Bradwood Landing already has plans for a pipeline through Kelso to supply the Northwest, so the Palomar pipeline is not needed for that purpose. Northwest Natural Gas has indicated that it would buy less than 1/10th of the output of the Bradwood terminal, and has stated that it could not support the Palomar pipeline by itself without other customers, that is, California energy companies.
- IND85-7 As you are also aware, a second terminal and pipeline have been proposed by Oregon LNG (owned by Leucadia Corp. based in New York), and is in competition with the NorthernStar terminal. Oregon LNG was formerly the Skipanon Natural Gas Facility, owned by Calpine, which went bankrupt and sold the project to Oregon LNG in Jan. 2007. Oregon LNG is operating on a 'shoe string' budget and has totally failed to comply with notification requirements to property owners along the pipeline, as well as, demonstrate it's ability to truthfully represent safety and environmental claims about this project to the communities adversely affected by these projects. They are resistant to providing any type of performance bond or other safety or environmental guarantees to property owners or governmental agencies through which their pipeline passes, and have taken the position that the public should simply 'trust them'. This is a totally irresponsible position to present to the community in light of the history of insolvency represented by the principals of Oregon LNG, which were also involved with Calpine, prior to its demise. To allow Oregon LNG to embark upon a project of this scope, with its history, is totally selling out Oregon interests to the interests of a private corporation involved in a very high-risk energy speculation scheme.
- Oregon LNG's terminal and processing plant would be in Warrenton, Oregon at the mouth of the Columbia River. Again, many of the public safety, marine safety and environmental concerns stated above with the Palomar project, directly apply to this project and should not be minimized by a Federal agency in the interest of needlessly "streamlining" an application or review process for a private, for profit group of speculators.
- The pipeline route would closely parallel the Palomar route through the Coast Range, the communities of Glenwood, Gales Creek Valley, Forest Grove, Gaston, Yamhill, Carlton, and continue all the way to the transfer station in Molalla. All along this pipeline path, the geology has been determined to be very unstable and at high risk for earthquake, landslides and flooding. In a recent article in the Oregonian

Individuals

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- IND85-6 See our response to IND55-5. The Bradwood Landing Project is intended to serve markets in the Pacific Northwest, not California. The Palomar pipeline is a separate project targeted to supply gas to the Portland metropolitan area and the Willamette Valley.
- IND85-7 The Palomar and Oregon LNG projects are briefly discussed in section 3. However, the FERC intends to conduct separate environmental reviews of those other projects.

K-1004

IND85-7
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newspaper this December, following heavy rains, flooding and landslides in northwestern Oregon, Dan Postrel, a spokesman for the Oregon Department of Forestry stated, "The Coast Range is inherently unstable and has a history of having the land slide away; it's happened for eons." This is the exact area where both pipeline projects are planned to cross through.

In addition, this pipeline is currently planned to cross hundreds of streams and rivers which serve as migratory and spawning habitats for salmon, steelhead and trout species as well as species of endangered plants and insects.

The two pipelines would be only 1-2 miles apart for some of the route but are often in much closer proximity to each other and occasionally cross paths over the 120 miles they travel, thus creating and significantly compounding both risks to public safety, risks to the environment and livability of these areas along the route. Unfortunately, once easements are granted across private property and/or once private property has been seized under the authority of eminent domain for these projects, additional pipelines can be 'piggy backed' onto these existing rights of way; thus compounding the violation of the rights of private property owners, the risks to public safety and potential for environmental damage. One of our neighbors personally witnessed this in New Jersey, where one pipeline was expanded to five pipelines over the same route within a few years, with ever-wider "easements" taken from the landowners.

The FERC Review Process

FERC conducted a public meeting in Forest Grove on Sept. 19, 2007 with Oregon LNG to inform the public of the project and to take public comments. At that meeting many citizens eloquently expressed their concerns and fears about the project and the damage it would do to their land, their livelihoods and their communities, as well as, expressing their frustration with the lack of information or notification about the hearings from either Oregon LNG or FERC. However, I have not been able to find these public comments posted to FERC's website, as promised, in the above referenced meeting. In addition, we have not been provided with adequate maps to comment on the specific route the pipeline will take, or the locations of pumping stations along the route. After the scoping hearings and an extremely short comment period, FERC then took a few months to prepare the DEIS during

Individuals

K-1005

IND85-7
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which time details of each project can be revised without the opportunity of the public to offer comment on the revisions.

It would appear that FERC is approaching this 'review process' more as a *partner* of the private LNG corporations rather than as an agency of the Federal Government, funded by Federal tax dollars, paid by citizens whose interest or mandate is to insure public interests and safety are satisfied. This is not how our Founding Fathers envisioned Democracy working. Public trust in our State and Federal governmental agencies is earned by open and honest processes being employed by our government. America can't stand another government agency placing the interests of mega corporations over the interests and concerns of the public, such as we witnessed with the recent sham hearing of the FCC. FERC officials would do well to learn from the mistakes made by the arrogant and corrupt Chairman of the FCC and not follow in his footsteps with the LNG project review processes, and further erode the credibility of the Federal Government with its citizens.

IND85-8

As stated above, FERC is doing no overall assessment of the need for imported LNG, followed by an evaluation of the total number of terminals and pipelines that might be necessary, or best sites available or best practices to most efficiently provide the service or product, if needed. FERC has allowed the 'cart to get well ahead of the horse' in this application and review process and it is, in my view, criminal to allow tax dollars to be wasted by FERC on a review process that may ultimately be determined to be unnecessary based on future energy needs for this region.

The U.S. currently has 5 LNG terminals, including one in Alaska. Since 2005, proposals have been made for an additional 45 terminals, including 5 in Oregon. The current process of reviewing all of them, one at a time, with no overall strategic planning, means that companies are racing each other to be the first to gain approval and thus reap huge profits. FERC's definition of "need" appears to be the existence of customers willing to buy the gas, no matter where they live, after each project is completed without any regard to the regional needs, financial, environmental or societal impacts to individual property owners and local communities, in the path of their rush to maximize corporate profits.

Were it not for the numerous adverse impacts on the individual property owners near the terminals and pipeline, the associated public safety issues surrounding such facilities and the devastating

Individuals

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IND85-8 See our responses to comments PM2-32, PM4-1, FA4-1, and IND33-52.

IND85-8
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degradation of the environment and livability of the State, as a result of each of these projects, this process would have allowed these issues to have been glossed over; thereby allowing the paradigm of market forces, and 'possible' future needs, seem like a rational strategy. However, common sense would dictate, comprehensive and objective analysis of future energy needs be conducted well in advance of the review process for construction of any one of these projects. It defies logic why US Government tax dollars are being wasted to separately review three different LNG projects in Oregon in advance of any needs analysis being conducted on future needs for the Northwest.

FERC should be required to stop the three current project review processes until the need for even one LNG terminal and pipeline is established.

Each of the two proposed import terminals and pipelines sited in NW Oregon would have the capacity of transporting 1.3 bcf/d of gas; the construction of just one of these projects would more than triple Oregon's gas supply requirements. The consumption of natural gas throughout the region has been flat over the past 15 years. Increases in demand in the Northwest are projected to be quite small and should be met by the State's initiative to increase use of renewable energy.

Oregon Senate Bill 838, passed on June 6, 2007, mandates that Oregon utilities get 25% of their energy from renewable sources by 2025. Meeting this target would take care of Oregon's future energy needs. An oversupply of natural gas would undermine Oregon's law and energy policy, and would divert resources from the urgently needed development of renewable energy sources that promote independence and lessens the effects of Global Warming. Therefore, it boggles the mind why FERC would even entertain an application for construction on even one of these projects, let alone the Oregon LNG, Palomar and the Coos Bay project all at the same time. It is obvious that these pipelines would bring in an excessive supply of natural gas that is not needed now, or in the foreseeable future.

However, if this determination that additional LNG is needed for this region in the near future, then, and only then, should our tax dollars be spent to review proposals to satisfy this need. FERC should then be required to undertake a combined and comprehensive review process (for Oregon LNG and Palomar) which would incorporate a cost-benefit and/or risk-reward analysis weighing the interests of the local communities, the state and the region prior to approving even one of these questionable projects.

Individuals

K-1007

IND85-9 Does California need this natural gas? The 2006 California Gas Report, released by a consortium of California gas and electric utilities, projects that demand in California will decrease through 2015. An LNG terminal has already been built and will become operational in January 2008 at Costa Azul, Baja Mexico that will transport gas via pipeline to California; an expansion and extension of the California pipeline has already been approved. The California Lieutenant Governor has stated that this will provide all of the State's natural gas needs for the foreseeable future, and furthermore has said that the plan to bring LNG to California through the Oregon "back door" undermines California's priorities and energy policy, including its aggressive programs to promote conservation and renewable energy resources.

IND85-10 FERC is required to issue a "Certificate of Public Necessity" prior to approving projects such as these and thus far there has been no definitive proof of public necessity established, other than claims offered by the private corporations, who stand to benefit by sacrificing the livelihood of thousands of small farmers, owners of timber land and fishermen in Oregon.

Impact on Landowners in the Pipeline Path

IND85-11 While Federal law provides that private property can be taken for LNG pipelines by eminent domain, against the wishes of landowners, if a mutual agreement cannot be reached between the pipeline company and the landowner, a judge will decide what compensation the landowner will receive. The compensation matrix is not based on the full value of the land—it is not for purchase of the land but only for an easement, which typically is worth about 10% of the land value (and the landowner continues to pay the property tax). In similar cases in southern Oregon, landowners received "pennies on the dollar" and the individual property owner and community is left with the additional indignity of paying to clean up the environmental mess left by the pipeline company which chose to disregard contractual agreements to mitigate inconvenience, use restrictions and environmental damage to property and streams and wetlands along the pipeline path.

This does not take into consideration that a pipeline corridor may alter or restrict use of the entire property, cut it in half, and/or in many cases make it impossible to continue previous activities such as farming and timber management. Furthermore, with a pipeline in place or even planned, property values will plummet and land will more than

Individuals

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IND85-9 See our response to comment PM1-23.

IND85-10 Under section 3 of the NGA, a public necessity determination is not required for an LNG import terminal and no natural gas ratepayers are at risk for higher rates or stranded investments resulting from construction of the Bradwood Landing LNG terminal. The Commission's Order for this project will present its findings of public convenience and necessity for the pipeline.

IND85-11 See response to comment PM1-15. The project would not result in the loss of livelihood for anyone along the pipeline route. After the pipeline is installed, it would be restored to its previous condition and use. However, trees could not be within 15 feet of the centerline and no improvements could be built over the permanent right-of-way.

K-1008

IND85-11 | likely become un-saleable at current market values. Some landowners have been told they could not even get insurance to their farms or property following approval of the pipeline project. The result for many individuals in the path of these projects will be the loss of their livelihood and life savings. It strikes us as an extraordinary abuse of power that two competing, privately owned, corporations can use the power of the Federal Government to seize our land against our will for the purpose of profit, not for the greater good of the community. Before eminent domain can be used, FERC must issue a "Certificate of Public Necessity." We see no such necessity for building these pipelines. They amount to use of eminent domain for speculation, private gain and greed.

IND85-12 | The pipelines would take a permanent 60-foot-wide easement that would be logged, cleared and maintained by the company, with access rights at any time. During construction they would clear a temporary easement of about 120 feet (the width of the sections equate to that of 4 a lane highway with a generous center median). No trees and many perennial crops will be allowed to be replanted within this corridor, but invasive weeds will proliferate and many endangered native plants will be sacrificed along the way. In other places the easements where vegetation are sprayed with herbicides to control brush, many organic farm operation certifications will be revoked, and the eco-friendly and local fresh food market would be destroyed in the communities in the path of the pipeline. This is just one example of the consequences of the pipeline to the citizens of Oregon. If you include damage to timber, fisheries and farming, you see that the pipeline could have a huge economic impact to the citizens, living in the small towns and rural areas of Oregon, which lie in the 230 mile swath that the pipeline travels in Western Oregon.

IND85-13 | Both pipelines will be 36 inches in diameter. In the case of the Oregon LNG pipeline, it is planned to be just 3-5 feet underground. Pipelines are known to spontaneously rupture and explode with disastrous consequences. A few years ago, two boys in Washington State were killed by an exploding gas pipeline, and a pipeline exploded and started brush fires in Port Arthur, Texas this October. The natural gas in a pipeline is under very high pressure (Oregon LNG representatives state 1400 psi will be the operating pressure), so a rupture would cause an extremely large and devastating explosion and fireball, with obvious results if such an event occurred in a forested area in the summer. Just a reminder to FERC officials who do not live in Oregon, the Tillamook Burn Fire started in Gales Creek by a spark from a logging operation. This fire devastated tens of thousands of

Individuals

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IND85-12 The Bradwood Landing pipeline would have a permanent right-of-way 50-foot-wide. Sections 4.4.2 and 4.7.3 address permanent impacts on upland vegetation and land-use, respectively.

IND85-13 Pipeline safety is addressed in section 4.11.9. See our response to comment IND60-6.

IND85-13 | acres of prime old growth forest land in Northwest Oregon. This is the
cont'd | exact area where both of these LNG pipelines are targeted to pass
through.

According to a September article in the "Hillsboro Argus," there have been 866 natural gas pipeline accidents in the U.S. since 2000—about 1 every 3 days. As previously stated, our State Forestry Dept. and remote rural communities do not have adequate fire and emergency services to cope with this level of disaster, however, these are the communities which stand in the path of these pipeline projects.

Broader Negative Impacts of LNG Import Terminals and Pipelines

IND85-14 | The proposed pipelines would be needed specifically to transport imported LNG. Our country has a stated goal of reducing our dependence on imported energy. Imported LNG does not reduce this dependence, but rather perpetuates it. The major sources of LNG for these facilities would most likely be Indonesia, Algeria, Nigeria, Russia and Qatar; Iran has some of the world's largest reserves. These are obviously not the most stable countries from which to tie our future energy dependence, nor are they our most stable or best allies. Therefore supplies and costs of LNG would, by logical extension, be unstable, and we will continue to be at the mercy of numerous tenuous political and economic factors, just as we currently are for our supply of imported oil.

IND85-15 | Imported LNG will not reduce the cost of natural gas to Oregonians. Because of the cost of transportation, security and processing, it is more expensive than domestic natural gas. Its cost is not determined by local need, but by global supply. Right now the LNG supply is less than the demand. Europe and Asia are currently outbidding the U.S. for LNG, so that terminals that have already been built are unable to obtain a supply and are sitting idle or operating far below capacity. This means that the cost of imported LNG will be higher, if we can even get it at all, from several of the traditional sources.

IND85-16 | Although domestic natural gas is a relatively clean fuel, imported liquefied natural gas (LNG) is a different story. Extracting the LNG, transporting it from far corners of the globe, and the liquification process itself, are highly energy intensive and add approximately 25-50% to greenhouse gas emissions, producing large amounts of carbon

Individuals

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IND85-14 | The Bradwood Landing sendout pipeline would transport natural gas from vaporized LNG. While NorthernStar does not have to reveal the sources of its imported LNG, it may come from politically stable exporting places around the Pacific Basin such as Alaska and Australia. See our response to comment IND66-8.

IND85-15 | Market factors, which are affected by supply and demand, change over time. NorthernStar believes imported LNG can compete with North American natural gas, and may result in stabilization of prices, as explained in section 1.1.

IND85-16 | Section 4.10.1 has been updated to include the estimated greenhouse gas emissions resulting from the construction and operation of the project. See our response to comment PM1-22.

IND85-16 cont'd	<p>that contribute to global warming, according to many energy experts. With these factored in, LNG is as dirty as oil.</p> <p>Expansion of LNG facilities is part of a "dinosaur" policy to continue to promote the fossil fuel industry, rather than put serious effort into alternative energy sources, including conservation strategies. The latest report of the Intergovernmental Panel on Climate Change (which just won the Nobel Prize, together with Al Gore) includes the most dire warnings yet on the accelerating pace of climate change, and the UN Secretary-General has said that "we are on the verge of a catastrophe." This is not the time to increase the use of fossil fuels—it is a short-sighted and ultimately suicidal strategy.</p> <p>On 11/16/07 the federal Ninth Circuit Court of Appeals, in a suit brought by several states against the Bush administration to challenge federal fuel economy standards, ruled that greenhouse gas emissions and effects of global warming <u>must</u> be considered in setting such standards. Judge Betty Fletcher wrote that the "impact of greenhouse-gas emissions on climate change is precisely the kind of cumulative-impacts analysis" required as part of Environment Impact reviews. The Supreme Court also recently ruled that the EPA can regulate greenhouse gas emissions. Therefore, <u>FERC must now take this issue into consideration in their review of LNG projects.</u></p>
IND85-17A	<p>The LNG companies will tell you that LNG can't burn. That's true while it's still at 260 degrees below zero. But as soon as it is released into the air it warms up, mixes with oxygen in the air, LNG becomes an extremely high explosive risk. Large quantities burn so hot that the</p>
IND85-17B	<p>fires cannot be put out and just have to burn themselves out. Oregon LNG officials stated last week that there would be automatic shut off valves installed along the pipeline to reduce the risk of explosions should a leak occur. However, when pressed for details, Peter Hanson also stated these valves would be about five miles apart. Considering the pressure and volume of gas contained in a five mile stretch of 36" diameter pipe, this provides no comfort to local emergency responders and even less to local residents along the pipeline.</p>
IND85-18	<p>Tankers filled with LNG, and the processing plants on the Columbia River, pose a frightening security risk to residents of both Washington and Oregon. A typical tanker carries 30 million gallons of LNG. Richard Clarke, the National Security Advisor who tried in vain to warn of the 9/11 attacks, identified both LNG tankers and terminals as prime terrorist targets. A tanker explosion could release as much energy as 50 Hiroshima-sized atomic bombs, with a fireball at least 3 miles wide;</p>

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IND85-17A	<p>As discussed in section 4.11.1, LNG is not explosive as it is normally transported and stored. Natural gas vapors (primarily methane) can explode if contained within a confined space, such as a building or other structure, and ignited.</p>
IND85-17B	
IND85-18	<p>The Coast Guard has established a moving safety/security safety extending 500 yards around the vessel while transiting, a 200 yard security zone around the vessel while it is moored, and a 50 yard security zone around the facility when there is not a vessel moored. This should have minor impacts on shipping and recreational river use. Section 4.11.5.3 presents the hazards associated with a spill from an LNG carrier and section 4.11.8 discusses terrorism and security issues. It is possible that a release from the LNG storage tanks could be caused by an intentional act, such as a terrorist attack. Although an intentional breach scenario could result in greater thermal radiation in the immediate vicinity of the release, such scenarios are typically associated with the desire to inflict damage to major infrastructure and population and commercial centers.</p>

IND85-18
cont'd

release and ignition of 1/10th of a tanker's cargo would fatally burn people a mile away, according to a report by Sandia National Laboratories. Some of the main sources of LNG (Algeria and Indonesia) have serious terrorist issues, so one could imagine a tanker becoming a Trojan horse, loaded with time-delayed explosives. Plane crashes, accidental or deliberate, would also be a serious threat. The U.S Coast Guard released a Waterway Suitability Report calling the Bradwood Landing site "unsuitable without extensive measures to improve safety and security." These measures would have major impacts on both sides of the river, because security restrictions would interfere with shipping and recreation. Large exclusion zones would be necessary around an LNG facility, including areas where all travel or activity is prohibited, flight paths restricted and bridges closed. This would restrict commerce, travel and recreation on the Columbia River. These supertankers would, in effect, impose a rolling blockade on the Columbia River to insure cargo security is maximized.

In summary, FERC should not make siting decisions for LNG projects without first accessing the comprehensive, objective, scientific analysis available as to future energy needs, and the social, economic, and environmental impacts of these projects. All potential sources of energy must be evaluated prior to granting cart blanche approval for any energy infrastructure construction project which potentially interferes with the property rights of, the public safety of, community livability of and environmental security of citizens of this great United States of America. This will require FERC to slow down the review process and conduct an objective needs analysis for future energy requirements for the region, then to fully involve State government and local stakeholders in a collaborative decision making process, to establish a plan to satisfy priority needs which are identified. Only by working together can a truly satisfactory plan for our regional energy needs be accomplished.

Sincerely,

Charles Straughan

Cynthia Straughan
P. O. Box 34
Gales Creek, Oregon 97117

Individuals

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K-1011

Cc: Columbia River Keepers

Individuals

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December 23, 2007

To:

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First St., N.E., Room 1A
Washington, DC 20426.

From:

Mike & Jane Rees
2820 42nd Avenue West
Seattle WA 98199

Reference: FERC/EIS-0214D, **Dockets No. CP06-365-000 & CP06-366-00.**

Subject: Comments to the Federal Energy Regulatory Commission
Draft Environmental Impact Statement (DEIS) for the proposed
Bradwood, Oregon facility.

[PLEASE NOTE WE WISH TO BE ON THE ADDRESS LIST TO RECIEVE
ALL MAILINGS RELATED TO THIS SUBJECT]

Ms. Bose,

Background & interest:

Our family has a home on Pleasant Point Road, Skamokawa, Washington, immediately opposite Mile Post 33. We have yet to learn of any valid reason for permitting the transportation of Liquid Natural Gas (LNG) on the Columbia. In fact data suggests there is no requirement for this facility to supply natural gas for the Northwest. But even if there were a need for natural gas, it is clearly a dangerous operation with environmental, security and safety hazards that can be significantly reduced or mitigated by siting the facility off-shore, or on a coastal site.

We recognize the need for imported energy to the U.S. even though we regret the shortsightedness of the Federal, State and local governments in failing to mandate vigorous conservation for all forms of energy used by the population and not promoting renewable energy systems more strongly. Encouraging importation of fuel, in our opinion, leads us into a future crisis. Our energy dollars would be far

Individuals

better spent in producing electric power from renewable sources, thus eliminating the need to import LNG.

The choice of the Bradwood site is extremely poor, and evidence that the proponent, Northern Star, did not evaluate its proposal's impact on the community and the valuable natural environment. The area from Astoria to Bradwood includes one of the few unspoiled reaches of the Lower Columbia, and includes large areas of natural and protected wildlife, enabling citizens to benefit from their natural heritage. The terrain is still much as Lewis & Clark found it 200 years ago. This is a natural legacy that should not be violated unless there is absolutely no alternative. Clearly alternatives exist. The proponent should be made to show why other viable alternatives should not be considered.

It is our belief that the FERC should deny this application because of its potential damage to the citizens and environment of the Lower Columbia. We realize that the proponent has the right to request the EIS process to proceed, but feel he should consider a site that has less potential for environmental, community and human damage. Lessons learned from other large scale questionable projects (e.g. the Sea-Tac third runway, which was proposed in 1987 and is still not complete) shows that controversial proposals can be held up in the courts for years, especially when environmental issues are challenged.

Qualifications:

Mike Rees is a retired engineer from the Boeing Company (30 years); Jane Rees is a PhD nutritionist and human biologist on the faculty of the School of Public Health and Medicine at the University of Washington, Seattle (35 years).

Summary:

From our review of the DEIS we find:

1. The DEIS is inadequate as a basis to proceed to a FEIS. The data cited are inadequate and there is too much speculation as to what the proponent might implement.
2. The stipulations of specific recommended requirements are significant in quantity (over 100) and should require the proponent to respond with detailed plans for public review before proceeding to the Final EIS (FEIS).
3. The DEIS requires a Supplemental EIS (SEIS) that addresses these shortcomings before consideration of an FEIS.

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IND86-1

We believe the EIS has been prepared in compliance with NEPA regulations and that it is adequate. A supplemental EIS is not necessary. See our responses to comments PM4-20 and PM6-94.

Comments to Draft EIS dated August 2007.

- IND86-1 cont'd | We submitted scoping comments to you on October 15, 2005. We understanding the lead agency is required to address all submitted Scoping Comments, in the DEIS. This DEIS does not address many of our comments, therefore we find it inadequate. We ask that the lead agency review all the scoping comments, and address those not included in the DEIS in an SEIS.
- The following specific comments are identified by section number and page number, where possible:
- 3.1.1**
- IND86-2 | (Pg 3-2 DEIS) The "No Action" alternative includes the statement "If the Commission selects the no action or postponed action alternative, the objectives of the proposed project would not be met and Northern Star would not be able to import LNG to provide natural gas to markets in the Pacific Northwest."
- Recent studies indicate that the likelihood of natural gas from the proposed Bradwood facility being used in the Northwest is small. What is likely is that the output from Bradwood would be used by the California market, if at all. We note that the California Energy Commission 2007 Integrated Energy Policy Report, dated December 5, 2007 recommends California *"Supports displacing natural gas with renewable sources to generate electricity and alternatives such as solar for water and space heating."*
- Please update the projections of the need for gas in the Northwest and California using the latest data available, and provide an estimate of the use of the output from Bradwood for the next 30 years.
- 3.1.6.3**
- IND86-3 | (Pg 3-43 DEIS) Please evaluate the effect on the aquatic habitat of the vaporization technology discharge that requires additives of sodium carbonate, sodium nitrate and other sodium salts.
- (Pg 3-43 DEIS) Identify what are the "other sodium salts"?
- IND86-4 | (Pg 3-43 DEIS) The DEIS indicates that no water would be taken from the Columbia River for vaporizing technologies, however water

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- IND86-2 | We have updated and expanded our purpose and need discussion in section 1.1 and included information to clarify that the natural gas would not go to California.
- IND86-3 | Table 4.3.2-4 shows the constituents expected in the SCV discharge. The discharge would meet ODEQ standards and the requirements of the NPDES permit, which are designed to be protective of the aquatic environment.
- IND86-4 | Sections 4.3 and 4.5 discuss discharge of water from the SCVs and potential impacts on aquatic habitats and resources of the lower Columbia River. Our revised BA and EFH assessment will address impacts and mitigation from this proposed action on federally listed fish and the FWS and NMFS will have an opportunity to provide their analyses in their BOs. Also see our response to comment PM3-27.

IND86-4
cont'd

condensate would be discharged into the river which would be treated for pH neutralization and be at 68 deg F. (1996 USGS reports 41 deg in March and 71.4 deg in July) The amount of water that would be discharged is stated to be 160 gpm, or nearly a quarter of a million gallons per day. Where has the appropriate Fish and Wildlife agency addressed the effect of this discharge on the local aquatic habitat? How is the pH neutralization system designed to prevent accidental discharge of non-neutralized water?

(Pg 3-43 DEIS) Describe the impact on aquatic habitat of discharging water condensate at 68 deg F when the ambient water temperature of river water temperature is 41 deg F (a difference of 27 deg F). It should not be difficult to ensure the discharging water condensate be within ± 5 deg F of the ambient river water temperature. A system of monitoring the temperature should be in place.

4.1.3.3

IND86-5

(Pg 4-9 DEIS) The DEIS did not address the landslide that occurred in the area upriver from the Bradwood site. As indicated by testimony from Mr. Beck on November 6th, at the FERC meeting in Cathlamet, such a slide did occur, was reported in the local press, and caused significant damage and a loss of life. Please address this event and the likelihood of such an occurrence that could affect the Bradwood site, and access to the site for emergency services. Also please review the recent slide near Clatskanie (December 11, 2007), and whether such a similar event could occur at Bradwood, and the likelihood that an LNG facility contributes to the danger of unstable earth and slides.

4.10.2.2

IND86-6

(Pg 4-389 DEIS) The noise analysis in the DEIS is insufficient. As indicated in our scoping comments dated October 15, 2005 it is not reasonable to identify noise levels in only the Dnl metric. Dnl is misleading, it does not address the impact of short duration noise amplitudes that are significantly higher than the average levels. For example, if a large cannon were located at the Bradwood Site and fired every 15 minutes throughout the day, the effect on residents of Puget Island would be extremely annoying. However, because the Dnl metric averages the noise levels over 24 hours (with an adjustment for nighttime sensitivity between 10 pm and 7 am) the noise from the cannon would make an insignificant difference to the Dnl average value. Therefore the SEIS should also address the noise metric Time Above or TA in which the total time above certain noise levels, say 60 dBA in a 24 hour period, is reported in minutes. With a construction period of 36 months and a pile driving program of 4 months,

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IND86-5

See our response to comment PM3-39.

IND86-6

A sufficient analysis of noise impacts is provided in section 4.10.2. See our response to comment PM3-28.

IND86-6 cont'd	expressing the noise levels in Dnl is totally inadequate. Communities would need realistic noise assessments. Similarly, for the proposed project operational phase the analysis should include ship docking operations, valve operations and other short duration, high amplitude noise levels in the Time Above metric. If Northern Star were truly interested in measuring and minimizing the impact on the adjacent communities, they would include at least three noise monitors (one on the Bradwood site, one on Puget Island, Washington, and one by the nearest community to the Bradwood site in Oregon) to evaluate noise complaints that would surely occur.
IND86-7	<p>4.7 (DEIS Pg. 4-273) The DEIS states "These communities already view thousand of ships traveling up and down the Columbia River" which is true, but the number of ships of the size of typical LNG tankers or larger, observed on the Columbia River annually, is not included. Please identify this number.</p> <p>Specific Scoping Comments not addressed (areas of concern are highlighted)</p> <p>Scoping comment: Show several alternative sites that would not require the use of the Columbia River for transporting LNG. e.g. off-shore locations. Analysis of alternatives should be in sufficient detail as to make a comparative evaluation possible in each of the twelve areas identified in the NOI published on September 13, 2005 (page 4).</p>
IND86-8	<p>The DEIS (Section 3.0) does consider some alternative sites, however they are not analyzed for the 12 points identified in the NOI. The 12 points should be addressed in the SEIS (where applicable) for each alternative:</p> <p>Geology and soils, water resources, aquatic vegetation and wildlife, threatened and endangered species land use, recreation, and visual resources, cultural resources, socioeconomics, marine transportation, air quality and noise, reliability and safety, and cumulative impacts.</p> <p>Scoping Comment: Show the expected air and water pollution that would occur for the worst case scenario, over the life of the project. Include the measurement systems that would be in place to monitor the air and water pollution levels.</p>
IND86-9	The DEIS does not specify air and water pollution monitoring systems or their locations. These should be addressed before considering a permit for this project.

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IND86-7	The addition of 125 LNG carriers for the Bradwood Landing LNG terminal would represent an increase in vessel traffic of about 25 percent for large, deep-draft vessels currently transiting these waterways but only a 7 percent increase overall in total commercial traffic. See table 4.8.10-5 for the number and types of commercial ships that use the lower Columbia River.
IND86-8	The EIS summarizes the results of the alternatives analysis. We looked at factors that were appropriate for distinguishing among the sites and data that could be reasonably obtained for each site.
IND86-9	Specific air emissions monitoring requirements for the Bradwood Landing terminal emission sources will be identified in the Air Contaminant Discharge Permit to be issued by the ODEQ as required by applicable federal and state air quality regulations. Water quality monitoring would be carried out in accordance with the requirements of the NPDES permits issued by the ODEQ and WDE.

Scoping Comment: Show the effect of artificial light pollution at the proposed facility. Include an analysis of the artificial lighting on communities and residences within 5 miles. Analyze alternative lighting schemes including use of directional lighting and non-reflective surfaces (including camouflage) on paved areas, facility structures, docks, cranes, etc. to eliminate visible glare in adjacent communities, and wildlife refuges.

IND86-10 | The DEIS does not address the effects of facility lighting, light pollution and light reflection on the communities and wildlife refuges. Please address these issues, taking into account the weather possibilities at Bradwood, before considering a permit for this project.

Deleterious effects on Global Climate Change (topic not covered in DEIS)

IND86-11 | According to scientific reports it is typical for an LNG system in the US to have a 1.5 percent leakage rate (Nature April 2004). This leakage occurs primarily from valves, pumps and mechanical systems used either to convert the liquid to gas, to transport the gas along pipelines, and from spills and accidents. Further, natural gas is essentially methane, a 24 times more potent greenhouse gas than carbon dioxide. At peak output of 1.3 Bcf per day, from Bradwood Landing, would amount to approximately 20 million cf of methane gas vented to the atmosphere per day; equal to nearly 500 million cf of carbon dioxide per day (or 61 million lbs or 31 thousand tons of carbon dioxide per day). Neither the expected leakage nor its environmental impact is addressed in this DEIS. The SEIS should include the realistic maximum expected leakage rate of the total system, and the effects of that leakage on the environment including global warming (i.e. in carbon dioxide equivalents) over the life of the system.

Thank you for the opportunity to submit these comments for your consideration.

Sincerely,

Mike & Jane Rees

Individuals

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IND86-10 | Visual impacts associated with lighting at the proposed LNG terminal are discussed in section 4.7.2.7. In addition, this section has been revised to include additional information regarding NorthernStar's terminal lighting plan.

IND86-11 | See our response to comment IND85-16.

IND87-1

I am opposed to the proposed Bradwood Liquefied Natural Gas import facility in Clatsop County, Oregon. The facility proposes to dredge and fill shallow water habitats and wetlands in and adjacent to the Columbia River estuary. The Columbia River estuary is critical habitat to many species of fish, birds and wildlife. Over the past 150 years, the Columbia River estuary has lost over half of the tidal wetlands due to development along the shorelines. Thousands of acres of shallow water habitat have been destroyed through both dredging and filling of dredge spoils to create islands such as Rice Island, Lois Island and Mott Island.

The proposed Bradwood Liquefied Natural Gas import facility would further destroy valuable habitats. A very small percentage of the Columbia River estuary was designated Aquatic Natural in Clatsop County's Land and Water Use Comprehensive Plan. The Bradwood Facility is proposing to first change the zoning of Aquatic Natural to Aquatic Development and then dredge the area. This shallow water habitat is vital to migrating salmonids and sturgeon. The shallow water habitats that are being proposed for dredging have thousands of benthic invertebrates per square meter that are the base of the food web in the Columbia River estuary.

The Columbia River estuary has been modified by humans for the past 150 years. The estuary is on the verge of collapse. We cannot allow any more dredging of significant habitats.

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IND87-1

Section 4.5.2.1 has been revised to quantify direct impacts on shallow water. Potential impacts on wetlands and wildlife due to construction and operation of the LNG terminal are described in sections 4.4.1.2 and 4.5.2. See also our response to comment SA1-16.

- IND88-1** | For obvious reasons, I don't believe anyone would consider siting an LNG terminal at Carmel-by-the-Sea in California or at Martha's Vineyard in Massachusetts. And for those reason and more, it makes no sense to consider locating an LNG terminal in the Columbia River Estuary near Astoria, Oregon.
- If LNG is needed in this country, FERC could be considering sites where a terminal would blend in, where the local population wants it and where infrastructure is largely in place. It is likely that hospitable places can be found in America's so-called "rust belt," for example, where industrialized areas have been abandoned because of global shifts in manufacturing.
- The Lower Columbia River is not such a place. Here, the economy has been growing vigorously since the mid 90s. Unemployment is low. Quality of life is very high. And tourism is in full flower.
- At the same time, this is a place teeming with nature in a way that provides a window into America's past. Bald Eagles fly over our rivers and forests, where elk, deer, bear, cougar, coyote and other native animals thrive. The Columbia River is a haven for salmon, steelhead, sturgeon, sea lions and other species unique to the Estuary.
- I am sure you are aware that local people turned out in large numbers at every opportunity to fight the siting of an LNG terminal here, and to oppose construction of pipelines over unspoiled lands. Meanwhile, most of the relatively few who testified in support were from elsewhere and, like the speculators promoting the project, had little knowledge of or connection to the Lower Columbia.
- IND88-2** | At the beginning of December, this area was hit by hurricane-force storms with winds over 100 mph and heavy rain. All of the roads leading in or out of the area were blocked by fallen trees and mudslides. Power and phone service were knocked out for days. The Columbia River Bar had to be closed – a not infrequent occurrence here in the winter as it is the infamous "graveyard of the Pacific."
- IND88-3** | Meanwhile, scientists have been warning us that the region is overdue for another major earthquake, which experts predict could hit nine on the Richter scale. Does that sound like a good spot for an LNG terminal?
- Perhaps an LNG terminal could breath new life into some abandoned industrial area with existing infrastructure. Here, however, it would spoil what many have worked long and hard to build with great success.
- I sincerely hope that FERC is actively planning for the best logical sitings of LNG terminals on behalf of America, its people and its environment, and not just refereeing a helter-skelter race by speculators for pots of gold.
- Thank you for the opportunity to offer a local perspective.
- Roger Rocka, 362 Duane Street, Astoria, OR, 97103
(Former Exec. Director of the Astoria-Warrenton Area Chamber of Commerce, 1994-2005.)

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- IND88-1** The FERC does not select the locations for proposed LNG facilities. The locations are selected by the applicant and the FERC then conducts an environmental assessment for that location.
- IND88-2** See our response to comment IND22-20.
- IND88-3** The LNG terminal would be designed appropriately for its seismic setting.

December 24, 2007

330 Oregon Street
Astoria, OR 97103

Kimberly D. Bose, Secretary
Federal Energy Reserve Commission
888 First Street, NE Room 1A
Washington DC 20426

Reference: CP 06-365-000 and CP 06-366-000

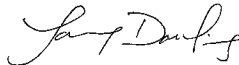
To Whom It May Concern:

I am writing to urge you to say no to LNG on the Columbia River. Allowing a fossil fuel enterprise to establish itself here would invite safety, environmental, health, and economic problems. Questions over the area's geologic concerns need to be addressed, especially in light of the recent storm's devastation. Putting in LNG terminals where there is the potential for major storms, landslides, earthquakes, and other geologic issues seems like a poor choice. Additionally, the threat to the salmon and environment need to be more carefully considered.

My husband and I moved to this area because we were drawn to the environmental richness and quality of life that the Astoria area offers. The quality of life that living by the Columbia allows would be directly affected by allowing LNG tankers in and building large, permanent structures to house the fuel. As a school teacher and resident, I am very concerned about the safety and health issues involved in having LNG tankers and facilities nearby. So far, the explanation for risks and emergency assistance has been insufficient.

Not only would establishing LNG sites in this area cause environmental, safety, and economic concerns relating to fishing and tourism, but it is unnecessary. The people of this area deserve more than what LNG promises. Please do not make it easy for LNG to change the landscape of such a unique cultural and environmental treasure. Consider more carefully all of the negative effects on the environment and people in this area.

Sincerely,



Tammy Dowling

Individuals

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IND89-1

Geologic hazards and mitigation are addressed in sections 4.1.3.3 and 4.1.4.3. Safety is addressed in section 4.11.

IND89-2

See our response to comment PM3-68. Impacts on salmonids are addressed in sections 4.5 and 4.6.

IND89-3

As discussed in section 4.7.1.5, LNG carriers would be generally consistent with large tankers that currently use the navigation channel heading to and from upriver ports. We address the safety of LNG carriers in section 4.11.5. Because the lower Columbia River already has industrial, commercial, and residential development, the Bradwood Landing Project is not likely to change the quality of life in the region.

IND89-4

A discussion of the hazards associated with a spill from an LNG carrier is presented in section 4.11.5.3. Also, see our response to IND60-6 and LA3-55.

K-1021

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12/21/07

Kimberly D. Bose Secretary
Federal Energy Regulatory Commission
888 First Street N.E. Room 1A
Washington, D.C. 20426

Docket No. CP06-365-000

IND90-1

Please read the following article paying
close attention to the highlighted sections.

Please note that Chuck D. Winter Northern
States spokesman calculated the Bradwood
Landing Facility at 600 million dollars, and
Michael Olson principal utility appraiser for the
Oregon Department of Revenue makes it clear
that for tax purposes the project is large.
I believe this situation constitutes a legal
definition of large.

Large projects are not allowed under the
Clatsop County Comprehensive Plan. Therefore
I believe the Clatsop County Planning
Commission and the Clatsop County Commission
erred when they called the Bradwood
Landing Project medium and voted to
approve it.

Sincerely
Paul Darnley

IND90-1

With an operational footprint of only 40 acres, the Bradwood Landing LNG terminal would be smaller than many other current and proposed LNG terminals in the United States, and smaller than other existing industrial developments on the lower Columbia River, such as in Longview, Washington.

K-1022

George Exum
541 W. Birnie slough Rd
Cathlamet, WA 98612
Dec. 17, 2007

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE Room 1A
Washington, DC 20426

Re: docket No. CP06-356-000 et al

Re: Ballast and Filter Water System at the Proposed Bradwood LNG Facility

1. Ballast-Related Physical Properties and LNG Cargo Assumptions

- ☐ Density of Fresh Water (FW) -1000 kg per cubic meter or 264 gals/cubic meter
- ☐ Density of LNG - 450 kg per cubic meter
- ☐ Comparison weight LNG/weight of H2O = $450/1000 = 0.45$
- ☐ 21,800-gals/min average rated maximum output flow on a main salt water-circulating pump for cooling water on a steam ship. This flow rate would be when steam is being used in the main engine, flow rate for port operations would be temperature controlled for maximum cooling efficiency and would average about 50% or less of maximum output. This would equal about 10900 gals/min.
- ☐ $10900 \text{ gals/min} = 2477 \text{ m}^3/\text{hr}$ ($10900 \text{ gpm} \times 60 \text{ mph}/264 \text{ gpm}^3 = 2477 \text{ m}^3/\text{hr}$)
- ☐ $21800 \text{ gals/min} = 4954 \text{ m}^3/\text{hr}$ ($21800 \text{ gpm} \times 60 \text{ mph}/264 \text{ gpm}^3 = 4954 \text{ m}^3/\text{hr}$)

2. Ballast and LNG Cargo Operation Assumptions

- ☐ The maximum LNG discharge rate as configured in the DEIS by three 16" unloading arms, each rated at 5000 cubic meters per hr is 15000 cubic meters per hour.
- ☐ The USCG in their Waterway Suitability Review has approved LNG tankers with a cargo capacity of 148,000 cubic meters.
- ☐ Northern Star has requested LNG tankers with a cargo capacity of 200,000 cubic meters for service. Vessels of this capacity have not been approved for this location by USCG until after the applicant has completed a site-specific analysis.
- ☐ Effective cargo discharge volume is approximately 0.92 of total cargo capacity based on the need for return fuel and the need to keep the cargo tanks cooled.

3. 148,000 Cubic Meter LNG Vessel Cargo Discharge

- ☐ Effective LNG cargo capacity of 148000 cubic meter vessels is 136,160 cubic meters ($148,000 \times 0.92$).
- ☐ Discharging 136,160 cubic meters of LNG at a discharge rate of 15000 m³/hr, gives a discharge time of 9.1 hours. The actual discharge time will be more due

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to the fact that start up pumping will be at a slower rate and the pumping rate near the end will be slower. For this scenario we will assume 10 hour discharge time

- ☐ Equivalent LNG weight to Ballast Water weight would be $136,160 \text{ m}^3 \times 0.45 = 61,272 \text{ m}^3$ of H₂O.
- ☐ Rate of fresh water ballast during unloading would be $61,272 \text{ m}^3$ divided by 10 hrs = $6,127 \text{ m}^3/\text{hr}$ H₂O for ballast and cooling.

4. 200,000 Cubic Meter LNG Vessel Cargo Discharge

- ☐ Effective LNG cargo capacity of 200,000 cubic meter vessels is 184,000 cubic meters ($200,000 \times 0.92$).
- ☐ Discharging 184,000 cubic meters of LNG at a discharge rate of 15,000 m³/hr, gives a discharge time of 12.3 hours. The actual discharge time will be more due to the fact that start up pumping will be at a slower rate and the pumping rate near the end will be slower. For this scenario we will assume 13 hour discharge time
- ☐ Equivalent LNG weight to Ballast Water weight would be $184,000 \text{ m}^3 \times 0.45 = 82,800 \text{ m}^3$ of H₂O.
- ☐ Rate of fresh water ballast during unloading would be $82,800 \text{ m}^3$ divided by 13 hrs = $6,369 \text{ m}^3/\text{hr}$ H₂O for ballast and cooling.

5. Questions & Comments

- K-1024
- IND91-1 ☐ The required ballasting flow volume rate is approximately 1.5 X the maximum usual output of the circulating pump for cooling water to the condenser aboard the ship. The flow rate is more than 2.5 X the usual flow rate for port operations. Northern Star proposes to have the ballast water go through the cooling system prior to entry into the ballast water piping. How will flow be controlled?
 - IND91-2 ☐ Why is a simple piping system filed under CEII?
 - IND91-3 ☐ In the DEIS, Northern Star states that each vessel will need 20 to 50 million gals of ballast water and cooling water. If 50 million gals are needed for any vessel, it will require a flow rate of 10,521 m³/hr.
 - IND91-4 ☐ What are the effects on the river bottom of one or more pumps creating suction lift to supply the required volumes of water?
 - IND91-5 ☐ What are the effects on fish near the intake screens?
 - IND91-6 ☐ This filtered water system for cooling and ballast water should be transparent and available for public comment. This will affect future port operations in the Columbia River so it is imperative that other port users can review it.
 - IND91-7 ☐ The required shipboard modifications are expensive. Will they be certified by the regulatory agencies(ABS, Lloyds, DNV, and others)?
 - IND91-8 ☐ Will each ship be required to provide certification to the USCG prior to entry into the Columbia River?
 - ☐ What will be the penalties for non-compliance? Will the penalties be to both the terminal operator and the shipping company?
 - IND91-9 ☐ Who will have the authority to inspect the operation of the system during discharge? Hopefully that would be a National Marine Fisheries representative.

Individuals

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- IND91-1 The flow would be controlled by the intake pumps and the screens are designed to minimize fish entrainment and impingement. See also our response to comment PM1-31.
- IND91-2 Engineering views of the pump station have been submitted to the FERC and other appropriate agencies for review; however, these design drawings are considered proprietary information and are not available to the public.
- IND91-3 Note that the intake screens have been redesigned and are larger to meet the slot size and intake velocity requirements of the NMFS. Unloading is expected to occur over a period of 18 hours.
- IND91-4 Due to the low intake velocities of the fish screens, there would be no measurable effects on the riverbed.
- IND91-5 As described in section 4.5.2.1, fish screen designs have been reviewed and approved by the NMFS. Furthermore, we have recommended that NorthernStar conduct post-construction monitoring to assess the effects of impingement and entrainment from use of the screened water supply system on juvenile salmonids during terminal operations and provide annual reports to both the FERC and NMFS regarding the efficacy of the screened water intake system, which would identify any problems and address how such problems would be rectified; therefore, impacts on fish in the vicinity of the intake screens are not expected to be significant.
- IND91-6 Engineering views of the pump station have been submitted to the FERC and other appropriate agencies for review; however, these design drawings are considered proprietary information and are not available to the public. The screened water intake system would apply only to LNG carriers calling at the Bradwood Landing LNG terminal and would not affect other ports.
- IND91-7 We are not aware of any certifications for the retrofit.
- IND91-8 The Coast Guard would not have responsibilities or authority relative to screened water intake system.
- IND91-9 NorthernStar would be responsible for meeting the conditions of the FERC's authorization for operation of the LNG terminal. See also our response to comment PM1-31.

IND91-9
cont'd

- ☐ Will the inspectors have the authority to cease cargo operations if the ship and terminal are in non-compliance?

IND91-10

- ☐ All of the above questions should be addressed by FERC and supplied to regulatory agencies (USACE, NOAA, USFWS, ODEQ, & ODFW) prior to the issuance of any permits?

6. Conclusions

I conclude from material publicly available that the ballast & cooling water system as presented has many engineering hurdles to overcome. The US LNG market is basically a spot market of convenience. Looking at the vessel cargo discharges in the existing operating LNG facilities, cargo deliveries are made available to US import facilities when market conditions make the US the highest bidder. Recently, during the summer and fall, we have been a LNG import destination only because we have been the highest bidder on spot market cargoes. When the US is not in this position, cargoes go to Asian and European facilities. How are we guaranteed that the LNG tankers have been retrofitted in this kind of market? Northern Star claims that they will give financial incentives. What are these incentives? What are the economic impacts to other Columbia River Port Districts regarding the Ballast water requirements on discharging vessels in their docks? Who will bear the costs of these new regulations?

IND91-11

The fish screen aspect of this issue is far from being resolved. Final design information has not been made available to regulatory agencies or the public. How are the adverse affects to endangered species determined without specific data? How can a DEIS be presented to the public for review be so lacking in important data?

IND91-12

IND91-13

If diesel motor driven vessels are to be used in this service, then the cooling water criteria will be totally different as they require less cooling water during normal operation. These situations will require a system that can monitor between the different shipboard propulsion systems and deliver cooling/ballast water systemically.

Who is the regulatory body regarding this? The effects of non-compliance are monumental, FERC is the regulatory body. What are the REGULATIONS.

George Exum has been involved in the maritime industry since 1967. I have a USCG license as Chief Engineer of Steam and Motor Vessels – Any Horsepower. I have sailed in all Engineering capacities on both tankers and freighters. Currently I work as a project engineer on ships performing preventative maintenance analysis and correction. I am also certified by ABS to perform ISM (International Safety Management) audits.

Sincerely,

George Exum

Individuals

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IND91-10 The FERC's responses to comments are provided in volume 2, Appendix K. The FWS and NMFS will have an opportunity to review this EIS and the FERC's revised BA and our EFH assessment.

IND91-11 See our response to comment PM1-31. The retrofit to allow use of the screened water intake system applies only to LNG carriers calling at the Bradwood Landing LNG terminal and would not affect ship traffic at other ports.

IND91-12 See our response to comment FA1-28. Engineering views of the pump station have been submitted to the FERC and other appropriate agencies for review; however, these design drawings are considered proprietary information and are not available to the public.

IND91-13 It is the responsibility of NorthernStar to determine how they would adapt the screened ballast and cooling water intake system to the different types of LNG carriers that would use the Bradwood Landing LNG terminal. See also our response to comment PM1-31.

K-1025

George Exum
541 W. Birnie slough Rd
Cathlamet, WA 98612
Dec. 17, 2007

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE Room 1A
Washington, DC 20426

Re: docket No. CP06-356-000 et al

To whom it may concern:

There are a multitude of issues that need to be addressed regarding the DEIS submitted by FERC regarding this proposed project. FERC staff will address many of these issues and many will be ignored. Unfortunately for the citizens that live in areas impacted by projects under consideration by FERC, their concerns and issues will only be given minimal consideration in the context of "market forces". FERC is a stellar example of the "best government that money can buy". FERC regulates the corporations and industry that fund its operations. This federal commission seems to operate in a vacuum as to the consequences of its decisions both locally and regionally. With regard to LNG, there is no federal or regional plan to determine the need for the product; only the FERC mandate that rewards the "gold rush" mentality to let the "market" decide.

1. December Storm 2007

IND92-1 Recent headlines from the Daily Astoria include: "Coast digs out of Rubble", "Power on Sometime", "Storm Damage comes to the Surface", and finally "There Will Be a Next Time" by Gov Kulongoski. Where in the DEIS are the recent consequences from recent storm damages effectively addressed? I know that FERC sheltered away in Washington, DC rate the recent storm a non-event. Many aspects of the recent storm have immense impacts on the ability of a large industrial facility at Bradwood to operate. The consequences of the recent storm on the operation of the proposed facility are monumental and they need to be addressed for public consideration. The DEIS gave only minimal coverage of storm impacts on operation. Northern Star and their "for hire" associates will conclude that this is a once in a lifetime event. Locally, citizens want to know why it is a recurring event. "Global warming". Who knows!!! Consequently, it is imperative that FERC address and quantify the effects of these repeated storms have on the operation of an LNG facility in their Environmental Impact Statement,

So what happened recently in Clatsop County? How would these events have impacted the operation of the proposed facility? FERC needs to address the impacts and inform the public before considering approval of this project. The recent storm included winds of 150 mph winds on the coast with high winds inland, massive rain, the Columbia River Bar closed to vessel traffic, loss of power throughout Clatsop County, no phone service, no cell phone service (even satellite phones were affected), Emergency services were

Individuals

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IND92-1

See our response to comment IND22-20.

K-1026

IND92-1
cont'd

without the ability to communicate, 911 and reverse 911 did not operate, many roads closed including Route 30 that provides access to the site, downed trees on every road and many slides, and massive flooding and that is just the start of the list.

The Clifton area around Bradwood was without electrical power for 6 days. I know that Northern Star has included an emergency generator in their plans. What is the duration of operating capacity for this unit? During and after the storm there was no road access to the proposed site. Major arterials on both side of the Columbia were blocked by flooding, slides, and downed trees. The Wahkiakum County Ferry was not operating. Westport, OR was flooded with no access to Route 30. How would the operator of the facility get employees to the site? The USCG base was worked to the maximum and they were required to bring in back-up personnel from bases out of the Pacific Northwest.

IND92-2

What were the storm impacts on the proposed pipeline route? All streams and rivers were near, at, or above flood stage. Trees were broken off or uprooted and hillsides moved. What are the consequences on a pipeline? How much earth movement can the pipeline withstand during a slide? The damage and devastation was even more pronounced along the linked Palomar Pipeline that exists the proposed terminal.

It is imperative that FERC take the effects of this event into consideration regarding this project. Consult with government agencies that have had to deal with this. Read the press accounts of the storm. Remember what Governor Kulongoski has stated in the press, "There Will Be a Next Time".

Sincerely,

George W. Exum

Individuals

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IND92-2

Flood and landslide hazards along the proposed pipeline route are addressed in section 4.1.4.3. The Palomar Pipeline is not part of the proposed action.

K-1027

George Exum
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Cathlamet, WA 98612
Dec. 17, 2007

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE Room 1A
Washington, DC 20426

Re: docket No. CP06-356-000 et al

To whom it may concern:

IND93-1 There are a multitude of issues that need to be addressed regarding the DEIS submitted by FERC regarding this proposed project. It seems as though FERC is rushing the EIS process. The DEIS is supposed to be the summary of all the material that the applicant is required to provide that has environmental consequences. Some of the information required is still being presented by the applicant, how does this haphazard approach relate to the normal NEPA process for energy projects? Many topics are followed by FERC staff recommendations that the applicant supply info or plans prior to construction or operation. Unfortunately the requested information or plans have environmental impacts or consequences to the project, how can the public and governmental agencies analyze and provide comment after the fact? It seems that all information and design criteria should be available for comment prior to the end of the public comment period. FERC relies totally on the information and modeling funded by Northern Star. Has FERC verified and validated the modeling performed in Northern Star's funded studies? Does FERC independently confirm the input and variables of the models used by an applicant? The DEIS for the proposed Bradwood facility is as Governor Kulongowski has stated, "flawed and incomplete".

IND93-2

There are many vague or forward approving topics. Following are a few that I feel should be addressed in the FEIS.

1. Liquefaction and depth of foundation of the tanks.
2. Shoreline Erosion and fish stranding on Puget Island caused by LNG Tanker propeller wash and thruster operation. Also the impacts of three tugboats and military gunboats.
3. Inadequate mitigation
4. Dredge Spoil Disposal
5. Emergency Response Plans
6. Water disposal from SCV operation
7. Property values of residences within the blast zone of vessel transit, the terminal, and the outgoing pipeline.
8. Part 2 of the proposed Palomar Pipeline is linked infrastructure.

On the following pages, I will question how the DEIS addresses these issues

Individuals

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IND93-1 The FERC has not been rushing through this process, and has been studying this project for almost 3 years. We believe the EIS has been prepared in compliance with NEPA regulations and that it is adequate. See also responses to comments PM5-57 and PM6-94.

IND93-2 See our response to comment IND33-9. Section 4.11 explains how we used modeling to develop exclusion zones.

- IND93-3 1. **Liquefaction**
Potential exists for liquefaction to occur at the proposed LNG terminal. In the DEIS page 4-12, "the upper 85 feet at the site would liquefy during events with large ground motions. The section goes on to state that deep foundations would support the LNG storage tanks. How deep? I assume below the 85 feet of soil that could liquefy. Does that 85-foot figure include the dredge material that Northern Star proposes to put on the existing site? During the last major seismic event in 1700 the land on Puget Island and other areas in the estuary sank approximately 3 feet (see research previously submitted to FERC by K. Takada & B. Atwater). What would the consequences be to the terminal and the send out pipeline if the ground dropped that much? It should be examined and detailed in the FEIS. Most of the staff recommendations in the DEIS include the phrases like in the design phase, prior to construction, or prior to commissioning. Seismic activity has monumental environmental consequences but FERC seems to be rushing to approval prior to the information necessary.
- IND93-4 2. **Shoreline erosion**
In the DEIS page 4-66, FERC states that they do not anticipate propeller wash from LNG ships and tugs would result in significant degradation of water quality even though in the same paragraph they state that ship wakes breaking on the shore could cause increased erosion along the shoreline and re-suspend the eroded material in the water column. FERC generalizes the effects in section 4.1.2.3. Unfortunately nowhere are the effects of the ship's propulsion engines, assist thrusters, 3 tugboats, and multiple USCG gunboats scurrying around on the shoreline of Puget Island. During the turning maneuver all vessel's propeller thrust will be directed towards the island's shoreline. The DEIS does not address the issue of erosion on Puget Island during the maneuvering and turning of multiple vessels. An independent agency should analyze the situation. If the project moves forward, then Northern Star should be financially responsible to ensure the shoreline and property on the west side of Puget Island, It is FERC's responsibility to make this a condition.
- IND93-5 3. **Mitigation**
How can the Hunt Creek area, which is already natural, be considered for mitigation? Maybe Northern Star will destroy it so they can then restore it to the condition that now exists there.
- IND93-6 4. **Dredge Spoil Disposal**
Northern Star proposes to pump approximately 350,000 cubic yards of material to the Wahkiakum County Sand pit and adjacent shoreline on Puget Island. From discussions with Wahkiakum County officials, the USACE also plans to use this same area for the Columbia River Deepening Project and for regular maintenance dredging. Where will Northern Star place dredge material if the closest place is not available? On a similar path, the JARPA submitted by Wahkiakum County

Individuals

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- IND93-3 The foundation piles would be set into stable soils at depths of at least 140 feet. See also our response to comment PM1-6.
- IND93-4 See our response to comment PM3-18.
- IND93-5 Preservation of the Hunt Creek Mitigation Site as part of the NorthernStar's Compensatory Mitigation Plan is discussed in the response to comment FA3-3. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11.
- IND93-6 NorthernStar would place additional dredged material at the LNG terminal site or at another approved dredged material disposal site.

IND93-6 cont'd	for those location only requests a permit for the placement of no more than 205,000 cubic yards of material.
IND93-7	<p>5. Emergency Response Safety and security are paramount for the transportation, storage, and re-gasification of LNG. All aspects of safety and security including local gaps in resources, necessary equipment, evacuation, available medical personnel and resources, police requirements, and funding for all of these services needs to be addressed prior to construction. The applicant should shoulder funding for all of the services that are additional to local communities. If the facility were not there, then the local community would not need the extra services. FERC as the regulatory agency should make a condition of any approval on the applicant to formulate a plan with all affected local communities and contractually agree to the funding prior to the start of construction.</p>
IND93-8	<p>5. Water Disposal Operation of the Submerged Gas Vaporizers will generate approximately 160 gals of wastewater per minute. This water will be chemically treated to neutralize its acidic nature. In all probability it will also need to be treated for dissolved oxygen. Nowhere in the DEIS is the total chemical treatment explained for public comment. Only temperature is listed as a concern. FERC's solution is the old adage, "the solution to pollution is dilution". Industry worldwide has found solutions that eliminate discharging into sensitive waterways. Obviously, we don't want to inconvenience the applicant.</p>
IND93-9	<p>6. Property values The section on property values borders on the ridiculous. To compare property values next to a small peak storage facility, which in all probability is located in an industrial area, to a large noisy illuminated re-gasification facility in a beautiful rural setting is absurd. Also to claim that the most recent studies on this type of situation were 1993 seems to be strange. George Tolley from the University of Chicago has done extensive studies on residential property near numerous types of industrial facilities, including the approximate percentage loss in property value determined by the distance from the industrial facility. FERC requires mitigation for numerous things including plants, animals, fish, and numerous activities but does nothing for economic impacts on people. Another example of absurdity is the statement from FERC/Northern Star that claims "the site would have minimal impact on the view shed from roadways and surrounding communities". How is a facility with two 17 -story tanks with noisy industrial fully illuminated components a "minimal impact" on the surrounding communities?</p>

Individuals

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IND93-7	See our response to comment IND60-6 and LA3-55.
IND93-8	NorthernStar proposes to discharge the excess SCV water directly to the Columbia River under an NPDES permit following pH adjustment. Sampling and analysis of the SCV discharge would be carried out in accordance with the requirements of the NPDES permit issued by the ODEQ.
IND93-9	See our responses to comments PM1-5 and IND3-16. Visual impacts including the LNG storage tanks are discussed in section 4.7.2.7.

IND93-10

7. **Palomar Pipeline**

By some logic, a pipeline that carries the product from a re-gasification facility to an end user is not linked to the project. What kind of piecemeal approach is being used? Indications from agencies and business state that the capacity of the Williams pipeline is at capacity. Where will the output from the proposed Bradwood facility go?

Sincerely,

George W. Exum

Individuals

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IND93-10

As described in section 3.1.2.2, we consider the Palomar Project to be a separate undertaking from the Bradwood Landing Project. Neither project is inter-dependent on the other. If Palomar is not authorized or built, the Bradwood Landing Project could still go forward, and vice versa. As discussed in section 1.0, the Williams Northwest pipeline would have capacity for the natural gas from the Bradwood landing pipeline project.

K-1031

ORIGINAL

FILED
OFFICE OF THE
SECRETARY

Carol A. Kriesel
107 Ostervold Road
Cathlamet, Wa 98612

2007 DEC 12 P 2:28

Kimberly D. Bose Secretary
Federal Energy Regulatory Commission
888 First Street, NE Room 1A
Washington, D.C. 20426

FEDERAL ENERGY
REGULATORY COMMISSION

Re: Docket No CP06-000 et al.

CP06-365-000

To Whom It May Concern:

Thank you for providing this venue for me to voice my opinions.

I have three major concerns

- IND94-1 1. **Distance from the proposed plant to Puget Island.** Using a GPS we measured from shore to shore from our property to the proposed site. This is 0.48 miles. Because we are so close, we will be the direct recipients of pollution (noise, light, carbon dioxide emissions).. And in a worse case scenario, we would be in danger of fire. (Please note the photos which I have provided showing distance.)
- IND94-2 2. **Size of the project.** According to the DEIS there are several pages where this is referred to as a large project. The site where the proposed plant is zoned for a small to medium size plant. The following are pages from the DEIS:
- p. 162 A type of low-profile LNG storage tank, referred to as LNG Smart Horizontal Tank Storage, has been developed by Mustang Engineering, but has not been used on a scale as large as the proposed project.
- P. 165 Because the surface area of the heat exchangers needs to be large for efficient heat transfer, the structures would be large and require significant space for construction and operation.
- P. 266 Potential impacts on water quality, resulting from boring operations would be due to the relatively large work areas.
- p. 328 Due to the very dynamic nature of large-scale construction, Northern Star has not defined specific lighting plans for construction.
- P. 262 Most large energy facilities in Oregon are under the jurisdiction of the Oregon Energy Facility Siting Council.
- P. 565 Motor vehicles are a primary source of air pollution with large industrial facilities accounting for

Individuals

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- IND94-1 Visual impacts associated with lighting at the proposed LNG terminal are discussed in section 4.7.2.7. In addition, this section has been revised to include additional information regarding NorthernStar's terminal lighting plan. Potential impacts in air quality and noise associated with the proposed project are discussed in section 4.10. Section 4.11.5.4 discloses that there are 22 structures overlapped by Zone 1 on Puget Island. However, with the safety considerations outlined in section 4.11, we believe that this project does not represent a danger to the public or nearby residences.

- IND94-2 See our response to comment IND90-1.

K-1032

Individuals

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IND94-2 | less than 15% of most types of criteria pollutants

cont'd

Finally there are four pages that contain the same phrase:

p. 276 For any large construction project there is the potential for spills or leaks.

P. 283 For any large construction project there is the potential for spills or leaks

p.329 For any large construction project there is the potential for spills or leaks

p.350 For any large construction project there is the potential for spills or leaks

As you can see, the FERC and Northern Star refer to this project as LARGE. It is not small to medium size.

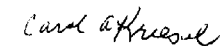
3. Safety concerns

IND94-3 | There have been concerns raised by elected officials as well as concerned citizens regarding the safety plan as stated in the DEIS. I want to add a further concern. Clatsop County was crippled by the recent rain/wind storm. Highway 30 was closed due to landslides. I have included some newspaper accounts of this storm. Although seldom, this kind of storm happens in this area. With the landslides, there was no way to get to Astoria or Portland. What would happen if there was an emergency with an LNG plant sited in this area?

I would like you to take these three areas of concern-distance, size, and safety.

Thank you again for taking my comments into consideration.

Sincerely,



Carol A. Kriesel

IND94-3 | See our response to comment IND22-20.

K-1033

George Exum
541 W. Birnie slough Rd
Cathlamet, WA 98612
Dec. 25, 2007

Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First St. NE Room 1A
Washington, DC 20426

Re: docket No . CP06-356-000 et al

To whom it may concern:

IND95-1

The Society of International Gas Terminal and Tanker Operators (SIGTTO) is an international organization that has formulated the industry standards that have help to create the current safety and operations record of the LNG industry. The society was formed to develop and promote the criteria for best practices.

FERC and Northern Star's selection of Bradwood fails on many levels to adhere to the best practices as detailed by SIGTTO. I will list some of them and will include the SIGTTO publication, "Site Selection and Design for LNG Ports and Jetties."

1. Short approach channels are preferable to long inshore routes which carry more numerous hazards.
2. The width of the channel should be examined throughout its length to confirm that it provides adequate navigable water in all operational contingencies.
3. Ship movements by nearby ships when the LNG carrier is pumping cargo should be disallowed.
4. Locations that already attract other craft, including pleasure craft and fishing vessels, are inherently unsuitable for LNG terminals.
5. Ideally, LNG terminals should be sited away from fairways used by other ships. Even when protected from the threat of approaching ships, the berth ought to be free from wave effects generated by passing traffic.
6. Harbor channels should be of uniform depth and have a **Minimum** width equal to **Five Times** the beam of the largest ship
7. Turning circles should have a minimum diameter of twice the overall length of the largest ship where current effect is minimal. Where turning circles are located in areas of current, diameters should be increased.

There are also many other items that FERC, USCG, & Northern Star have attempted to engineer around to make a unsuitable site acceptable to themselves. The DEIS fails to address what is the worldwide best practices with regard to LNG.

Individuals

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IND95-1

See our response to comment IND60-11.

IND95-2 Finally, a brief comment about a figure in the DEIS. Figure 4.4.1-2 on page4-93, labels the waterway adjacent to the terminal incorrectly. According to NOAA Chart 18523, the waterway is Clifton Channel not the Columbia River. Obviously NRG staff was to busy on the Palomar Pipeline to verify the information on Bradwood.

The DEIS is "flawed and incomplete"!!!!!!

Sincerely,

George W. Exum

Individuals

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IND95-2 The Clifton Channel is part of the Columbia River. See our response to comment PM4-20.

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

Re: Docket No. CP06-365-000 et al.

ATTN: Gas Branch 3, PJ11.3

To Whom It May Concern:

We're writing to say that we oppose the building of the LNG plant at Bradwood, OR and the building of the pipeline across Cowlitz County in Washington State. We are landowners who will be directly impacted, again, by the construction of a pipeline. To us it means increased trespassing, increased exposure to liability from those trespassers, loss of income-producing forestland and loss of wildlife habitat. Since this pipeline will apparently be placed south of the existing pipeline, we're also very concerned about its effect on our spring, the only water source for our household. No one is sure where the aquifer is that feeds our spring and if it is damaged during construction it is irreplaceable to us. It will be an invasive 100-foot-wide swath out of our forest. The final frustration of this whole process is that no one can tell us exactly where this pipeline is going to be built, and our experience with a previous pipeline that was built is that people tell you one thing and do something completely different. Why can't we get accurate maps and statements to say exactly where it is going to go on our property? In fact, the information provided by the Army Corps of Engineers doesn't even make it clear where the proposed pipeline will cross the Columbia River.

In the Draft Environmental Impact Statement (DEIS), on page ES-3, it was recommended that NorthernStar would allow only ships that can hook up to their screened water filtering system, when they take up their ballast water, "...up to 50 million gallons over a 24-hour period." (DEIS, p. 4-67) Yet on page 2-7, "NorthernStar has stated it will offer contract incentives to the LNG suppliers to retrofit the LNG ships with the piping and equipment necessary to connect with the filtered water supply." The implication here is that if they choose not to retrofit, they'll just suck up unfiltered water with all the accompanying juvenile salmon or other fish that are there. This should not be acceptable.

We have many other concerns about the impact of this project on our river and surrounding environs. It just does NOT, in our opinion, fit our river and the places around it. Specifically, this river, with its relatively narrow channel, serves a huge area upriver clear to the Lewiston, Idaho. If some disaster were to happen, shipping would be shut down. Similarly, if NorthernStar chose to use smaller boats and had to have an extra ship anchored in the river, waiting to offload (with its exclusion zone of 500 yards, DEIS p.4-431), all of the upriver commerce, from Longview's port and beyond, would be impacted. This is not a wide harbor on a busy seacoast where ships can choose to move to another port. Our states stand to lose much valuable commerce due to the opening of this one facility. That does not seem fair.

Many industries along the lower Columbia River are dependent on its pristine habitat. Timberland makes up a major portion of the land base and lumbering and pulp and paper are still major employers. Tourism is growing rapidly. Fishing, both sport and commercial, are major employers, and both occur in the Bradwood area in addition to along the route of the ships. Four species of salmon and steelhead, sturgeon, Dungeness crab, smelt and crayfish are all harvested in the lower river. The seasons are carefully managed and are time-dependent as part of their

Individuals

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K-1036

- IND96-1 We revised the text of the EIS to address the potential for trespass and unauthorized use of the pipeline right-of-way by ORVs. Impacts on forest and mitigation are discussed in section 4.4.2.3. See our response to comment PM3-6.
- IND96-2 See our response to comment PM6-85. The EIS discusses potential impacts on springs and wells, and we have included a recommendation that the Commission Order contain a condition requiring NorthernStar to develop a plan to mitigate impacts on residences and residential water supplies within 50 feet of the construction right-of-way. Impacts on wildlife and mitigation are discussed in section 4.5.3.3.
- IND96-3 Comment noted. Upland forested communities would be replanted in-kind with trees, with the exception of the portion of the right-of-way within 15 feet of the pipeline. NorthernStar's proposed tree planting exceeds the revegetation requirements of the FERC staff's Procedures.
- IND96-4 See response to comment PM1-38.
- IND96-5 See our response to PM1-31.
- IND96-6 As discussed in section 4.7.1.5, LNG ships would be generally consistent with large tankers that currently use the navigation channel heading to and from upriver ports. Given the measures to be implemented by NorthernStar and the conditions of the Coast Guards WSR, we believe that an accident involving an LNG carrier shutting down commercial traffic on the Columbia River is highly unlikely. See our responses to comments PM1-14, PM1-52, PM3-11, PM5-31, PM5-47, and others.
- IND96-7 The lower Columbia River is not a pristine habitat, and places along the river have been developed for commercial and industrial uses since the early nineteenth century. As explained in sections 4.7 and 4.8 of our EIS, we do not believe that the project would have significant impacts on the timber industry, fishing, commercial shipping, and recreational boating. Impacts on fisheries are discussed in sections 4.5 and 4.6.

IND96-7
cont'd

compliance with Endangered Species regulations. Halting or postponing a fishery could have a devastating impact on the management and success of that fishery and its ability to stay within its EIS guidelines.

We hope you will deny NorthernStar their final permit to build this facility. Thank you for this opportunity to express our concerns. If you would ever like to have a tour of our property, please feel free to contact us. We have a barn that has recently been added to the Washington State Heritage Barn Register. We manage our forestland for a compromise between profit and habitat. We enjoy sharing our sustainable-yield tree farm with interested people.

Sincerely,

Robert and Lisa Sudar
734 Fall Creek Road
Longview, WA. 98632
fallcreek@toledotel.com
360-423-1780

Individuals

96

K-1037

FERC
Reference docket No. CP06-365-000 et al

These comments pertain to the DEIS for the Bradwood Landing LNG Project in Oregon. I am a professional ecologist and writer who resides in Washington not far from the proposed project site. I will confine my remarks to four essential points:

- IND97-1 1) Consideration of the potential impacts to the Julia Butler Hansen National Wildlife Refuge is extremely cursory and inadequate in the document. One would think from the data presented that the only effect would be shore-wash from LNG ship wakes, and that this would be minor. In fact, the proximity of the terminal to the major refuge for the endangered Columbian white-tailed deer places this national resource--and the many years and public funds spent toward its recovery--in jeopardy from accident and fire. This adjacency alone should render the site selection invalid.
- IND97-2 2) Many points in the EIS admit that accidental or intentional release of LNG from the terminal or ships would have the potential for major damage, from immediate lethality to regional forest fire over a long stretch of Columbia shoreline. But in each instance, this concern is met by the summary statement that "the risk of gas release is very low and can be managed." This response is far too glib and dismissive of actual threat. Even if the statistical risk is deemed to be low, the specific consequences should be parsed in the EIS. For example, what would riverside forest fires mean for erosion and its effect on salmon and sturgeon populations in the downslope waters? What would the likely mortality of Columbian white-tailed deer be in the case of a pool fire spreading to island habitats very near the project site? And so on. There are many such potential cases, skirted by the present document, that should certainly be modeled in full in any final EIS.
- IND97-3 3) The narrative of mitigation measures is unbalanced and conveys no compelling reason to accept it at face value. While salmonid mitigation is discussed at length, many other aspects are only suggested in vague lines. For example, control of alien weeds is often mentioned as a goal, with almost no discussion as to how this difficult work would be accomplished. And while the restoration of plant communities is laid out with species lists, there is a paucity of detail as to how such worthwhile but always very challenging goals would be realized on the ground. In other words, some problems are recognized and glossed over with pretty but unrealistic plans, while others are simply ignored. In reality, many plant communities and their attendant fauna would be heavily affected by the project site and the pipeline, and the ideal of mitigation and recovery would likely lose attention as its difficulty became apparent, and ultimately fail. The full EIS would require much more concrete detail about how such a common outcome would be avoided, and how mitigation promises would be guaranteed. In any case, I have serious doubts about several of the mitigation measures proposed as regards their functional equivalency with existing ecological conditions.

Individuals

97

- IND97-1 Potential project impacts on the JBHNR are discussed in sections 4.7.1.4, 4.7.2.6, 4.7.3.6, and 4.8.1.7. Impacts on the Columbian white tailed deer are discussed in sections 4.6.2.1, 4.6.2.2, and 4.6.2.3.
- IND97-2 Even if the probability of an impact is exceedingly low, the FERC's EIS for the Bradwood Landing Project recognizes the catastrophic consequences that could result from an accidental or intentional release of LNG. However, according to the CEQ regulations for implementing the NEPA, we only need to consider impacts that are likely to occur. We believe that a release of LNG is highly unlikely, given the measures that NorthernStar would implement and the conditions required in the Coast Guard's WSR. After mitigation, we conclude such effects would not be significant. Where new information is available and where it is appropriate, the EIS has been updated to include additional information on the potential impacts of an LNG release on wildlife in the project area (see section 4.6.1.4). However, the analysis was done in a manner that was concise, clear, and to the point. Updates were completed provided that the analysis of the impacts was supported by credible scientific evidence, was not based on pure conjecture, and was within the rule of reason (see 40 CFR 1502.22).
- IND97-3 The adequacy of compensatory mitigation proposed for the project is discussed in the response to comment FA2-10. Directions for accessing NorthernStar's Compensatory Mitigation Plan via the eLibrary can be found in the response to comment PM6-11. Implementation of the final Compensatory Mitigation Plan would be assured through the FERC's authorization of the project. Noxious weed control is discussed in the response to comment FA3-10. Directions for accessing NorthernStar's Noxious Weeds and Soil-borne Plant Disease Control Plan via the eLibrary can be found in the response to comment PM6-60.

IND97-4

4) Finally, in my area of expertise, I find almost no attention to terrestrial invertebrate populations in the vicinity of the Bradwood Landing project site. The Federally Threatened Oregon silverspot butterfly is considered, which does not occur nearby--yet virtually no other attention is given to insects and other invertebrates, in spite of the fact that they comprise the great majority of the biota in the affected area. As just one example, what impact would the vastly increased ambient night-time light have on native moth populations? A large and diverse lepidopteran fauna occupies the project area, but no attempt has been made to survey it or to ask such questions. Moth depletion through light pollution is well documented and can lead to diminished bat and songbird populations--but where is this recognized, or even asked, in the DEIS? Many other such questions are left hanging about other insect orders, let alone overall invertebrate components of the local ecosystem.

In summary, I find the biological analysis of Bradwood Landing impacts and mitigation measures to be uneven, often shallow, acutely uninformed and unhelpful in some key areas, and altogether inadequate. As a local ecologist familiar with Wahkiakum and Clatsop county flora and fauna, I believe that the impacts of the Bradwood Landing LNG project and pipeline would be far more severe and long-lasting than the DEIS suggests. The document fails to inspire any confidence in the environmental acceptability of this massive industrial project, were it to be imposed in a rural and wildland setting such as ours.

Thank you for your attention to my comments.

Robert Michael Pyle, Ph.D. (Ecology and environmental Studies, Yale University, 1976); Founder, the Xerces Society for Invertebrate Conservation; author, Wintergreen, etc. 369 Loop Road, Gray's River, WA 98621 (360)-465-2539

NOTE: I attempted to submit these comments on-line prior to 5 p.m. on Wednesday, December 26, 2007, with my registration no. F168936, but my on-line comment was met with this message several times: "We apologize, an unexpected error has occurred on the server. FERC support staff have been notified of this problem and will work to resolve it as soon as possible. Please try again later." On account of this problem through no fault of my own, I hope my comments above will be allowed into the record of public response.

Individuals

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IND97-4

Based on the CEQ's guidelines, inclusion of all additional information and plans is not necessary for an EIS to provide a full and fair discussion of significant environmental impacts in a manner that is concise, clear, and to the point (see 40 CFR 1502.1). The FERC staff believes that the draft EIS provided sufficient detail to allow a review of wildlife occurring within the project site and determine the extent of potential project impacts on that resource.

K-1040

December 12, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

ORIGINAL

RECEIVED
OFFICE OF THE
SECRETARY

2007 DEC 19 P 12:42

RECEIVED
FEDERAL ENERGY
REGULATORY COMMISSION

Re: Docket No. CP06-365-000, Bradwood Landing Project

Attn: Gas Branch 3, PJ11.3

Dear FERC Commission Members:

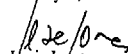
During this comment and rebuttal period to the DEIS, there are specific concerns regarding wildlife habitat that I would like for you to please formally address and respond to.

IND98-1 | In a pre-DEIS letter, I wrote of my concern for the safety and protection of the greater and lesser scaup of the Clifton Channel in regard to the obvious negative impact to their habitat that tanker transport, storage, and conversion of LNG at Bradwood Landing would entail. In addition, the dredging of the river to accommodate these tankers would adversely impact their habitat. Would you explain how these major impacts would not significantly harm the scaup and other migrating and native birds and waterfowl that use and inhabit the Clifton Channel? The Clifton Channel is within the Pacific Flyway and is important, fragile, unique, and vital to the wildlife of the lower Columbia River. Additionally, the effect of the high structures and lights on night-migrating birds would be negative and profound. [Mitigation in the form of proffered low-light emissions and camouflage are not really satisfactory in this regard].

IND98-2 | I would also like to bring up the concern of the pipeline and its impact on the Columbian white-tailed deer population and other wildlife that inhabit these areas. The proposed pipeline would pass through several miles of prime Columbian white-tailed deer habitat, disturbing and displacing the population. Besides the significant impact to the habitat by constructing the pipeline, there is also potential devastation (should there be an explosion or fire at the plant or at the pipeline sites) to human and wildlife populations in the areas as well as to the nearby protected Columbian white-tailed deer herd and wildlife habitat of the Julia Butler Hansen NWR at Tenasillahe Island.

There are many such serious concerns regarding wildlife habitat that the DEIS did not sufficiently or satisfactorily address. Please re-evaluate and address these concerns further.

Thank you,


Jessie Jones
P.O. Box 31003
Santa Barbara, CA 93130

Individuals

98

IND98-1 | The greater and lesser scaup are included in tables 4.5.1-2 and 4.5.3-4, which describe the wildlife species that occur in the vicinity of the project. Potential impacts on wildlife from construction and operation of the proposed LNG terminal are discussed in section 4.5.2.1. In addition, potential impacts on migratory birds due to the LNG terminal are described in section 4.6.2.2.

IND98-2 | See response to FA4-5 for a discussion of potential impacts on Columbian white-tailed deer from the Bradwood Landing Project. Potential impacts on humans and wildlife due to a catastrophic event at the LNG terminal site are discussed in sections 4.11.6 and 4.5.2.3, respectively. Potential impacts on humans and wildlife due to a catastrophic event along the pipeline route are discussed in sections 4.11.9.3 and 4.5.3.3, respectively. See our response to comment IND97-2.

Deborah Jaques
 Pacific Eco Logic
 375 3rd Street
 Astoria, Oregon 97103

28 November, 2007

Federal Energy Regulatory Commission
 Washington, D.C.

RE: OEP/DG2E/Gas 3
Bradwood Landing LLC Northern Star Energy LLC
Docket Nos. CP06-365-000, CP06-366-00, et al.

IND99-1

This is a comment regarding the treatment of the **California Brown Pelican** (*Pelecanus occidentalis*) in the Threatened and Endangered Species section of the Environmental Analysis for the proposed Bradwood Landing LNG terminal. I am a professional wildlife biologist with a specialty in Brown Pelicans. I have conducted numerous field research projects on Brown Pelicans and other seabirds on the Pacific Coast over the past 20 years, including the Columbia River mouth region. The Draft EIS fails to acknowledge the importance of the Columbia River estuary to the Brown Pelican and underestimates the damages that could be incurred to this species in the event of LNG tanker breach at the mouth of the river.

The Columbia River estuary supports as much as 20% of the U.S. west coast population of Brown Pelicans during the migratory season, and is the location of one of the largest traditional non-breeding communal roosts for the species in the United States. More than 10,000 Brown Pelicans have been recorded at East Sand Island, just inside the river mouth at Baker Bay. Many other smaller pelican roost sites exist adjacent to the projected path of the LNG tankers. Pelicans commonly occur as far as 18 miles up the Columbia River, at Rice Island. Several government agencies, universities, and environmental consultants have documented Brown Pelican use of the estuary; including the U. S. Fish and Wildlife Service, University of California at Davis, Oregon State University, Crescent Coastal Research, and Pacific Eco Logic.

While the DEIS does mention that pelicans roost on dry land, it does not mention the primary roost site inside the river mouth, any of the other roost sites in the study region, or the intensive use of the estuary by foraging brown pelicans.

The assessment that "*Brown pelicans occurring along the waterway would be limited to the area near the mouth of the Columbia River during the summer months*" is faulty on 2 points, 1) the birds may found at least 18 miles up the river, and 2) pelicans commonly occur in the estuary from April through November, not just during the summer months.

Individuals

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IND99-1

Additional information has been added to section 4.6.1.1 on use of the Columbia River estuary by brown pelicans. In addition, section 4.6.1.4 has been revised to reflect potential impacts on brown pelicans in the event of an accidental or intentional release of LNG along the waterway while brown pelicans are present. However, an analysis of population-level impacts on the brown pelican due to the breach of an LNG ship that is supported by credible scientific evidence is beyond the scope of this EIS (see 40 CFR 1502.22).

IND99-1
cont'd

The DEIS states that *"During operation of the proposed project, impacts on brown pelicans from LNG marine traffic would be limited to an accidental or intentional breach of an LNG ship. If a brown pelican were to be in the vicinity of an LNG ship in the event of an accidental or intentional breach, the pelican would likely be injured, killed, or displaced from the area."* Since there could potentially be thousands of pelicans in the vicinity of an LNG ship in the lower estuary, it would be more accurate to state that thousands of pelicans could likely be injured, killed or displaced in the event of an accidental or intentional breach of an LNG ship. The loss of thousands of pelicans in the Columbia River estuary would represent a significant negative impact to the west coast population of the Brown Pelican.

The document goes on to state that *"the risk of an accidental or intentional release of LNG during transit of the LNG ships is extremely low and can be managed by implementing the recommendations in the Coast Guard's WSR."* It is not realistic to expect that even the best plans can prevent significant damages to habitat and wildlife. I have just returned from conducting Natural Resource Damage Assessment work at the San Francisco, California oil spill, where it was clear that responses to such incidents do not always go as planned.

There is no one published document that covers the use of the Columbia River estuary by Brown Pelicans, however, there are many unpublished reports, data sets, meeting abstracts, professional and agency contacts that can be tapped for a proper assessment in the final EIS. I can provide documents supporting the above statements upon request.

Thank you for the opportunity to comment on this project. I hope that the final EIS will reflect a more thorough and accurate treatment of this federally listed species.

Sincerely,

Deborah Jaques

Individuals

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December 22, 2007

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St NE, Room 1A
Washington, DC 20426

Re: DEIS Comments on Bradwood Landing LLC – Docket No. CP06-365-000,
Northern Star Energy, LLC – Docket No. CP06-366-000, and FERC/EIS – 0214D, *Draft
Environmental Impact Statement* – Bradwood Landing Project Volume I. August 2007

Dear Secretary Bose:

Bradwood Landing is for Fishing.

I am a lifelong Oregonian/Clatsop County resident with nearly 40 years of personal experience with the Bradwood Landing area of the Lower Columbia River Estuary. To say I am dismayed at the proposed Bradwood Landing LNG terminal project is an understatement. For me and the numerous others who fish this unparalleled salmon fishing area, our fate to continue pursuing our passion here appears to now lie solely in your Commissioners' hands. In reviewing the Bradwood Landing Draft Environmental Impact Statement (DEIS) for the project's impact(s) on fish and fisheries resources, I found many of the conclusions to be based on inadequate science and less than truthful submission of basic biological facts about this reach of the river. On this basis alone, the Commission should not be making a decision to license this facility because the information before them is simply inadequate. For the record, please submit the following comments about salmonid biology and fisheries of the Lower Columbia River estuary that the above referenced DEIS does not adequately address.

Background

The Columbia River Estuary is the culmination point for all of the upriver sub-basins and tributaries. The health and overall long-term survival of all of this river's migratory salmonid species depends, to a significant extent, on a fully natural functioning estuary and a healthy lower Columbia ecosystem. The significance of this phenomenon is paramount to the entire range of salmonid life history types represented by such a vast watershed (the river and its tributaries are the dominant water system in the Pacific Northwest) and is unrivaled by any other river system in the continental United States.

The area comprising the Bradwood Landing site is located at Columbia River Mile (CRM) 38 and is within the head of tidewater in the Lower Columbia River Estuary. The affect of the twice a day Pacific Ocean tide reversal of fresh water river flow occurs even to a greater extent upriver of Bradwood, as far as Oak Point (CRM 53) and the extent of tidally induced changes in water level are observed even further upriver as far as Bonneville Dam (CRM 146).

Individuals

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K-1043

K-1044

It is common knowledge that juvenile salmonids migrate to the ocean, residing in the head of tidewater areas of estuaries for weeks to months at a time as they grow and adapt to salt water before moving out to sea. It is here in the estuary where they make the critical transformation from a freshwater to a saltwater fish, a process called smoltification. With this transformation come changes in body chemistry, appearance, and behavioral characteristics. When these same fish return from sea as adults, they pause again in the estuary to readapt to freshwater, before heading back upstream to spawn and complete the life cycle. Consequently, because of this behavioral use of the estuary by salmonids, the most highly productive fishing opportunities for recreational and commercial fisheries are resultant.

In light of these facts and considering the unique/critical nature of the Lower Columbia River estuary for fish and fisherman, CRM 38 (Bradwood Landing) is within the worst possible area of the river for sighting a LNG Terminal operation.

Specific Comments to the DEIS missing or found to be problematic for fair evaluation of fish or fisheries resources in addition to other comments I am already aware that have been submitted to FERC:

Section 4.5.1.2 (p.4-125)

Identification of Essential Fish Habitat along the Waterway for LNG Marine Traffic

IND100-1 The statement of "2 species of salmon" is not true. There are 7 species of salmonids found in the Lower Columbia River Estuary immediately around the proposed LNG terminal location, including five species of salmon (Chinook, Coho, Chum, Sockeye, & Pink) and two species of trout (Steelhead and Sea run Cutthroat).

Section 4.5.2.1 Aquatic Resources (p. 4-132)

IND100-2 The extent of saltwater intrusion in the Lower Columbia River is transient, not a static/stationary location at CRM 23 as suggested here. For example, the extent of saltwater intrusion has been measured beyond Pillar Rock (CRM 28) during periods of low river flow. The extent of the upriver estuarine boundary is also much further upriver than stated. Reversal of river flow during high tide is measurable as far upstream as Oak Point (CRM 53) (an area well beyond the proposed Bradwood Landing LNG terminal site at CRM 38).

NOTE: *The extent of saltwater intrusion is subject to extend even further upstream from its current recognized location as a result of any future channel deepening (dredging) efforts within the Lower Columbia River estuary.*

Section 4.5.2.2 (p. 4-154)

Essential Fish Habitat

IND100-3 This section implies that only two species of salmon, Coho and Chinook may be affected negatively by the construction of this project. As stated previously, there are seven species of salmonids that utilize the Lower Columbia River Estuary, including the area surrounding the Bradwood Landing site. Again, these other species include, Chum, Pink, and Sockeye salmon and Steelhead/Sea-run Cutthroat trout.

Individuals

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- IND100-1 Sections 4.5.1.2, 4.5.2.2, and 4.5.3.2 discuss EFH in the vicinity of the proposed project. As discussed in section 4.5.1.1, six species of salmonids occur within the lower Columbia River and its tributaries (Chinook, coho, chum, and sockeye salmon; steelhead; and coastal cutthroat trout); however, EFH has only been defined for two of these species (Chinook and coho). Pink salmon do not occur in the lower Columbia River system.
- IND100-2 Section 4.5.2.1 has been revised to reflect the extent of saltwater intrusion into Columbia River. The additional dredging that would occur for the terminal area would represent an increase of approximately 0.1 percent to the existing dredged area within the navigation channel that between the mouth of the Columbia River and Portland. Therefore, impacts on saltwater intrusion along the lower Columbia River are not expected to be significant.
- IND100-3 See our response to IND100-1.

Figure 4.7.1-1

IND100-4 This map is incomplete; it should show all the commercial gillnet drift locations and popular recreational fishing areas including where boats anchor along the shorelines and/or in the main channel, tie up to the pile dikes, areas that are targeted for trolling, and the entire popular beach fishing locations.

Section 4.7.1.4 (pp. 4-279 – 4-280) and Section 4.8.1.7 Transportation and River Traffic (pp. 4-328 – 4-330)**Commercial and Recreational Fishing Use of the Columbia River**

IND100-5 The applicant has stipulated in various public meetings that LNG ships will navigate the Lower Columbia River at night during the key fishing seasons to avoid disruption of the highly popular fisheries for both Recreational and Commercial users. This is not true, as anyone who lives along the river or who knows anything about ship traffic operations, know that ship movement in the river is entirely dependent on stage of tide, tide height, river bar conditions, weather, bar/river pilot availability, and competition for the limited space within the navigation channel as it is utilized by other ship traffic. (This is partly brought to light in the 1st paragraph of page 5-9 and the 4th paragraph on page 5-12 of the DEIS). In other words, LNG ships will cross the bar and move up and down the river when conditions permit, regardless of any consideration for fisheries in progress.

IND100-6 Also brought to light in the 1st paragraph of page 5-9 and in the 3rd paragraph of page 5-12 (without coming out and specifically stating it), is the impact security measures surrounding LNG traffic will impose on commercial fishing and recreational users of the Lower Columbia River. This impact must not be taken lightly. It is imperative for all to know who and what stands to be lost in the way of river use(s) if LNG is allowed to proceed. Anything less than full disclosure for all to weigh prior to a decision would be unjust, negligent, and criminal.

Sec 4.7.2.6 Recreation, Public Interest, and Special Use Areas

IND100-7 There is historical (year round) public use of the Bradwood Landing property (up until the current change in property ownership) that provided bank angling opportunity (day use) for dozens of people throughout open periods of salmon/steelhead fisheries. At present there is an extensive boat fishery for Salmon and steelhead in the Clifton and Columbia River channels directly in front of the proposed LNG terminal site. This fishery includes boaters who anchor directly along the shoreline in front of Bradwood landing and fish the outgoing tide as the shoreline at this location is in the direct pathway for migrating adult salmon.

NOTE: A consultation with the Oregon Department of Fish and Wildlife Columbia River Management Program will yield data showing significant (100+) peak boat counts fishing the head of Clifton and the Columbia River channels at Bradwood during the months of late February through May.

Directly across the Clifton Channel from Bradwood Landing is the top of Tennessee Island, this is another highly popular angling location for boaters and bank anglers. A sight also used by many for overnight camping and day use during these fisheries. Also,

Individuals

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IND100-4 Figure 4.7.1-1 is intended to show potentially sensitive resources that have specific designated locations. Our discussion of general recreation and other river users in section 4.7.1.4 includes other commercial and recreational fishing activities.

IND100-5 The final schedule for LNG vessel deliveries would not be known until operation at the proposed LNG terminal begins. Our EIS does not specify the time of day when LNG vessels would navigate the Columbia River. See our response to comment SA1-62.

IND100-6 See our response to comment IND74-1.

IND100-7 A discussion of recreational users, including fishing, of the Columbia River is included in sections 4.7.1.4, 4.7.2.6, 4.8.1.8, and 4.8.2.8. Section 4.8.1.7 discusses gillnetting and drift rights.

IND100-7 cont'd directly across the Columbia River channel along Puget Island directly across from Bradwood Landing are more highly prized salmon fishing areas.

Commercial gill net "drift rights" persist throughout the Lower Columbia River including the area surrounding Bradwood Landing. These drift rights go back over 100 years and are recognized as valid fishing territories amongst commercial fisherman.

General Recreation and Other River Users

IND100-8 4.8.1 Waterway for LNG Marine Traffic

500 people are a gross understatement for the number of people residing in these towns and counties. Try thousands of people.

IND100-9 4.8.1.8 Recreation and Tourism

Why are/was Fishing/Recreational River Uses not covered or discussed here? How can this be? Was this purposefully left out? This is the most **significant** component of the Recreational uses of the Lower Columbia River Estuary including the area immediately surrounding Bradwood landing.

IND100-10 4.8.2.7 Transportation and Traffic (Ship Traffic)

How can the assertion be made that operation of the LNG terminal itself would not affect commercial or recreational uses of the Columbia River? The DEIS goes on to state that, "None of the structures to be constructed as part of the ship berth would be located within the navigation channel." These structures may not be an impediment for ship traffic but certainly will be an impediment for the current recreational/commercial users of the river area surrounding Bradwood Landing for fishing purposes, that is, if they are allowed to continue to utilize the river should this project come to fruition.

Conclusion

The proposed Bradwood Landing LNG Terminal site and the associated shipping operations it brings with it, stand to dramatically change the dynamics of the Lower Columbia River estuary in a way that may be forever unrecoverable. As mentioned previously, anything less than a full disclosure of all potential losses of our commercial and recreational uses, for all to weigh prior to a decision, would be unjust, negligent, and criminal.

Respectfully,

Troy Laws
37878 Hwy 26
Seaside, OR 97138

Individuals

100

- IND100-8 The referenced paragraph states that "**over** 500 people" reside in the towns adjacent to the waterway. The data on the population of communities in the project area, listed on tables in sections 4.8.1.1, 4.8.2.1, and 4.8.3.1, are derived from the United States Census and other demographic sources.
- IND100-9 The discussion of commercial and recreational fishing is included in section 4.7.1.4.
- IND100-10 The berth at the proposed Bradwood Landing LNG terminal would not be a major impediment for recreational and commercial boaters seeking to fish in the lower Columbia River or in Clifton Channel. Fishing boats would not be barred from using either the lower Columbia River or Clifton Channel outside of the safety and security zone around an LNG carrier at dock.

Individuals

101

12/24/2007

Chairman of FERC,
Joseph Kelliher

Fax # 1-202-502-8612

Docket # CP06-365-000 Bradwood Landing and
Northernstar Docket # CP06-366-000

Sir:

IND101-1 Why is Oregon a dumping ground for high risk ventures that could be toxic to our wetlands, farmlands, streams, landscapes, our environment for LNG gas lines that will be

IND101-2 fossil fuel business in our state when we should be thinking of global warming and cutting back on fossil fuel businesses?

IND101-3 The LNG massive gaslines are so high risk that the high pressure pipelines have a blast zone that would extend 700 feet of either side of the pipeline. Why would Oregon want that? California won't allow it on their land and the gas is for them.

We don't want it — not at Bradwood Landing — not at Coos Bay — not at Warrenton!!!

We don't need these energy speculators in our state. We are not backwood hicks — go away and take your greedy speculators with you. we are not for sale!!

Sincerely

Barbara Pereira
1213 SE Umatilla
Portland, OR 97202

IND101-1 See our response to comment PM1-58. The project would not result in the release of any toxins that could significantly impact wetlands or farmlands.

IND101-2 Oregon's future need for natural gas is discussed in section 1.1. Section 3.1.1.2 of the EIS discusses conservation, and section 3.1.1.3 discusses natural gas compared to other fossil fuels.

IND101-3 Pipeline safety is addressed in section 4.11.9.

K-1047

CP06-365-000

07 Nov 14

FERC Testimony: November 8, 2007
Knappa, OR

Ted Messing
35 year resident of Clatsop County
former commercial fisherman

IND102-1 After following these proposed LNG projects for 3 years, during which we have attended nearly every federal, state, and county meeting, I have my doubts that anything I could say here today will make much difference. I am sure that the main purpose of this meeting is so you can check the box that says you held a public meeting.

However, the consensus outside the bubble is that this project is a bad idea! The Bradwood site and head of Clifton Channel is an incredibly sensitive area for ALL Columbia River Salmonids. It is the gateway to their estuary!

The dredging will completely destroy the natural shallow water entrance to the entire downstream estuary ecosystem. Changing river currents will wash away fragile islands all of which are part of the wildlife refuge.

This disruption of the natural path to their estuary of 13 endangered salmonid species, will be a daily occurrence. Dredging, tugs turning massive tankers, millions of gallons of river water sucked up for ballast, does not seem healthy for salmonids.

The LNG industry says they can "mitigate" for this destruction, but how do you mitigate for a river that has been turned into an industrial ditch? Mitigation is a pathetic attempt to restore what we already have, after it has been damaged or destroyed.

There could not be a worse site on the west coast to put an industrial gas terminal and tank farm than Bradwood.

I am submitting 3 testimonies given at the Clatsop County zone change hearings to support our objection.

Individuals

102

IND102-1 The proposed dredging for the Bradwood Landing LNG terminal turning basin would not destroy the lower Columbia River estuary. Nor would it result in major changes to river flow. See sections 4.2.2.2 and 4.3.2.3. Impacts on salmon and mitigation are discussed in sections 4.5 and 4.6.

K-1048

IND102-1
cont'd

#1 Testimony by Lee Cain – fisheries biologist, about the importance of protecting the estuary.

#2 Testimony by Hobe Kyter of Salmon for All, as to the negative impacts on our commercial river fisheries.

#3 Clatsop County Planning Staff report, recommending denial of the zone change requests for Bradwood.

In spite of the heavily influenced and therefore illegal vote in favor of zone changes by some of the Planning Commissioners, the staff report is good science on the consequences of this project and its non-compliance with zoning laws. I have included the website address at which the report can be read.

www.co.clatsop.or.us

links to Bradwood Landing

Surprise us, don't let this cancer get started in our estuary!

Individuals

102

K-1049

December 17, 2007

Kimberly D. Soes, Secretary
FERC
888 First Street N.E. Room 1A
Washington, DC 20426

 ORIGINAL

Docket No. CP06-365-000 et al.

FERC,
I strongly urge you to deny siting of Northern Star's Bradwood Landing LNG Terminal on the Columbia River and the associated pipeline. The points I want to broach are in your DES.

IND103-1 First, there are many instances in which it sounds as though FERC has already made its decision for granting NorthernStar this LNG facility. Examples: page ES-5 Paragraph 3 ... "We have recommended that NorthernStar defer construction until surveys are completed..."

Paragraph 6... "Several areas of concern were noted with respect to the proposed facility, and we identified specific recommendations to be addressed by NorthernStar prior to initial site preparation, prior to construction after final design..."

IND103-2 Secondly, There are big problems with the cost sharing plan for safety services. On pages ES-4 & 5, paragraph 7 (continued on ES-5) you say: "There may be impacts on public services..." "Besides NorthernStar's proposed safety and security measures, the Coast Guard would enforce additional measures to ensure the safety of the waterway and LNG terminal." We have recommended that NorthernStar develop an Emergency Response Plan, which includes a Cost Sharing Plan to reimburse the local providers of these services."

Doesn't 'cost sharing' mean that NorthernStar and local providers share the cost of emergency services and safety services? Our fire departments, ambulances, hospital, and police are thinly stretched as it is. The nearest hospital is 30 minutes away. Where is this money coming from to support an LNG facility? The Coast Guard will have to cut out some of its rescue of boats, ships, and people to attend to the safety of the LNG tankers, the facility, and the Columbia River. They won't be able to do such a great job catching drug traffickers if they are catering to the LNG franchise. Where will the money come from? Will it be us, the taxpayers?

Please do not site this thing on the Columbia River. Most people, the taxpayers, do not want these terminals and tankers on our river.

Sincerely,



Lori Durham
308 Atlantic
Astoria, OR 97103-5708
(503) 325-1856

Individuals

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IND103-1 See our response to comment PM1-2, PM2-3, and PM6-94..

IND103-2 See our response to comment PM1-1 and LA3-55.

K-1050

CP06-366
CP06-365

Paul Friedman

From: Richard Hoffmann
Sent: Wednesday, December 26, 2007 1:13 PM
To: Paul Friedman, Medha Kochhar
Subject: FW: LNG new energy for 1900's not 2000's

Please file this in your dockets.

-----Original Message-----

From: Gene Malizia [mailto:jerseygino@gmail.com]
Sent: Tuesday, December 25, 2007 5:15 PM
To: Richard Hoffmann
Subject: LNG new energy for 1900's not 2000's

IND104-1

Please develop new energy for the coming century, fossil fuel drove the industries of the 1900's, it also ruined the environment and made some people very rich. We need to develop some energy source that doesn't decimate the environment. This gas will make the same people richer and keep ruining the atmosphere. New technologies are a much better investment. The Federal Government should help in developing new sources more than help en richen existing energy companies. Please don't develop the LNG terminals in Oregon. Californians didn't want these facilities in their state even though they are the ones that need the energy, lets develop new sources of energy that are safe and we all could benefit from. This LNG is too dangerous to plant on the coast and this earthquake prone area is too dangerous to put over 200 miles of high pressure pipeline through.

IND104-2

Oregon is proud of being ahead of the curve on being environmentally aware , why are you doing this to us, many people here don't want this kind of industry. I learned recently that some laws were changed so we wouldn't have the power to object to such goings on and the federal government could force it upon us. Is this the what America is about?

IND104-3

Gene Malizia
1614 Camino
Forest Grove, Or. 97116

ORIGINAL

DEC 26 2007 1:13 PM
FBI

K-1051

Individuals

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- IND104-1 Renewable energy resources as alternatives to natural gas are discussed in 3.1.1.3 of the EIS. We also compare natural gas to other fossil fuels.
- IND104-2 Safety issues related to the project are addressed in section 4.11 and earthquakes are addressed in section 4.1.
- IND104-3 The public has had multiple opportunities to comment on this project, including at public scoping meetings held during the Pre-filing period, and at local meetings held to take comments on the draft EIS. See section 1.4. The Commission will take public comments into consideration before making its decision. No laws were changed to prevent people from objecting to the project. See our response to comment PM2-29.

ORIGINAL

Kimberly Bose
FERC

FILED
OFFICE OF THE
SECRETARY
2007 DEC 26 P 4:45

Re: Docket # CP06-365-000
Bradwood Landing LNG Terminal

IND105-1

My biggest complaint (aside from the horrendous environmental impacts) of this project is that there is absolutely no evidence of need. There is nothing wrong with existing grid & there is no reason to add more. If California needs this gas then they should host their own terminals & lines. The other travesty is the way each of these aspects were divided up in an effort to get approval. This should all be considered ONE Project - not a pipeline and a separate terminal project - These should be combined and subjected to a Programmatic

IND105-2

Individuals

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IND105-1 See our response to comment IND86-2.

IND105-2 We disagree. We intend to review each of the natural gas projects proposed in Oregon individually, on its own merits. See our response to comment FA4-1.

K-1052

ORIGINAL

Vance Fraser
PO Box 1443
Clatskanie, OR 97016-1443

RECEIVED 12/18/2007

12/18/2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

Re: Docket No. CP06-365-000 et al.

To Whom It May Concern:

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Abbreviations

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I. LEGAL IMPACTS AFFECTING THE CoE

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Abbreviations:

CoE - US Army Corps of Engineers

CRNC - Columbia River Navigational Channel

DEQ - Department of Environmental Quality (Oregon State)

DE - Department of Ecology (Washington State)

DEIS - Draft Environmental Impact Statement

DLCD - Department of Land Conservation and Development (Oregon)

EPA - Environmental Protection Agency

FERC - Federal Energy Regulatory Commission

Gas - Natural Gas

LNG - Liquefied Natural Gas

PNW - Pacific Northwest

WSA - Waterway Suitability Assessment

PREFACE

After a brief scan of the DEIS, two things are clear:

- IND106-1 | 1. The Agencies that were part of the DEIS have not been supplied with sufficient information and much of the information they have been supplied with or have presented is incorrect. Purposefully misleading statements are a significant part of the DEIS.
- IND106-2 | 2. The cooperating Agencies have been arm twisted into issuance of their parts of the DEIS

Individuals

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- IND106-1 | We disagree. NorthernStar provided sufficient information to allow the cooperating agencies to produce an adequate EIS that complies with the NEPA. The data provided by NorthernStar was independently reviewed by the cooperating agencies. The EIS does not contain misleading statements.
- IND106-2 | The cooperating agencies volunteered to participate in the production of the EIS, and each agency will make an independent decision about whether to issue appropriate permits and approvals. See our responses to comments PM4-20, PM1-26, IND33-9, and IND33-12.

K-1053

K-1054

IND106-2
cont'd

prematurely by pressure on Agency management, who then dictate to staff.

This lap dog Agency situation is completely unacceptable as it is contrary to the Public Interest which the Agencies are supposedly there to ensure.

This is a formal request to:

1. Identify those responsible for causing the DEIS to be sent out prematurely and filled with inaccurate and misleading information.
2. Identify and delineate the process by which this occurred and what steps necessary will be taken to prevent its reoccurrence.
3. Recall the DEIS until adequate information and verification can be obtained for a proper DEIS.

As a member of the taxpaying Public that pays for all this nonsense, I fully resent having to take the time to write this when the DEIS should have never been published or at the very least recalled to address the glaring omissions and revise the errors. It is the Agencies' job to check the facts for accuracy and completeness that it presents, not everyone else's.

One could easily conclude that the level of misinformation in the DEIS as well as using unwarranted Homeland Security designations used to keep pertinent information from the Public, was intentional by Bradwood Landing together with FERC and that FERC is clearly not an Agency that represents the interests of the Public, should admit conflicts of interest and be relieved of duty, and be replaced by a Citizen's Panel until such time that FERC can be reorganized to prevent such blatant disregard for honesty and the Public Interest.

This has Not been intended to be a complete review of the DEIS since time doesn't allow delineation of the huge number of inaccuracies and misinformation. Examples of omissions and errors in the DEIS are sprinkled throughout the following comments to demonstrate the complete lack of credibility of the project proponents and FERC who have not performed due diligence in fact checking and completeness.

The section names herein will have to suffice in relation to the DEIS "evidence" location. There can be no "specific evidence location" for items that should be in the DEIS but aren't. Further, I'm not getting paid to make a full time career out of this review which is what a completely detailed comprehensive review would require. FERC is the lead agency on this DEIS, if it is not familiar enough with the project to understand where these major items relate to then READ the DEIS.

Yes, I am extremely displeased with what has gone on here along with all those I know who have read the DEIS and have experienced FERC attitudes and denial of information.

I. LEGAL IMPACTS AFFECTING THE CoE

Note: Several comments in this section are about the CoE involvement in the CRNC Deepening Project and how it relates to the Bradwood Landing project.

IND106-3

Statements made by CoE officials in support of project sponsor Port of Portland and for work for themselves during CRNC Deepening Project approval process to avoid more reasonable and efficient alternatives than dredging the CRNC deeper for deeper draft ships to travel all the way to Portland:

1. The CoE is not in the port building business.
2. Improvements to navigation allowing deeper draft Grain Export ships and Container ships justify the CRNC Deepening Project.

Statement made by CoE officials in support of work for themselves and planned budgetary expenditures for "environmental work" during CRNC Deepening approval process to avoid more

Individuals

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IND106-3

The COE channel deepening project is a separate and distinct undertaking, for which an environmental review was already conducted, and it is not inter-connected or dependent on the Bradwood Landing Project being reviewed in this EIS.

K-1055

IND106-3
cont'd

reasonable and efficient alternatives than piling Dredged Channel Material on top of wetlands, requiring costly environmental mitigation paid in part by taxpayers:
1. Beach nourishment is not in our long term plan to reduce the amount of Channel Maintenance Dredging and its associated costs.

Other pertinent statements made by CoE Officials regarding the CRNC Deepening Project:
1. CoE involvement in projects rests with National Economic Benefits. A Benefit to Cost Ratio of greater than 1 is necessary to justify involvement.
2. Mitigation projects are to be implemented prior to the commencement of the CRNC Deepening.

Now in the Bradwood Landing DEIS, of which the CoE was a Cooperating Agency, the CoE plans to:
1. Approve of and Dredge out a large LNG ship turning basin for the LNG terminal.
2. Perform Beach Nourishment in the area.
3. Skip the National Economic Benefit analysis with all ship types on the river.

LNG ships and LNG facilities are recognized terrorist targets otherwise there would be no need for the Coast Guard.

Conclusions based on the above items:
It would seem the whole premise for the CRNC Deepening Project is false when the CoE is now planning to support and perform the Dredging and site filling role in the process of "terminal building".

It would seem the whole premise for the justification for destruction of wetlands by deposit of Dredged Materials as well as the Eminent Domain and/or other Land Acquisition for CRNC Deepening Project Wetland Mitigation is false when the CoE now plans Beach Nourishment.

It would seem that the whole premise of National Economic Benefits is false since no National Economic Benefit study was done by the CoE nor FERC regarding this Foreign Energy LNG Project and compared to viable alternatives such as those outlined in the following section "III. Alternatives". Please provide these comparisons.

IND106-4

It also seems the National Economic Benefits analysis was not performed to avoid the negative result and greatly negative as compared to viable alternatives.

Further it seems the National Economic Benefits analysis for Bradwood Landing was not performed to avoid the negative impact LNG ships on the Columbia River would have on the National Economic Benefits of the CRNC Deepening Project, reducing its already questionable greater than 1 Benefit to Cost Ratio to significantly less than 1, knowing that LNG ships on the CRNC will delay other ship traffic; especially Grain Exports and Container ships which were used to justify the CRNC Deepening Project.

IND106-5

The CoE should be required by law to re-analyze the CRNC Deepening Project Benefit to Cost Ratio knowing full well that LNG ships were being proposed on the river and that they would affect river traffic certainly in time to affect major expenditures of the taxpayers' money.

It seems that the CoE and the Ports are asking for lawsuits regarding the above items from interested parties and parties affected by and to be affected by the CRNC Deepening Project.

Individuals

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IND106-4 See our responses to comments IND3-4 and IND33-52.

IND106-5 See our response to comment IND106-3.

K-1056

- IND106-5 cont'd Agencies responsible for permitting and allowing recognized terrorist targets to build within the borders of the USA and allowing the recognized terrorist target LNG ships to transit within the CRNC have full culpability for any loss of life. Protections afforded government workers do not apply to willful misconduct.
- IND106-6 If built Bradwood Landing will cause negative National Economic Benefits in three ways:
1. The economic drain caused by energy dollars going to foreign interests.
2. The additional Homeland Security (Coast Guard) and other Public expenditures resulting from the importation of LNG.
3. Indirect military costs and casualties and possible civilian costs and casualties associated with USA purchased LNG dollars going to terrorist supporting countries and Iraq insurgents.
- IND106-7 Does the CoE want to be implicated along with other governmental agencies, administration officials, NW Natural, NorthernStar Energy / Bradwood Landing along with their representation which appear to have conspired to deny due process to intervenors and the Public? Remember that the CoE is a cooperating agency which has failed the Public in its duty in performing due diligence in its DEIS responsibility (and it could be argued purposefully) as well as the significantly premature and erroneous Public Notice for Permit Application.
- IND106-8 Additional
When exactly did the CoE gain autonomy over the Columbia River? CoE Public Notice states CoE will determine appropriate mitigation for the Bradwood Landing project. Possibly written for expediency, if so, again demonstrates the Public Notice was severely premature. All damages to Public resources as well as mitigation requirements are to be provided for review by the Public.

I'm sure others who would like to do projects along the Columbia River will be happy to know that it is fine to fill in wetlands and dredge in the river then point to another environmental habitat restoration project as compensating mitigation as is the case with the Bradwood Landing proposal.
- IND106-9 Although the CoE appears to be fond of "mitigation" since it is a growing part of their job justification, with the amount of Public and private funds spent on salmon restoration and subsequent lack of success, it can be argued that "mitigation" doesn't work, is a farce, and the epitome of man's arrogance, to attempt to relocate important naturally formed habitat.
Further, ignoring the far reaching long term consequences of the turning basin dredging along with maintenance dredging, being the erosion of the downstream salmon rearing grounds which cannot be replaced and are extremely rare, is not in the Public Interest since salmon is a food source.
- IND106-10 The easiest, best, least cost to the Public, method of habitat restoration is not to destroy it in the first place and especially when superior alternatives to a proposed project exist that will not damage the habitat in jeopardy.
- II. NEED and JUSTIFICATION
- IND106-11 The DEIS claims the PNW could face a Gas shortfall ...which flies in the face of plentiful and available existing and New North American energy sources other than the multi-detrimental proposed Bradwood Landing LNG facility along the Lower Columbia River.
The LNG promoters(Bradwood Landing, FERC, et al) CITE NO described market condition other than some magical future Gas shortage, described in the DEIS, as possible "extremely cold

Individuals

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- IND106-6 NorthernStar would pay for additional resources required by local first-responders for security related to this project, as outlined in its ERP. It is unsupported speculation that money spent to import LNG would go to countries that encourage terrorism. Although NorthernStar is not required to reveal the source of its LNG, exporting nations around the Pacific Basin include the United States (Alaska) and Australia. Trinidad and Tobago is currently the biggest exporter of LNG to the United States.
- IND106-7 There is no evidence that due process was denied during review of this project. The COE's processing of NorthernStar's application is being conducted according to its regulations.
- IND106-8 The COE has regulatory responsibilities under the RHA and CWA.
- IND106-9 The adequacy of mitigation is discussed in the response to comment FA2-10.

Potential impacts on salmonids as a result of dredging of the ship berth and maneuvering area during construction and operation of the project is discussed in section 4.5.2.1. As stated in section 4.6.3, the FERC would not allow construction to proceed until after we have concluded formal consultation with the FWS and NMFS.
- IND106-10 The alternatives section of the EIS compares the proposed Bradwood Landing Project to other alternatives.
- IND106-11 See our response to comment PM1-8.

K-1057

IND106-11 | winter" or "a high growth scenario", without saying just how infinitely cold that would have to be or how ridiculously unlikely high growth that would entail, with NO CITED reasoning or information (a continuing theme with the LNG promoters) to suggest plausibility.

cont'd

The industry self serving NW Gas Association, a major member being NW Natural, whose projections fly in the face of the more rationally expected Energy Information Agency projections which also may be high considering the advance of alternative energy and the decline of industry and manufacturing in the USA in favor of Asia. Note that Industrial use is the major use, by far, of Gas in the PNW.

IND106-12 | The DEIS claims LNG would "contribute to natural gas price stabilization".

However, LNG CANNOT provide price nor supply stability when LNG ships can and have been held off shore waiting for prices to rise -or- supplying countries can cut off supplies at any time. Price manipulation, embargoes, war, political conflicts, worker strikes, internal energy policy changes (which have already occurred in some potential South American Gas sources for LNG), are all part of the foreign LNG equation just as it is with crude oil.

IND106-13 | The DEIS states that "NorthernStar's Project" is specifically designed to:

1. Deliver Gas to Wauna Mill and Beaver Power Plant at Port Westward (both in Oregon along the Columbia River)

However, Wauna Mill already has a supplier of Gas and has alternatives such as liquid fuel (bunker C, I think) and "hog fuel" (black liquor and other products of the pulp and paper process). Supply from Bradwood Landing is unneeded.

Beaver Power Plant already has a supplier of Gas as well since it is an operating Gas fired turbine electrical generating facility. Supply from Bradwood Landing is unneeded.

IND106-14 | 2. Interconnect with NW Natural's pipeline which can also feed their Mist Storage Facility.

This will introduce the regasified LNG into NW Natural's system. The regasified LNG is known to burn hotter and dry out seals and has been linked to home explosions for that reason. The National Gas Manufacturers Association does Not recommend using regasified LNG and consider it damaging to their equipment for those same reasons. Mixing domestic Gas and regasified LNG is supposed to solve the problem but what happens when you get a long slug of mostly the regasified LNG? Are residential and business consumers being notified of this? ...Unlikely and jeopardizing their lives and businesses which is Not in the Public Interest.

IND106-15 | 3. Interconnect with Williams interstate pipeline system.

This is the biggest ruse of all. Bradwood Landing representation stated in Clatsop County testimony and in the DEIS that ONLY the original 36 mile interstate sendout pipeline extending to the Williams pipeline near Kelso, WA was part of the project. They also stated in both, that the extension of the proposed Palomar pipeline (which connects to the TransCanada pipeline to California) to Bradwood Landing's sendout pipeline near Wauna, OR was Not part of the project and not necessary for the project at all.

However, at Pipeline capacity meetings regarding the said Williams pipeline, it was determined No additional capacity was needed.

Further, Williams representatives have stated that no contact has been made by or between NorthernStar Energy [Bradwood Landing].

On Nov. 29, 2007 at WA State Citizens Advisory Committee on Pipeline Safety meeting:

It was stated that the Williams pipeline has no room for the LNG from Bradwood Landing, to which the Williams manager agreed.

No indication that a significant increase in capacity would be required in the future was forthcoming. If so, it would be logical for Williams to gear up for that, which it has not.

Individuals

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IND106-12 See section 1.1. NorthernStar believes imported LNG can compete with domestic natural gas, and this competition using supplies from other countries with natural gas reserves would help stabilize the price of natural gas in the Pacific Northwest.

IND106-13 The Bradwood Landing Project would provide an alternative source of natural gas for the Wauna Mill and Beaver Power Plant.

IND106-14 See our response to comment IND33-27.

IND106-15 See our response to comment PM3-50.

K-1058

IND106-16 | So, there is the Bradwood Landing proposed 30 inch sendout pipeline connect to Williams which has nowhere to send the Gas ...while the Palomar pipeline isn't needed nor part of the project but has a large market being California. Right. A demonstration of Bradwood Landing and FERC lack of credibility.

It is California's job to take care of California not a Columbia River based LNG facility nor NW Natural nor the Portland CoE nor FERC aiding and abetting same.

Taxation without representation in this matter is unacceptable to the PNW.

Independent analysis:

Oregon Public Utilities Commission analyst stated that three quarters of the Gas from Oregon based LNG facilities would go to California.

The California Lieutenant Gov. stated that the majority of Oregon based LNG would come to California AND ALSO STATED THAT IT IS THE ROLE OF GOVERNMENT TO PROTECT CONSUMERS FROM MARKET MANIPULATION, SUBSTITUTING HIGH PRICED LNG FOR LOW PRICED NORTH AMERICAN GAS.

When reading FERC literature and the DEIS, it seems FERC believes its role is to promote LNG regardless of the damage and risk to the Public and Public Interests.

It is easy to conclude that the whole premise of Bradwood Landing's proposal of Gas for the PNW is false.

The straight fact is, there is NO justifiable need for LNG in the PNW.

LNG proponents should not be allowed to redefine the PNW to include parts of California.

There is NO evidence to suggest in any way that the PNW will have a shortage of Gas if LNG is Not located along the Columbia River or in the PNW, quite the contrary, see section III.

ALTERNATIVES.

The simple fact is that Gas is sold on contract. You pay, you get. That's it, end of story. All the self-serving nonsense about Canadian and Rocky Mountain region Gas going elsewhere would only occur if NW Natural refuses to contract for it.

Further, new Gas field sources are available from the Rockies if needed, see section III.

ALTERNATIVES.

IND106-17 | LNG is all about supplanting domestic supply with foreign and causing the Gas price to rise JUST LIKE CRUDE OIL which has the supply quantities to garner a much lower price as compared to before the run up to the war in Iraq. This isn't rocket science, it is the screwing of the Public just as with crude oil. The reason the other Gas pipeline companies aren't complaining much is they know LNG will cause prices to go UP not down, just as the California Lieutenant Gov. warns.

Apparently as long as "certain entities" are making more money, the consequences don't matter and governmental Agencies charged with industry regulation have been co-opted by the Gas and oil industry.

Obviously foreign LNG WHICH CAN BE CUT OFF AT ANY TIME is not in the Public Interest, especially along the Columbia River with its many risks and detriments, see subsequent sections.

UNTIL AN HONEST INDEPENDENT ANALYSIS OF THE ENTIRE GAS SUPPLY AND DEMAND PICTURE FOR THIS WHOLE REGION INCLUDING THE ROCKY MOUNTAIN STATES REGION AND WESTERN CANADA IS DEVELOPED THERE IS NO BASIS WHATSOEVER TO JUSTIFY ALLOWING ALL THE DETRIMENTS OF BRADWOOD LANDING.

Individuals

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IND106-16 | See our response to comment PM1-58.

IND106-17 | See our discussion of purpose and need in section 1.1, where we cite several sources which indicate that LNG would have a positive impact on natural gas prices.

K-1059

IND106-18 | What justification is there to allow the TROJAN HORSE LNG into the CRNC with all it's negative risks and impacts? (A Trojan Horse that can bring economic as well as physical destruction.)
A case COULD be made IF we desperately needed Gas to keep the Trojan Horse outside of our gates, being off shore, where it could be prevented from causing massive destruction but under NO CIRCUMSTANCES can it be justified to bring such a Trojan Horse into our borders and into the Columbia River. Statements made by the Mayor of Boston as to the risks and dangers of LNG support this argument. Furthermore, superior alternatives exist to make that proposition unnecessary, see section III. ALTERNATIVES.

IND106-19 | Quite plainly,
Bradwood Landing wants to make money selling regasified LNG. Apparently they don't care who they sell it to nor the consequences to others.
NW Natural wants to expand and make more money sending Gas to California since the market in the PNW has been and is likely to remain relatively flat. Apparently they don't care who they send it to nor the consequences to others.
It seems Bradwood Landing is using FERC, Homeland Security, the CoE, and friends in high places as a crowbar to get in.
It seems NW Natural is using its political connections to assist in this violation of the Public Trust and Interests.
They both seem to be more than willing to misrepresent the facts.
If they are successful, will the PNW be better off? That depends on how you measure it, if you are Bradwood Landing and NW Natural you are better off, if you are almost everyone and everything else you are much worse off, see subsequent sections.

Facilitating NW Natural's foreign imported regasified LNG Transmission business, to get a piece of the pie of Gas to California via Bradwood Landing, on the backs of NW landowners via ruining their land and property value and limiting its use, also on the backs of the Public via Coast Guard Security costs, Emergency Management costs, and Environmental costs not born by Bradwood Landing, as well as facilitating a serious risk to the Public's physical and economic safety while aiding and abetting Foreign energy interests as well as terrorist interests, IS COUNTER to the purpose of government regulation, the role of the Agencies, nor is it in the Public Interest, nor will it provide National Economic Benefit, nor can it provide price and supply stability of Gas.

It seems likely that the mad rush to obtain LNG project permits around the nation, stems from the structure of FERC along with the current Federal Administration and Congress being highly foreign Gas and Oil industry supportive which could change in the next national election.

When the Senate took away State's rights against the intentions of the Constitution to provide FERC siting authority over LNG facilities, this demonstrated the corruptive influence of the foreign and international (Oil and Gas) energy lobby, none of which is in the Public Interest.

If all the proposed LNG facilities were built, the amount of regasified LNG would be more than the nation could use, by several times, SUPPLANTING domestic Gas, and further draining and weakening the USA economy and strengthening our enemies, putting the USA at further risk, again, not in the Public Interest.

Why should private individuals and groups have to provide independent economic and other analysis that Permitting Agencies SHOULD be performing and supplying to the Public for review?

If the LNG project promoters information and analyses are accepted, then the whole process of DEIS Comment is a scam on the Public, the Agencies should admit conflict of interest or

Individuals

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IND106-18 | See section 3.1.4 for our conclusions regarding offshore alternatives.

IND106-19 | NorthernStar indicated that its project is intended to serve markets mainly in the Pacific Northwest, not California. We briefly summarize the project need and purpose in section 1.1. The Commission will determine public necessity in its project Order. No state rights were taken away. The NGA established that the FERC would authorize onshore LNG import terminals and that was reinforced by the EPAct 2005. The EPAct 2005 has a provision allowing states to provide comments to the FERC on safety and security concerns. Further, it clarifies that states retain permitting powers under federally delegated laws, including the CWA and CZMA.

IND106-19 inability to protect the Public Interest, be relieved of duty, and be replaced by a Citizens Panel to protect the Public Interest.

cont'd

III. ALTERNATIVES

IND106-20 What is the EXACT QUANTITY of people in an area for which an LNG facility would not be allowed to be built near? What is the EXACT DISTANCE that an LNG facility would be required to be built away from such a quantity of people?

Until these questions can be defined to a number, then Portland, OR is the most logical choice for this project IF a new LNG source of Gas were needed for the PNW (which it isn't needed). Portland can accommodate all its requirements of depth, turning basin, terminal space, short distance access to distribution pipelines, sufficient emergency management and security resources, firemen, tugboats, parts for maintenance, technical personnel, and Union Workers who want the project. Who cares if Portlanders may not want it, if it is needed as stated in the DEIS then "railroad it" onto them just as has been attempted at Bradwood. If those in Portland want the Gas from the LNG then it should be provided to them in an efficient short distance manner without long pipelines ruining our wetlands, farmlands, forest lands, and fish rearing grounds as the current proposal does.

The hypocrisy should be clear by now. It is okay to put "those people over there" at risk and screw up their environment and way of life, who have no need for LNG but "not us" in Portland who would more likely have the need if there was a need and less likely to screw up the fish and fish habitat, wetlands, forest lands, farmlands, with the sendout pipeline, but have the ability to say no since sufficient authorities reside there and who want it approved so long as they don't have to suffer any of the consequences.

IND106-21 There are other opportunities for jobs which unions could recruit and promote without all the negatives of bringing LNG into the river. If politicians weren't in the back pocket of large corporations it would be an easy matter to create a significant number of jobs tomorrow, more so than LNG, with no risk to the river and other jobs.

Alaska has a law which does not allow raw logs to be shipped out of the state. So, the Japanese built sawmills to cut the logs into lumber before shipping, employing Alaskans, the whole purpose of the law. The same could easily be done in OR and WA.

If the Unions want jobs, there they are, building and operating sawmills, an industry that is well known and compatible with the Lower Columbia River area. Why Unions are so counterproductive as to want to build the object of their own destruction losing many more Union jobs at the Ports is beyond me. Likely the same reason they don't seem to bother working towards the no raw logs export law.

Other jobs could be had developing the 500 year supply of shale oil in the basin between Colorado, Utah, and Wyoming which studies have shown it to be profitable at about \$30/bbl (which patriotic Union members could promote rather than economy draining foreign energy LNG). So one has to ask why do we need all the foreign energy?

Has our administration and elected representatives sold us out to foreign energy interests again? What have they done in the past 30 years to secure the nation's economy from economic terrorism of foreign oil since the OPEC oil embargo in the 1970s? Worse than nothing. They have sold us out to foreign interests again and again. Worse yet they have caused us to be funding our own terrorism nightmare. We do NOT need more foreign energy. It is NOT in the Public Interest when ABUNDANT supplies exist within our nation.

Individuals

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IND106-20 There is no exact population numbers, required by regulation, that would prevent the location of an LNG import terminal. However, there would be less environmental impacts on people if an LNG terminal was located in an unpopulated area, in comparison to a densely populated area. The exclusion zones around an LNG carrier at dock and the LNG terminal piping and storage facilities, established by regulations, would represent the distance that an LNG terminal must be built away from people's residences or other occupied structures. As explained in other responses, the project proponent selects the location of its facilities, and the FERC analyzes the environmental impacts associated with the proposed action at that location. Our alternatives analyses did not identify another location in the region that would have significantly less environmental impacts than the proposed project. We did not identify specific sites in the Portland area to consider in our alternatives analysis due to the longer LNG marine waterway that would be required and the much higher population density in the Portland area.

IND106-21 Additional supplies of natural gas from domestic unconventional onshore resources, including coalbed methane, tight sandstones, and gas shale, are discussed in section 1.1 of this EIS.

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- IND106-22 | The completely sound and logical permit denial alternative is the most appropriate choice for the Bradwood Landing proposal due to Public Safety and Columbia River valley economics and environment safety (includes wetlands, fish and fish habitat, Ports, river commerce, fishing industry, sport fishing, recreation, river related businesses and jobs, forests, farms, and other business and jobs which support all those such as stores, services, schools, government) impacted by LNG ship security zone caused delays and disruption to all others on the river as well as real and perceived danger to the Public.
- IND106-23 | There is a tremendous supply of Gas in the Rockies with new source fields that have been more recently developed. The planned Bronco pipeline coming West proves this. However, Williams already has a pipeline routed West from the Rockies through Idaho, then following I-84 until it connects to their I-5 North/South pipeline. IF (as in "if") the PNW needed more Gas, Williams could supply it. Pipeline capacity meetings show NO NEED to increase capacity. We do NOT need LNG in the Columbia River screwing it up.
- IND106-24 | Another completely sound and viable alternative to the Bradwood Landing proposal would be the Kitimat LNG facility in British Columbia, Canada.
Purely speculative comments in the DEIS about very little of the Kitimat Gas coming to the USA are unfounded, unwarranted, and an obvious attempt to mislead the Public regarding that already authorized LNG facility's markets of Western Canada, PNW, and California. There is nothing to show that sufficient supplies wouldn't be available to the PNW from this and current Canadian Gas suppliers.
- IND106-25 | The 3 authorized gulf states LNG facilities together with the 4 existing LNG facilities in the USA will provide more than sufficient Gas supplies to the USA. Note previous FERC Chairman's comments about the number of LNG facilities needed.
Statements in the DEIS about the gulf states LNG facilities being too distant to be considered an alternative are ridiculous and inconsistent with how Gas is transmitted from pipeline to pipeline.
Further, whatever markets the gulf states LNG proposals would serve, that would free up yet more of the already abundant domestic Gas from the Rockies to come West.

The only thing wrong with the proposed Kitimat and Gulf States alternatives (or any other alternative sourced outside of this region) is that it doesn't give NW Natural a piece of the Gas transmission business to California, so to put money in their pockets they need to screw Williams pipeline company, screw the fish and environment, screw the landowners, screw the grain exporters and other river users, port workers, etc.
- IND106-26 | It is not FERC's, the CoE's, the DOT's, nor Homeland Security's job to permit Bradwood Landing and NW Natural at the detriment of everyone else's business and the environment while putting most everyone and everything in the Lower Columbia River Valley at risk.
It is California's job to take care of California not a Columbia River based LNG facility nor NW Natural nor the Portland CoE nor FERC aiding and abetting same. Taxation without representation in this matter is unacceptable to the PNW.
IF LNG were absolutely needed, the authorized Kitimat LNG facility, or the Baja California LNG facility, or the 3 authorized Gulf States based LNG facilities alternatives eliminates all risks and detriment stated herein to the Columbia River, to the Grain Exports, river commerce, fishing, recreation, environment, people, and so on.
Further, there is no proof that any of these are necessary for sufficient Gas to the PNW.

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- IND106-22 | The no action alternative is discussed in section 3.1.1. Impacts on environmental resources, and mitigation, are addressed throughout section 4.
- IND106-23 | Section 1.1 of the EIS acknowledges projected increases in Rocky Mountain natural gas production. We added text in section 3.1.2.2 to address newly proposed pipelines as system alternatives, including the Ruby Pipeline Project and the Bronco Pipeline Project, which would bring Rocky Mountain gas to Malin, Oregon.
- IND106-24 | The Kitimat LNG terminal could not satisfy all of the objectives of the Bradwood Landing Project. According to the developers of the Kitimat Project, one of their main goals is to provide natural gas for use in the extraction of tar sands oil in Alberta, Canada. The text regarding this project has been updated in section 3.1.3.2.
- IND106-25 | The existing and authorized LNG import terminals on the East and Gulf coasts are intended to serve markets in the southern and eastern portions of the United States. They do not supply natural gas to the Pacific Northwest. The Pacific Northwest is served by only two interstate natural gas pipelines, Williams Northwest and GTN, neither of which is connected to an East or Gulf coast LNG terminal.
- IND106-26 | A study conducted by Wood McKenzie indicated that at full use, more than 80 percent of the natural gas sent out from the proposed Bradwood Landing terminal would go to customers in Washington and Oregon. As explained in section 3.1.3.1, the majority of the natural gas sent out by the Costa Azul LNG terminal would be transported to customers in northern Mexico and southern California.

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- IND106-27 Not mentioned in the DEIS, the also completely sound and viable domestic (and non foreign LNG) alternative to Bradwood Landing, the Bronco pipeline's 1.0 Bcfd coming to the PNW and California from the Rockies scheduled for 2011, would be more than sufficient.
This alternative recycles our energy dollars in the USA so would be an ECONOMY BOOSTER having positive National Economic Benefits instead of a drain like foreign imported LNG.
- IND106-28 With the Current Canadian suppliers, Williams pipelines, the Kitimat LNG project, and the Bronco pipeline, there certainly won't be a shortage of Gas coming to the PNW, further demonstrating the lack of need for the Bradwood Landing project with all its risks and detrimental physical and economic impacts of polluting and blocking the river, fish degradation, etc.
Bradwood Landing's position in the DEIS of other alternatives not meeting "all their objectives" is irrelevant. Wauna Mill and Beaver Power Plant at Port Westward would be sufficiently supplied will any of the alternatives describe in this document.
- IND106-29 Clearly there are superior, less detrimental alternatives to the Bradwood Landing project.
However, since other viable Alternatives were omitted from the DEIS they may as well be mentioned:
1. Since a stated design goal of Bradwood Landing is to connect regasified LNG to the Williams pipeline in the State of Washington, it is more that preposterous, it is purposeful omission, to ignore the Kalama, WA area as the site for the LNG facility due to its much closer proximity to the Williams pipeline and Goble, OR pipeline interconnect. It would provide for a much more efficient location. The NEGATIVE environmental IMPACTS and geologic risks as well as quantity of landowner impacts would be far less than the Bradwood, OR location.
- IND106-30 2. Locating an LNG FUELED ELECTRICAL GENERATING FACILITY OFF SHORE. No fuel pipelines coming ashore, only underwater electrical lines would lead ashore from the facility. Since a major use of Gas is for electrical generation, this method would eliminate most of the problems associated with the importation of LNG. It eliminates the risk of an LNG ship or facility being targeted within our shores, putting the Public at risk. It would eliminate much of the risk and costs to the Public and private:
Public Costs significantly reduced or eliminated by locating an LNG Fueled Electrical Generator off shore:
1. Safeguarding LNG ship transit up the Columbia River.
2. Additional Emergency Management Systems, personnel, and equipment.
3. Fish, fish habitat, and fishing industry degradation.
4. Lower Columbia River water and air pollution.
5. Delays to other ships, barges, fishing, and recreation and associated job loss and economic deterioration.
6. Road improvements.
7. Facility and pipeline impacts to wetlands, streams, fish, and wildlife.
Private Costs significantly reduced or eliminated by locating an LNG Fueled Electrical Generator off shore:
1. Initial and ongoing Pipeline costs to landowners (drain tiles, pipe floating, pipe leaks, pipeline deaths, inability to change operations to utilize land over pipe = limited use, harder to sell, lowered value, etc.)
2. Ongoing costs of LNG caused delays to all other shippers and users of the river.
Benefits to LNG promoters and the Environment:
1. The multitude of pipeline impacts would be eliminated, one of the cited reasons for the off shore alternative having failed to pass in California.

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- IND106-27 See our response to comment IND106-23.
- IND106-28 See our response to comment IND106-26.
- IND106-29 We did not analyze an alternative at Kalama, Washington because no developer had suggested that an LNG terminal be sited there. We have no data on the suitability of the Port of Kalama to handle LNG carriers, including the amount of dredging that may be necessary at an LNG terminal at that location. A shorter sendout pipeline from Kalama to the existing Williams Northwest system would be offset by other factors such as a longer LNG marine transit route, including a bridge at Longview. Furthermore, an LNG terminal at Kalama would require lateral pipelines to the Beaver Power Plant, Wauna Mill, and the Northwest Natural pipeline to the Mist storage facility.
- IND106-30 We addressed the feasibility of locating an LNG import terminal off the coast of Oregon in section 3.1.4. It is beyond the scope of this EIS to speculate on the environmental impacts of locating an electrical generation plant offshore. The ODE would be the state agency responsible for evaluating the siting of a power plant. Also see our response to comment PM1-58.

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- IND106-30 cont'd
2. Vaporizing the LNG would be much more efficient, utilizing waste heat from the electrical generator as well as sea water if necessary.
 3. More electricity would be generated more efficiently since no LNG would be needed to vaporized the LNG.
 4. Water and Air pollution would be reduced as no LNG would be needed to vaporize the LNG.
- Since it is known that the majority of the Bradwood Landing regasified LNG would be consumed in California, likely by Electrical Generating Facilities, then to provide efficient transmission of the electrical power to its intended customers, the Off-shore LNG Fueled Electrical Generation Facility would best be located off the California coast.
- If at some point there was evidence of a "high growth scenario" in Oregon bringing with it the increased demand for electricity then an Off-shore LNG Fueled Electrical Generation Facility located near Oregon could be considered at that time and compared to other available alternatives.
- IND106-31
- THE COSTS of various alternatives to Bradwood Landing or NorthernStar Energy should NOT be a consideration whatsoever. If it is, you are then saying the Safety of Public and All Costs to the Public and other businesses and individuals are secondary to the cost savings to an LNG project's first cost and not necessarily the LNG facility operating cost.
- Should the FERC or any other Agency or any of the other LNG project promoters be allowed to dictate the price of a human life, especially mine? Hardly. But for the record, landowners who produce food versus LNG: Can you live without food? Can you live without LNG? Does LNG have the potential for destroying food or fish habitat? Case closed.
- Conclusions based on the above items:
Superior efficiencies, minimized impacts, and minimized risks and costs to the Public and Private occur with the Off Shore LNG Fueled Electrical Generating Facility. It is only the First Costs which may be higher for this off shore alternative with Operating Costs lower due to the superior efficiencies.
- IND106-32
- TO ENSURE THE HONESTY OF ALL PARTIES INVOLVED WITH THE LNG AND SENDOUT PIPELINE, IF THE LNG FACILITY IS SITED ALONG THE COLUMBIA RIVER IT SHOULD BE A CONDITION OF PERMIT APPROVAL THAT ALL REGASIFIED LNG AND ELECTRICAL POWER GENERATED FROM IT BE CONSUMED WITHIN WA, OR, AND ID, SINCE THAT IS THE STATED GOAL "TO PROVIDE A NEW SOURCE OF GAS TO THE PNW". THIS WILL ENSURE THAT WE ARE NOT BEING PUT AT RISK FOR LITTLE OR NO BENEFIT. ENSURING REPRESENTATION FOR OUR TAXATION.
- IND106-33
- Even If the regasified LNG and electrical power generated from the proposed LNG facility remains in OR, WA, and ID, then there is no justification to site the LNG facility at Bradwood, OR when it can much more efficiently, with much less damage to the environment and to landowners, with an order of magnitude lower in length sendout pipeline, be sited near Kalama, WA or Portland, OR.
- On principle, if as all the project proponents claim, that the LNG is safe, has an excellent safety record, can be brought into the Columbia River safely, it should then be REQUIRED for this LNG project to disturb and impact the environment and all others as little as possible.
- IND106-34
- The current plan outlined in the DEIS impacts much more environment than is necessary and much more so than could be had with other viable alternatives.
1. Least Environmental and Economic Impact:
LNG FUELED ELECTRICAL GENERATING FACILITY LOCATED OFF SHORE with only electrical transmission cable coming onshore. Then LNG ships wouldn't affect river commerce at

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- IND106-31
- NorthernStar would bear the burden of paying for additional public safety services necessary as a result of its project, through a cost sharing agreement outlined in its ERP. No major sources of food would be destroyed as a result of this project. Impacts on fishery resources are addressed in section 4.5. See also our response to comment FA2-5.
- IND106-32
- Market conditions would determine where the re-gasified LNG is ultimately used. See our response to comment PM5-43.
- IND106-33
- See our responses to comments IND106-29 and PM5-8.
- IND106-34
- See our responses to comments IND106-29, PM5-8, and IND106-30.

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IND106-34 | all. LNG promoters still get to make money and have a much broader market.
cont'd | 2. Minimal Environmental and Economic Impact:
Locating LNG terminal in the Portland area, industrial areas and deep water port/terminal locations exist. Sendout pipeline has very short distance to distribution pipelines. LNG facility and pipeline would have a much lower impact on the environment.
3. Minimal to Some Environmental Impact:
Locating LNG terminal in the Kalama area. Deep water port/terminal locations exist. Sendout pipeline has very short distance to the planned distribution pipeline and Goble interconnect river crossing pipeline nearby.
4. Most Environmental Impact:
Locating LNG terminal at Bradwood, OR. Sendout pipeline has long distance through various wetlands, streams, and slide prone hills. LNG facility built on unstable base soil. Major and continual detriment to fish.
The worst environmental impacts, geologic risks, and navigational risks, by far, of any LNG facility location proposed for the nation and should be the outlier eliminated from consideration.

If the DEIS plan is accepted and permitted, it will demonstrate that the Agencies involved are more than willing to allow Foreign and Corporate interests to destroy USA environment and resources in almost any amount they so desire, rather than make as small an impact as possible.
It will also demonstrate the hypocrisy of those in authority, for if LNG is safe enough to travel past Boston, MA, and to bring into the Columbia River, yet deny it from being efficiently located in Portland, OR then those in authority such as the Portland CoE feel it is fine to put others at risk just not themselves. In other words its okay to put Astorians and others at risk just not themselves.
If a terrorist can take an LNG ship with little difficulty to Portland anyway (it seems only a few rifles and rocket propelled grenades would be all that is needed), what is the justification for not siting the LNG facility in Portland?

IV. POLLUTION and OTHER ENVIRONMENTAL IMPACTS
Pollution
IND106-35 | If the FERC, CoE, EPA, Oregon DLCD, Oregon DEQ and/or the Washington State DE allow Bradwood Landing to dump the pollutants stated in and also conveniently LEFT OUT of the DEIS into the Columbia River and Clifton Channel (incoming tides will take the pollutants upstream as well) that will result from the OUTDATED polluting technology described and planned for in the DEIS then the Agencies have completely failed to do their duty and need serious reorganization.
IND106-36 | Any and all building operators and any processes requiring heat, for the sake of energy efficiency and cost savings at the expense of the environment, should then convert to the same outdated polluting technology. If these supposed environmental protection agencies refuse to deny this backward step towards pollution, any business utilizing heat would then have the luxury at laughing in the face of these agencies and sue for equal protection, as they should.
IND106-37 | Directly exposing the LNG vaporizer heating water to flame products of combustion will introduce a number of pollutants into that heating water which may already have impurities from its source. The heating water will then have a portion that will be treated with acid neutralizing agents and dumped into the Columbia River.
Where is the table listing these items, quantities, their known detrimental effects, and cumulative impacts, such as carbonic acid, hexavalent chromium, benzene, PCBs, formaldehyde, and others, as well as the acid neutralizing agents' impact on fish and salmon sensitivity/death as a

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IND106-35 | Table 1.3-1 lists the major federal, state, and local codes, ordinances, statutes, rules, regulations, and permits that would apply to the project. NorthernStar would adhere to conditions of these permits. Each agency designs the permitting process to ensure that projects comply with the regulations set by each agency for the area of concern.
IND106-36 | The project would not pollute the Columbia River. See section 4.3.2.
IND106-37 | A table of the SCV constituents has been added to section 4.3.2.3. Section 4.5.2.1 includes a discussion of potential impacts on aquatic species due to the routine discharge of condensate water from the SCVs.

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- IND106-37 cont'd | result of exposure to such acid neutralizing agents (which are oftentimes considered "safe" but not to fish)?
- IND106-38 | The long term effects will be that these pollutants will get into the food chain and be detrimental to fish, humans, and other wildlife. Where are these long term costs to the Public and fishing industry and sport fishing industry delineated?
- IND106-39 |
- IND106-40 | It is stated in the DEIS that LNG will not mix with water in a spill, that it will only evaporate. That statement is also false. Previously FERC has mentioned spills at other LNG facilities, they described "a real mess". If as they claim in the DEIS, it only evaporates, then what causes the mess?
The super cold LNG will contact FREEZE the water along with the contaminants, pollutants, and material already in the river water. There will be mixing of LNG, being mostly the hydrocarbon methane, with all these things. There is a large amount of chlorinated fecal matter coming down the river from all the cities and towns upriver as well as pulp and paper effluents. (Following standard scientific procedures of course) get samples of water at different days and times at Bradwood, pour LNG into it, and send it to a lab to tell you how much hydrocarbon remains and what kind of other nasty combinations occur that will be impacting the fish, humans, and other environmental constituents. This information should be listed in the DEIS and other Agency Public Notices. It would seem extremely unlikely that FERC wouldn't be aware of this. It would only be a matter of time before some amount of spill from an overflow, backup, human error, or worse occurs (note various occurrences at other LNG facilities).
- IND106-41 | Where is the information listing the amounts of Methane that will be vented to the atmosphere when systems over pressure or cannot use the evaporated LNG in time and how it may impact the Air and Environment? At the very least an estimated quantitative information should be obtainable from other LNG facilities, by monitoring if need be.
- IND106-42 | Dredging Impacts
Bradwood Landing's analysis of the effects of dredging the turning basin is faulty. This large area deepening will scour out the salmon rearing grounds West of Bradwood over time.
- IND106-43 | In the DEIS Bradwood Landing states that the turning basin will need to have maintenance dredging every 2 to 4 years. This may be underestimating the short period of time generating large quantities of sediment build up.
- IND106-44 | Dredging the turning basin of approximately 50 acres:
The increased depth will also act as a large volume settling and catch basin causing the river to unload sediment there as the relative water speed slows into the area.
- IND106-45 | Water speed picks up sediment downstream:
Following the flow of the water downstream, when the ship turning basin bottom ends and the Clifton Channel bottom rises up to its undredged normal level, the water will have to increase speed to maintain the rate of flow coming into the channel. The increased speed (return to normal speed without dredging) enables the water to carry a larger load of sediment, and it WILL pick up sediment to replace that sediment which it unloaded into the large volume turning (catch) basin.
Results:
- IND106-46 | The downstream fish habitat will suffer scouring out and become deeper over time adding more sediment to the further downstream CRNC at bends in the river COSTING taxpayers more in CRNC maintenance dredging.
- IND106-47 | Bradwood Landing's paid for computer modeling is irrelevant when Actual similar river conditions can be used as evidence. It seems the only reason to use a computer to model the condition is to obtain the desired biased misinformation when actual similar river conditions can be
- IND106-48 |

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- IND106-38 | The long-term bioaccumulative effects of pollutants on fish, humans, and other wildlife resulting from construction and operation of the Bradwood Landing Project can not be characterized with the best available science. Bioaccumulative effects can result from a variety of physical, chemical, and biological processes. However, the concentration of contaminant levels reported in section 4.2.2.2 of the EIS does not indicate a significant biological effect is likely.
- IND106-39 | We have not identified any pollutants that would be produced by the project that could cause harm to humans or fish; see sections 4.2 and 4.10.1. Impacts on aquatic resources are addressed in section 4.5 and 4.6. Potential project impacts on fishing are discussed in sections 4.7 and 4.8.
- IND106-40 | Methane would not mix with water and freezing would be a temporary impact that would not alter existing contaminants in the river.
- IND106-41 | Section 4.10.1 has been updated to include the estimated greenhouse gas emissions resulting from the construction and operation of the project. Emissions resulting from upsets or system malfunctions are unpredictable and not considered reasonably foreseeable. As such, an evaluation of emissions and impacts from these events has not been included in the EIS.
- IND106-42 | While some downstream changes would likely occur as the river adjusts to the changes from dredging of the maneuvering basin, we do not believe the salmon rearing grounds west of Bradwood would be scoured out. See also our response to comment IND82-5.
- IND106-43 | This is NorthernStar's best estimate for maintenance dredging. Our review found it a reasonable estimate.
- IND106-44 | The EIS text has been revised to indicate that about 46 acres would need to be dredged for the turning basin. NorthernStar conducted modeling that indicates that the dredging would not greatly alter the flow or sedimentation of the river.
- IND106-45 | Sediment erosion and deposition is a dynamic and natural process. Changes anticipated to Clifton Channel and the main river channel as a result of the dredging are discussed in section 4.2.2.2.
- IND106-46 | See our response to comment IND106-42.
- IND106-47 | Data provided by NorthernStar, including modeling, were independently reviewed by staff, our third-party environmental contractor, cooperating agencies, and other agencies, such as the FWS and NMFS.
- IND106-48 | There is no evidence that the computer models used by NorthernStar were biased. The results of the modeling were independently reviewed by the FERC staff and appropriate resource agencies.

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IND106-48 | found.
cont'd

IND106-49 | Where is the disposal plan for the maintenance dredging of the LNG ship turning basin? Maintenance dredging without a disposal plan is not appropriate and should not be allowed. Without knowing the plan, the Public Interest is susceptible to compromise. It is extremely surprising that the CoE didn't require this prior to publication of the DEIS.

Pipeline Impacts

IND106-50 | If you have seen a pipeline installation. Any claims of "temporary impacts" are invalid whether to wetlands, water run off or drainage areas or to private property. The right of way above the pipeline is maintained clear of woody vegetation. The pipeline can have leaks or blowouts and require maintenance which will again disturb the area.

IND106-51 | The pipeline in saturated soils that giggle with tremors, earthquakes, and heavy equipment do not always stay at the level installed and can float upwards becoming exposed in some instances despite claims of precautions of concrete coatings to prevent this or the soil can settle or be forced downward around the pipe. Such conditions can severely affect the drain tiles in agricultural lands.

IND106-52 | The temperature of the Gas in the pipeline can affect the crops and vegetation.

IND106-53 | It is possible in hillsides with creeks and streams or abundant rainfall, pipelines can create abnormal water drainage along the pipeline, backing up water and creating weaknesses and mud slides. Obviously, the larger the pipe the larger the concern.

Additional

IND106-54 | Bradwood Landing will make the subset of "Lower Columbia River Humans" an endangered specie due to the real and/or perceived danger along the route of the LNG ships, in the area of the LNG facility, and along the sendout pipeline and new connecting pipelines. Some of these endangered Humans are in the agriculture industry whose agriculture activity support a wide variety of wildlife including endangered species of Deer, Geese, Birds of Prey, etc. through the increased and prime forage availability in agriculturally maintained lands.

When these Humans leave or are destroyed by LNG or regasified LNG incidents the agricultural lands will go fallow or be replaced by non agricultural industry and/or "mitigation" sites which many don't provide adequate forage or type, the essential ingredient for any specie, and not support the numbers of wildlife. (Note the huge budgets Congress allocates for acquisition of properties along waterways)

IND106-55 | This and follow on projects will further endanger the listed endangered species of "Lower Columbia River White Tailed Deer". Where will the US Fish & Wildlife Dept. get White Tailed Deer to replace those drowned in floods under their protection as has occurred in the past? Or to helicopter to other locations to attempt new group formations?

How will these Deer be able to traverse from group to group to ensure the strength of their gene pool when their pathway is blocked off by the expansive fenced footprint and continuous high levels of artificial light and noise as with the Bradwood Landing project directly across from the Tenas Illihee Island White Tailed Deer Refuge, the Deer, which swim across to traverse the other areas?

IND106-56 | How can the Agencies be said to have performed due diligence when all these items and other items identified by others have Not been addressed nor presented to the Public?

If it is up to the Public to identify many of the detrimental impacts of such a project, what is the purpose of the Agencies that are paid to and are supposed to be doing this work? If the project proponent analyses are accepted, then the whole process of Public review and comment is a scam on the Public, the Agencies should be relieved of duty, and be replaced by a Citizens Panel to

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IND106-49 | Permits for maintenance dredging, including all associated environmental review required under section 404, would be obtained from the COE.

IND106-50 | We agree that pipeline construction does create permanent impacts. These are addressed in various sections, including 4.4 and 4.7. See also our response to comment SA1-113.

IND106-51 | As discussed in section 4.3.1.4, NorthernStar would coat the pipe with a minimum of 4 inches of concrete to maintain negative buoyancy in areas of shallow groundwater (typically wetlands). This is a standard and effective mitigation measure when properly implemented. The proposed pipeline and associated aboveground facilities would be maintained as required by the DOT. Regular inspections would identify areas of pipe exposure or subsidence and corrective actions would be taken.

IND106-52 | See our response to IND33-38.

IND106-53 | FERC staff's Plan and Procedures include BMPs for construction in saturated soils. Section 2.4.2.2 also discusses special construction techniques. The proposed pipeline and associated aboveground facilities would be maintained as required by the DOT. Regular inspections would identify areas of pipe exposure or subsidence and corrective actions would be taken (see section 4.11.9.1).

IND106-54 | The EIS documents that the proposed project including mitigation would not result in significant impacts on humans and their environments.

IND106-55 | Section 4.6.2.2 and 4.6.2.3 have been revised to include additional information on the Columbian white-tailed deer due to construction and operation of the proposed terminal and pipeline facilities. See also our responses to comments PM3-68 and FA4-6.

IND106-56 | No information was withheld. Appropriate information has been included in the EIS to disclose to the public the potential environmental impacts associated with the proposed project, and comply with the NEPA. See our responses to comments IND33-9 and IND33-12.

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IND106-56 | protect the Public interest.
cont'd | How can the Public make comment on significant information that has been withheld, not included, or misinformed about? If the Agencies responsible do not have the appropriate information then they should not be issuing a DEIS or "Public Notices" until they do. PLEASE RESPOND WITH A LIST OF YOUR SUPERIORS' NAMES AND CONTACT INFORMATION WHICH HAVE REQUIRED YOU TO PUBLISH THE DEIS AND/OR "PUBLIC NOTICES" WITHOUT THE APPROPRIATE INFORMATION NECESSARY TO FULLY INFORM THE PUBLIC OF SIGNIFICANT IMPACTS. ALL I CAN SUGGEST IS THAT IT WOULD BE WISE FOR YOU TO DO SO AT THIS POINT.

V. ECONOMIC IMPACTS

IND106-57 | When dangerous LNG ships, their caused delays to all others utilizing the river, dangerous LNG facilities, and polluted diminishing numbers of salmon cause people to leave and less to visit, what will become of the viability of the Lower Columbia River communities as well as state and federal TAX and licensing REVENUE from them? The few industrial employed will not be able to make up the difference.

Claims of LNG not being dangerous or being safe are irrelevant even if it were safe. The perception of danger is enough to cause the effect. No matter what the advertising campaign, it would be difficult to convince folks that something is safe when it needs gunboat security which would be unlikely to prevent accident or attack.

IND106-58 | No adequate economic impact study was delineated in the DEIS. No delineation of the actual sequence of events which could and would cause economic impact were to be found in the DEIS. Such a delineation should include the path of the LNG ship beginning at the mouth of the Columbia River to its destination, listing all points along the way and associated impacts and potential impacts which would and could occur; Actual long term impacts to tourism, recreation, fishing industry including shellfish, import and export shipping, barge and river commerce, ports, jobs, population, schools, emergency management and services, etc.

IND106-59 | The premise of the Coast Guard's Waterway Suitability Report is faulty in many ways: Foremost is the ridiculous premise that LNG ships and the LNG facility could be successfully prevented from attack along the Columbia River. The city of Astoria, shore vegetation, river channels, canals, sloughs, and islands all provide sufficient cover for a successful attack. Claiming that an attack in this area is unlikely is merely misleading conjecture. There is absolutely no proof or factual basis that this area is less likely to have a terrorist attack.

The case could be made that an attack is More Likely since it would be much easier, with the multitudes of cover than in other locations, especially with any notion that it is "unlikely" causing the Coast Guard and/or other authorities to have lax or more lax security procedures than at other locations.

IND106-60 | What would be the corresponding economic impacts should a terrorist attack occur to an LNG ship at the significant points along the route? What would it be if terrorists took the LNG ship to Longview or Vancouver, WA or Portland, OR? How could this be prevented with terrorists already onboard an LNG ship having rifles and rocket propelled grenades which are easy to hide?

LNG Ship Caused Delays To Others

IND106-61 | 1. LNG ships will have a security zone around them with Coast Guard gunboat escorts and possibly others such as a helicopter with rifle, to enforce the security zone. There will be a lead tugboat which the LNG ship will be tethered to and a tugboat behind. All this will be moving

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IND106-57 | The safety of LNG carriers is addressed in section 4.11.5. See response to IND106-39.

IND106-58 | A discussion of potential socioeconomic impacts is included in section 4.8. NorthernStar commissioned a study performed by Dr. Philip Romano, of the University of Oregon, on the impact of LNG on the economy of the Pacific Northwest.

IND106-59 | Credible terrorist attack scenarios were developed in the WSA process including the measures needed to be in place to detect, deter, and respond. This was further analyzed in the WSR. The scenarios developed in the WSA and the WSR analysis are considered SSI and not releasable to the public. Also, a discussion on terrorism is included in section 4.11.8. It is possible that a release from the LNG storage tanks could be caused by an intentional act, such as a terrorist attack. Although an intentional breach scenario could result in greater thermal radiation in the immediate vicinity of the release, such scenarios are typically associated with the desire to inflict damage to major infrastructure and population and commercial centers.

IND106-60 | Section 4.11.8 includes a discussion of terrorism and security requirements that would be included as part of the proposed project.

IND106-61 | The safety aspects of LNG transportation by ship is discussed and summarized in section 4.11.5. The Coast Guard would be responsible for enforcing the conditions of its WSR. Pre-arrival and ongoing communication between the pilots, the LNG carriers, and other vessels that would occur would often assist in avoiding delays. In many instances, if a conflict with another vessel arrival or LNG carrier delay is anticipated by the bar pilots, other vessels may be instructed to increase speed and/or the LNG carrier may be instructed to decrease speed so as to avoid delays at the Bar.

K-1068

IND106-61

cont'd

slower and cause delays since other vessels will not be allowed to overtake the armada.

2. Since LNG ships require additional maneuvering room on CRNC turns, other ships would not be allowed to meet LNG ships on turns. At one time designated LNG Ship Passing Zones were proposed and located on a river map, which shows a great lack of understanding of river flow and ship movement. These LNG Ship Passing Zones are nothing more than a ruse to pacify those who don't know any better.

LNG Ship Passing Zones could not be enforced. How could they? Is the Coast Guard going to tell a ship to stop if it is about to pass through and leave a passing zone before the LNG ship gets there? This cannot happen since the ship, if it slowed enough or stopped, will not be able to maintain position on its side of the CRNC nor would it be able to slow or stop in time anyway.

Will LNG ships stop in LNG Ship Passing Zones waiting for other ships to pass through? And what if the timing is misjudged while the LNG ship attempts to make it to the next LNG Ship Passing Zone? "It would never happen" is yet another ridiculous notion.

What would happen to an LNG ship passing zone when the security alert level is raised?

Dependence on Global Positioning Systems(GPS) for accurate speed which relates to time to reach a passing zone will prove faulty since GPS systems are not always accurate, fluctuate in accuracy, and more so in the rain and other weather conditions. And what will occur when the LNG ship is delayed for some reason, any reason, such as an LNG escort tugboat that develops a performance problem? This could cause an LNG ship to meet another ship on a turn.

No depiction of LNG Ship Passing Zones were found in the DEIS so hopefully the silliness of this idea has been discovered and discarded.

It is unfortunate that the realization of safe transport of LNG on the Columbia River being a gross misjudgment has yet to occur by those same folks. What will that take, a catastrophe? How many ship groundings that have already occurred does it take to realize that an LNG ship which needs "extra room" on turns is an accident waiting to happen?

In general the passing zones are a joke and ships will likely time their outbound transit to coincide with arriving at Longview, WA at the supposed time the LNG ship is to be completely secured at the Bradwood terminal, so they can confirm that before passing the Longview area where sufficient anchorage exists along with available tugboats if needed to straighten themselves to get underway again.

Who will pay these ship operators for their additional expenses and time? Who will pay for the ship operators' waiting at the Columbia River Ports, due to LNG ships, waiting for the timing to be right to depart? How many delays will turn into 12 hour delays waiting for the next tide? A 12 hour delay to a ship can easily cost \$5000 and up.

Time is money in the shipping business and how many shipping lines will be lost due to LNG ship caused delays?

How many jobs will then be lost? How many more when there is more than one LNG facility along the Columbia River?

Why is LNG more important than any one else's business when Gas can be obtained by other superior means than LNG on the Columbia River?

IND106-62

Where in the DEIS are all the scenarios, for the LNG ship caused delays to all others who utilize the river, and time tables for review? If one LNG facility is allowed along the Columbia River, the likelihood of more than one through equal protection could easily result in 250 ships per year on the Columbia and the number could easily expand to 325 ships per year, with only 2 LNG facilities.

How will the Ports survive with all these delays? And the subsequent economic impacts of the domino effect of lost jobs which require less jobs in the service oriented businesses, etc.?

Individuals

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IND106-62

Our EIS discusses potential delays to other commercial ship traffic in the Columbia River is section 4.8.1.7, and takes into account the potential impacts on ship traffic resulting from more than one LNG terminal operating in the region under the cumulative impacts section 4.12.5. We assume the Coast Guard would require similar mitigation measures for managing the LNG marine traffic associated with the Oregon LNG Project as for the Bradwood Landing Project and, therefore, the cumulative impacts on shipping and the ports would be minor.

K-1069

IND106-63 Channel Deepening Project rightfully revisited
Considering the LNG caused delays to other ships, what then is the economic justification as measured by National Economic Benefits for the CRNC Deepening Project, from the furthest up river LNG facility to Portland? And for the whole length of the CRNC since the LNG shipments provide negative Economic Benefits to the nation draining the economy and increasing the balance of trade deficit?
Bradwood Landing should be paying for CRNC dredging at least from the Mouth of the Columbia up to Bradwood, OR; where is this mentioned in the DEIS?

IND106-64 Property Values
1. A Gas pipeline near or in a property makes those properties undesirable due to the risks of leaks and blowouts and the many deaths that occur due to pipeline incidents, lowering the value, and making it harder to sell. Has FERC verified the accuracy and completeness of the pipeline death statistics? No.
2. A Gas pipeline through a property limits the use of the property, lowering the value, and making it harder to sell.
3. Undesirable pipeline containing properties greatly reduces economic activity in that area. Even areas of scenic interest in WA state but having a pipeline through the property have proven difficult to sell.
I have heard one politician state that over time pipelines don't matter to property values and sales but not how long "over time" takes and whether I would be alive then.
The "don't matter" condition is ridiculous. The ONLY way that would occur is IF buyers were NOT NOTIFIED of the pipeline. This has been the case in some areas of the country where not even developers were notified and built residential property near or on pipeline right of ways, and likely the condition used for the "don't matter" incorrect notion.
Quite simply a property with a pipeline IS harder to sell. The only condition in which a property's "ease of sale" would equal that of the same or similar property without a pipeline is if it also had NO PIPELINE. Almost anyone looking at property for sale would avoid a pipeline unless significant price incentive were to be had, and many would not consider it at any price. This is only logical and makes the property much more difficult to sell and thereby reducing the economy of the area.
Real estate sales are an indicator of economic activity in an area because they are in themselves significant economic activity. Rising prices indicate increasing economic activity, falling prices indicate slowing economic activity and can indicate people leaving an area.
Who would buy property in such a pipeline route zoned agriculture or residential? People that don't want to move from the area or those that can't pass up or can't afford anything but a cheap price.
The pipeline condition doesn't make for a vibrant economy. Note that Cowlitz and WA State Realtors Associations are against the LNG project and pipeline. Note also that the national economy has been floated for quite some time on rising real estate prices and note that the economy is slowing along with falling real estate prices demonstrating the aspect of economic indicator.
Real estate activity is serious business and the LNG impact in reducing property values and making properties harder to sell, in this area which is economically bland as it is, will definitely worsen the situation.

IND106-65 Increased Energy Costs
Since the California Lieutenant Gov. stated that the majority of Oregon based LNG would come to California AND ALSO STATED THAT IT IS THE ROLE OF GOVERNMENT TO PROTECT CONSUMERS FROM MARKET MANIPULATION, SUBSTITUTING HIGH PRICED LNG

Individuals

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IND106-63 The project would not result in major delays for other commercial ships. See section 4.8.1.7.

IND106-64 A discussion of property values along the proposed pipeline route is included in section 4.8.3.3. Pipeline safety is discussed in section 4.11.9.

IND106-65 Market conditions will determine when LNG gas is price-competitive with other sources of natural gas. See our response to comment IND106-19.

K-1070

- IND106-65 | **FOR LOW PRICED NORTH AMERICAN GAS.**
 cont'd | And since it is a FACT that Foreign LNG arriving by ship will not guarantee lower Gas prices (Reference current price of Foreign Crude Oil arriving by ship which is in sufficient supply to garner a much lower price historically. It is not difficult to check historic API and EIA supply figures with corresponding prices.)
 | And since LNG ships can be held off shore or all the same claims of production or delivery disruptions due to weather, war, worker strikes, etc. as with crude oil.
 | It is highly likely LNG will bring higher energy prices.
 |
 | These conditions are a significantly negative impact to the local, regional, and national economies due to higher energy prices driving up the cost of everything else since it requires energy to make it, including heat and light. This is Not in the best interests of the Public.
 |
 | VI. RISK TO HUMANS AND OTHER
- IND106-66 | This is a formal request to protect from risk, impact, or disturbance by the Bradwood Landing project, all registered and eligible to be registered Cultural Resources, and do so as a former resident of the Clifton Bradwood area.
- IND106-67 | Either LNG is safe or it isn't. If it is safe as claimed then the LNG ship can travel to Portland much more efficiently to connect a short distance to several distribution pipelines than the planned inefficient long distance connect to distribution via expensive, dangerous, likely to fail in slide areas killing humans and starting forest fires which may kill more humans and wildlife, environment damaging sendout pipelines at and near Bradwood.
 |
 | If the LNG ship can't safely travel to Portland, or the Portland area is consider too populous for an LNG facility, then subjecting all of the people along the LNG ship route to the LNG terminal and possibly beyond in a terrorist LNG ship take-over situation, is more than hypocritical, it is an unconscionable breach of morality and ethics. It says you are more than willing to put all those people at risk but not the superior location of those who want the regasified LNG being NW Natural and Unions in Portland, OR having nearby distribution pipelines, large industrial and consumer base, deep water port with turning basins, etc.
 | What makes me wonder is why Portland folks aren't worried that a terrorist could easily take the LNG ship to Portland to explode; who is going to stop them if they have a few rocket propelled grenades on board? Could it be that they haven't been sufficiently informed of the risks by the Agencies that are supposed to inform and protect them but refuse to in favor of corporate and foreign interests?
 |
 | If terrorists exploded an LNG ship near Portland they could incinerate a 150,000 folks or more, start forest fires, and possibly wipe out the fuel supply for the region for a long while, wipe out lots of industry and other important structures that would take a long time to recover from if ever.
 | Ridiculous?
 | Oh no that would never happen, not here. Especially because it would be so easy for them, much easier than 911, and cause approximately 50 times the human toll. So don't even think about it. Give them permits and bend over for them since its the USA for sale to foreign energy interests again.
- IND106-68 | The LNG facility and sendout pipeline is an accident waiting to happen in this part of the river valley consisting of slide prone hills and saturated wiggly and easily displaced soil. Note 1996 and

Individuals

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- IND106-66 | As discussed in section 4.9.4, we are recommending that NorthernStar defer construction until: 1) cultural resource surveys are completed and evaluation reports, any required treatment or avoidance plans, and a cultural resources management plan are filed with the Secretary; 2) the SHPOs' comments on reports and plans are filed with the Commission; and 3) the Advisory Council on Historic Preservation has been given an opportunity to comment if any historic properties would be adversely affected.
- IND106-67 | NorthernStar selected the proposed location for the Bradwood Landing LNG terminal based on numerous factors. See also our response to PM1-1 and LA3-55.
- IND106-68 | Landslides are addressed in sections 4.1.3.3 and 4.1.4.3. NorthernStar's ERP would address emergency routes.

K-1071

- IND106-68 | 2007 hills sliding and blockage of US Highway 30 in the Clatskanie Oregon area. Note that Clifton Road slid out a few years ago. Note hills sliding and blockage of WA State Route 4 in 2006 and previously.
cont'd | What escape route is planned when these roads are blocked again and occurs in conjunction with an LNG tank failure or sendout pipeline blowout caused by a slide or an earthquake?
- IND106-69 | What escape route, what emergency measures, would prevent a large loss of life, what means of safety would prevent a catastrophe, when a 7/8ths empty GASOLINE ship INTENTIONALLY strikes the LNG ship in front of Astoria, had been set to and is then exploded?
- IND106-70 | Imagine what a broken or ruptured 1300psi 36 inch gas pipeline turned blow torch could do to the forests around here. But who cares about loggers and the timber products industry anyway... not to mention the people, pets, livestock, and wildlife that would be killed. What pipeline in this area hasn't leaked or broken? There isn't any! The big difference is the pressure and volume of gas that will be coming through the proposed sendout pipeline. Its destructive capability far exceeds that of the other pipelines in the area.
- IND106-71 | Since pipelines in the area readily leak or fail due to the geologic and soil conditions it doesn't make any sense to allow this pipeline to go through any area where people reside nor the residential areas Non-odorized.
What good is any taxpayer supported government agency that will not represent the Public's safety interest and require the sendout pipeline to be ODORIZED? The only reason given by NorthernStar Energy[Bradwood Landing] Joe Desmond when questioned was that industry doesn't want it odorized.
HOW CAN THIS BE IN THIS DAY AND AGE THAT THE PUBLIC AT LARGE IS EVEN BEING CONSIDERED TO BE PUT AT RISK WITH NO WAY TO SAVE THEMSELVES FROM GAS PIPELINES WHICH IT IS ONLY A MATTER OF TIME BEFORE THEY LEAK OR BLOW OUT? THIS SHOULD NOT BE ALLOWED AND ODORANT SHOULD BE REQUIRED IN THE PUBLIC INTEREST AS A PERMIT REQUIREMENT.
Why is it that we are to be put at risk to save industrial customers money? This not acceptable. If Bradwood Landing gets to claim PUBLIC use and necessity "utility status" for eminent domain to plow through everyone's place then the PUBLIC should be able to request and receive Public protections.
On behalf of the Public, I request those protections and request Odorant be put into the sendout pipeline at Bradwood, OR.
If industrial customers don't want to have to remove the Odorant then they don't have to buy the Gas. They can chose to find or develop a less costly method of odorization and removal or odorant that doesn't require removal for their processes or use the standard methods when economic conditions warrant.

It is and has been the position of Bradwood Landing to NOT introduce Odorant into the sendout pipeline so it should be clear that the PROJECT CANNOT MOVE FORWARD DUE TO PUBLIC SAFETY AND PERMITS SHOULD BE DENIED.
It also should be clear that Bradwood Landing is not in the Public Interest.
- IND106-72 | The sendout pipeline has the ability to blow out levees which it passes under causing flooding of entire diking districts and wiping out the farms and businesses within them. It is the duty of the CoE who have authority over such levees to protect them. Again, how is LNG, which is unnecessary for the PNW, more important than anyone else's business, especially the food

Individuals

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- IND106-69 | Security measures would be in place to mitigate risk from terrorist attacks on LNG vessels. Also, a discussion on terrorism is included in section 4.11.8. It is possible that a release from the LNG storage tanks could be caused by an intentional act, such as a terrorist attack. Although an intentional breach scenario could result in greater thermal radiation in the immediate vicinity of the release, such scenarios are typically associated with the desire to inflict damage to major infrastructure and population and commercial centers. See also our response to PM1-1 and LA3-55 on emergency response plan.
- IND106-70 | Pipeline safety is addressed in section 4.11.9.
- IND106-71 | See our response to comment PM5-81.
- IND106-72 | The pipeline would not blow out levees. The proposed pipeline would be constructed in accordance with the regulations included in the DOT's Minimum Federal Safety Standards in 49 CFR Part 192. The COE would ensure, through its permit process, protection of all areas under its jurisdiction. The project would not impact food production; see our responses to comments IND33-59 and IND33-71.

IND106-72
cont'd

production business? Can you live without food?

IND106-73

There is information available which links a home being totally destroyed in a Gas explosion from regasified LNG which dried out connection seals. Regasified LNG is known to be typically hotter and to dry out seals.

The Gas [equipment] Manufacturers Association has stated that they have concerns about LNG, consider it damaging and don't recommend it for their equipment.

IND106-74

There is no law that states that this permitting must be approved. There are several laws that must be fractured to allow its approval, such as Coastal Zone Management Act regarding Clatsop County and State planning goals 11, 12, and 16.

However, the permit should be denied on any number of reasons, the foremost being Public Safety since it truly is impossible to protect the Public from a geologic or terrorist or human error caused incident or catastrophe nor Gas price manipulation without permit denial.

VII. VERIFICATION, ADDITIONAL COMMENTS & QUESTIONS

IND106-75

Just because Bradwood Landing and/or their contractors or other entities in support of their project have supplied FERC and other Agencies with studies and/or data, it certainly doesn't mean that it is accurate or addresses the situation, condition, item, or question adequately or appropriately. Quite the opposite, the Bradwood Landing DEIS demonstrates inaccuracy and incompleteness to the level of which relegates it to fiction. It is the duty of the Agencies to independently verify DEIS information in the Public Interest. The FERC consultants used to produce the DEIS are fully inadequate to the task and FERC reputation suffers as a result.

IND106-76

Note that the DEIS does not adequately describe ALL the discharges, their impacts, and cumulative long term effects, especially the discharges into the river. The DEIS is premature at best since this information should be readily available.

IND106-77

Further, of the information that State and Federal Agencies have requested regarding the LNG project but never received, the Agencies must stand firm against pressure, which they failed to do with the DEIS, and withhold publishing any approvals, permits, or Final Environmental Impact Statements until the information is supplied and have had independent analysis to confirm or deny that information. Failure to do so would be a failure of duty, a breach of the Public Trust.

In many instances Bradwood Landing et al has supplied outdated information and data, or removed sections of data from data available that are inconvenient for their purposes. Note the dates of several of the data/information in the DEIS.

No mention of the LNG ship which caught fire in the Middle East, I believe off the coast of Jordan or in that region. No mention of LNG coming from Iran, the source for the proposed LNG facility at Port Westward as stated by the project proponent. That project proponent has stated the project is not dead. Likely waiting for Bradwood Landing approval so that it can get approval through equal protection ruling as will Oregon LNG.

IND106-78

I've heard representatives of organizations supposedly representing the interests of shippers and longshoremen claim to Clatsop County officials that they "have looked at the issue and support LNG coming into the Columbia" yet they cite nothing about how they came to this conclusion excepting the honesty of NorthernStar representatives, which is one of the biggest jokes of all. Note all the misinformation, misuse of risk analysis techniques, omission of inconvenient information, and misleading statements contained in the DEIS.

One can only wonder what all those in support of LNG were promised and what will happen

Individuals

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IND106-73

See our response to comment IND67-13.

IND106-74

Public safety is addressed in section 4.11. Clatsop County made a land use decision about the project on March 20, 2008, as discussed in section 4.7. The ODLCD will determine if the project is consistent with the CZMA, as indicated in sections 1.3.9 and 4.7.2.4.

IND106-75

We agree it is the duty of the cooperating agencies to independently review and analyze data provided by NorthernStar.

IND106-76

Water appropriations and discharges associated with construction and operation of the proposed project are described in table 4.3.1-1. In addition, discharges to surface waters and their associated impacts are described in sections 4.3.2.3, 4.3.2.4, and 4.5.2.1. Water discharges to the Columbia River would be carried out in accordance with the requirements of the NPDES permits issued by the ODEQ and WDE.

IND106-77

See our response to comment PM6-94. While NorthernStar does not have to disclose the source of its LNG, it is more likely to come from exporting nations around the Pacific Basin than from Iran. LNG carrier accidents are discussed in section 4.11.5.

IND106-78

Section 4.8 discusses socioeconomic impacts and potential economic benefits for local communities. We assume people support the project because they want to see new supplies of natural gas made available to the Pacific Northwest through the importation of LNG, and they appreciate the potential economic benefits the project may have.

IND106-78
cont'd

to them when the investigation begins.

IND106-79

A prime example of misleading, is stating that the Gas is for the PNW. Independent analysis by the Oregon PUC, by the California Lieutenant Governor, and analysis by Columbia Riverkeeper shows this to be false. Even the DEIS description of the LNG project connection to the Palomar pipeline project proves this to be false, fortified by the fact that Williams pipeline cannot take the Bradwood Landing sendout pipeline capacity, is at capacity now and has no demand for more. On this basis alone there is no justification for the Public safety risk, pollution, habitat and economic damage along the Columbia River.

IND106-80

Bradwood Landing's claim of about 65 jobs is ridiculous. Their own prospectus states about half that which is also likely high. It is a for profit business so employees will be minimized. Why would they have any more than the following?:
1 manager/system operator
1 system operator
1 boom operator
1 millwright
1 electrician
3 security/firemen/tie up tenders
125 ships/yr X 24hr turn around = 60hrs/week
At two 12 shifts but only 30hrs/week each.
16 full time facility staff
Plus 6 tugboat employees, only 1 shift needed.
So 22 - 25 full time employees.
Their purpose is to sell Gas not hire people. This number of employees doesn't warrant all the jobs lost due to decline in recreation, import/exports shipping lines moving to elsewhere due to LNG caused delays on the river as well as to other river commerce and river users.

IND106-81

An Agency needs to step forward and halt this insanity and abuse of eminent domain of a sendout pipeline that connects to an already full pipeline. The FERC is best positioned and equipped to step forward and serve the Public Interest in denial of this PROJECT APPARENTLY BUILT ON DECEPTION.
Even if Bradwood Landing convinced Williams pipeline's suppliers to shut off supply to Williams so that Bradwood Landing could have the capacity, Williams pipeline could only handle part of the Bradwood Landing capacity. Yet Bradwood Landing states emphatically that the Palomar pipeline is separate and not part of the situation and unneeded ...more dishonesty from Bradwood Landing. It would take an inordinate amount of time to list it all and is not my job.
It is the job of Agencies to verify. Is there no penalty for lying the way through the permit process to get a project in?
What conflict of interest does FERC have regarding LNG and with Bradwood Landing?
Former FERC employees who are still friends with FERC management is a conflict of interest.
FERC literature PROMOTES foreign LNG, foreign energy being something that as a nation we should be and the President has stated that we should be weaning ourselves off of, yet their is a mad rush to get numerous LNG facilities authorized before the President's term is up, why is that?
This situation should be investigated for a blatant breach of the Public Trust.

IND106-82

The DEIS also states that the other gulf states authorized LNG sites are not considered suitable due to the distance from the proposed market area. This is an insult to anyone's intelligence who has any idea how far Gas already travels from pipeline to pipeline and is being proposed to travel in

Individuals

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IND106-79

See our responses to comments PM1-58 and PM3-50.

IND106-80

The number of employees that NorthernStar has indicated would be required during operation of the proposed project is in line with those required at similar facilities. There is no evidence that the project would result in a loss of jobs in other sectors. No declines in recreation or tourism are expected. There would not be major delays for commercial ships or other river users. The project would probably have a beneficial impact on the local economy; see section 4.8.

IND106-81

See section 1.0 for a discussion that although the existing Williams Northwest system is fully subscribed, it is still possible to find capacity for new entrants through a variety of programs, including interruptible transportation, capacity releases and turnbacks, and reverse open seasons. There is no conflict of interest for this project, see our response to comment PM3-65.

IND106-82

See our response to comment IND106-25.

K-1074

- IND106-82
cont'd | pipelines to "proposed market areas". Note the "Rocky Mountain Express" pipeline heading East.
- IND106-83 | Where is the independent unbiased Gas needs analysis for the Nation and the PNW? There can be no reason to warrant such risks and detrimental impacts in the Lower Columbia River Valley without a profound need. Obviously "independent" does Not include FERC nor the NW Gas Association whose major member is NW Natural a driving force behind LNG here so it can get a piece of the pie of Gas transmission to California.
- IND106-84 | The DEIS states, regarding the British Columbia, Canada authorized Kitimat LNG facility Gas that "only a portion would end up in the United States as most would probably go to Canadian markets". However NO EVIDENCE was given at all, nor regarding "most". No analysis of the British Columbia and Alberta Canada Gas equation. It is just as "probable" that more than sufficient supplies will be heading for the PNW and California from this facility.
Nonetheless, the Kitimat facility output, claimed to be about half that of Bradwood Landing, could be increased since it has storage capacity and pipeline size similar to the Bradwood Landing proposal.
It is just as likely that the Kitimat facility proponents have done their market analyses and don't foresee any more required supply to their Canadian, PNW, and California markets or they would have proposed increased supply capability or will do so WHEN a market for it develops.

FERC SHOULD DENY ANY PERMITS UNTIL FULL AND HONEST DISCLOSURE OCCURS.
- IND106-85 | THE EASIEST WAY TO VERIFY THAT THE GAS FROM THE LNG IS FOR THE PNW IS TO REQUIRE THAT AS A CONDITION OF PERMIT APPROVAL, THAT IT CAN ONLY BE SOLD WITHIN WA, OR, AND ID, AND THAT ALL ELECTRICAL GENERATION FROM THE GAS IS SOLD IN WA, OR, AND ID.
IF NOT THEN ALL PROPOSALS OF ANY TYPE CAN BE AFFORDED THE SAME LACK OF SCRUTINY OF DISHONEST STATEMENTS OR MISLEADING STATEMENTS, INFORMATION, AND DATA AND/OR LACK OF PERTINENT DATA AND INFORMATION.
- IND106-86 | The map of geologic fault lines included in the DEIS is incomplete at best. Note State of Oregon geologic comments. A true assessment of the geology of the area should require a permit denial to protect the Public unless Authorities purposefully intend to endanger the lives of those within 7plus miles of the LNG facility and within a half mile of the sendout pipeline, according to Sandia Labs modeling of a storage tank failure and ACTUAL pipeline incidents of similar size and pressure. If a major leak occurs Gas can accumulate into a wide area before reaching an ignition source or asphyxiate animals including humans before it reaches an ignitions source.
- IND106-87 | How is it that the US Coast Guard does NOT approve of LNG ships in other locations which are less difficult to safeguard than the route to Bradwood? Note US Coast Guard ruling at another proposed location. In truth it only shows the political and other pressure which has been applied to the Coast Guard in this district, with no regard for the safety or livelihoods of the many affected in this area and beyond. This situation is not in the Public Interest.

If one LNG facility is permitted here, the likelihood of more than one LNG facility along the Columbia River is high via equal protection. To provide for the Public interest, delays to all other ships, barges, and users of the river, should be determined for all scenarios. Many imports and exports come and go on a high tide as will the LNG ship. Timing conflicts and delays to other ships

Individuals

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- IND106-83 | See our response to comment PM1-8.
- IND106-84 | Our information was derived from the proponent of the Kitimat project, who indicated their target market was the tar sand oil production region of Alberta.
- IND106-85 | See our response to comment IND106-32.
- IND106-86 | Methane from a pipeline leak would not accumulate in a wide area at concentrations such that animals and human would be asphyxiated.
- IND106-87 | As discussed in section 4.8.1.7, the project would have minor impacts on other ship traffic. The delay scenarios for multiple non-existent LNG terminals are beyond the scope of the EIS. The majority of this comment is not relevant to the EIS

K-1075

IND106-87 cont'd | will occur. Even if only one LNG facility the delay scenarios for one and two and three should be outlined, why has this important issue been avoided? Because it is so damaging to Bradwood Landing, yet FERC is supposed to be an Agency of the government not of Bradwood Landing. Will FERC cause this information to be developed in the Public interest?

Why has the Port of Portland director told his staff that he is satisfied with LNG ships on the Columbia River without doing an actual in depth analysis? Why does he consider it a hands off issue? Who is he subordinate to on this issue? Why is he willing to screw all the port waterborne clients, those port workers, all the economy they affect and to benefit FOREIGN ENERGY INTERESTS which funds may go to kill our troops? Who is really calling the shots on this deal? Why is LNG so important? In truth it isn't at all. LNG is only important to those who plan to make money from it, otherwise it wouldn't even be considered here as their is absolutely no credible proof that LNG is needed in the Columbia River, and wasn't until LNG facility proposals met roadblocks in California. Why did the Stoel Rives attorney, the firm that also represents the Port of Portland, move to NW Natural VP slot in 2005 who also happens to be the wife of Congressman Blumenaur? Why does Blumenaur support LNG in the face of the lack of need? Please delineate all the other conflicts of interest such as all the Senators who have gained benefits from the energy lobbies that voted to give FERC powers that it should not have under the Constitution.

Where is the table of CONFLICTS OF INTEREST regarding this project so that the Public can be fully informed?

IND106-88 | Why should landowners along the proposed sendout pipeline route to the Williams pipeline connection be required to put up with a dangerous pipeline, loss in property value, hard to sell property, limited use property, when the Williams pipeline HAS NO ROOM FOR THE GAS?

IND106-89 | At the very least since the LNG sendout pipeline gets "public utility" status to plow through anyone's property and we all in the region have to live with the risk. We should get to VOTE on it like we did the Trojan nuclear plant. Interestingly the vote passed to keep Trojan since the Public was misled into thinking we needed the energy. The promoters of Trojan claimed that the area was solid and no reason to worry, however, later it was found to be on a fault line.

Statements in the DEIS about Trojan Nuclear plant are also false. Note that its vote passed. Misleading the decision makers regarding Alternatives to Bradwood Landing, such as nuclear not being acceptable to the Public, as well as the Kitimat conjecture, and gulf states LNG facilities inaccurate "opinions" should not be allowed.

WHERE IN THE USA IS A WORSE PLACE FOR LIKELIHOOD OF AN LNG FACILITY TANK BUCKLING, WORSE FOR FISH, WORSE RISK OF FOREST FIRES, WORSE PROBABILITY OF PIPELINE FAILURE? EASE OF TERRORIST ATTACK TO LNG SHIPS OR FACILITY?

Maybe next to a volcano? Oops! Mt. St. Helens anyone?

IND106-90 | Where is the EPA Public Notice regarding the unnecessary pollutants going into this interstate waterway? Tides will take the pollutants upstream into the main river channel and over to WA areas as well throughout the salmon rearing grounds West of Bradwood. Has FERC and/or Bradwood Landing notified the EPA of the "stuff" it is going to be dumping into the Columbia River continually while the facility is in operation for the life of the facility?

IND106-91 | It is worth noting that the Mayor of Boston, MA is completely against the LNG ships passing in front of Boston and has stated that the LNG facility should be located where the LNG ships would

Individuals

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IND106-88 | See our response to comment PM3-50.

IND106-89 | The Commission will determine if the project is a utility in the public necessity. The U.S. Congress gave certificated companies the power of eminent domain through section 7h of the NGA. Our discussion of nuclear power in section 3.1.1.3 indicated that it would not be a viable alternative for several reasons, including costs, problems associated with the remediation of nuclear waste, regulatory hurdles, long project planning time, and public opposition, based on a variety of cited sources. Likewise, our descriptions of the Kitimat and Gulf Coast LNG terminals are accurate, and based on cited sources.

IND106-90 | Although the EPA is involved in the review of the project's permit under section 404 of the CWA, this permit is actually issued by the COE. The COE issued a public notice on October 18, 2007. However, if the COE issues a section 404 permit, the EPA can veto the COE permit (see table 1.3-1). Section 401 of the federal CWA requires applicants for federal permits or licenses to provide the federal agency a water quality certification from the state agency if the proposed activity may result in a discharge to surface waters. The EPA delegated the project's section 401 certification to the ODEQ; the state issued a public notice on October 18, 2007.

IND106-91 | Each project and project location has unique characteristics and must be considered on its own merits.

K-1076

IND106-91
cont'd
be away from the city. Obviously he has the best interests and safety of the people of Boston at heart. Why don't the Agencies have the best interests and safety of the people in Astoria, OR at heart?

IND106-92
At a FERC hearing in the area, FERC representative Mr. Freidman stated that they cannot do anything outside of their current directives unless Congress asks them to.
Ron Wyden stated publicly in Astoria in 2006 that he had requested FERC to do a rating of proposed LNG facility locations around the country and make a table of merits and demerits so that poor locations would be omitted.
Where is this rating? If it hasn't been completed, then it should be required to be completed before a decision is rendered on permitting of Bradwood Landing.

IND106-93
The Coast Guard didn't call for the WSA to be kept from the Public, NorthernStar Energy did and got their friends at Homeland Security to implement that scam.
When a terrorist will be able to observe everything they would need to know, after the LNG facility is built, there can only be damaging information to Bradwood Landing's project in the WSA for them to want it kept from the Public. Allowing such is subverting the Public interest. The appropriate individuals with Homeland Security and NorthernStar Energy should be investigated for conspiracy against the Public interest and preventing due process.
Why would the avid fence sitter Congressman Baird come out against LNG on the Columbia but only after reading the WSA as he was able to do with his security clearance? What does he know that the rest of us should know?
Why would an Emergency Response Plan be kept secret? The only way people can follow "the plan" is if it is known! It seems that it is held secret because there IS NO CREDIBLE PLAN. They don't want to jeopardize their project when the people realize they will be dead in any number of scenarios. Another breach of the Public trust and due process.
No Action until the full WSA and ERP is made public seems the only route to take in safeguarding the Public.

IND106-94
VIII. ENDING COMMENT
Regarding the Agencies' permit decisions being based on the "probable impact on the Public Interest", "reflecting national concern for protection and utilization of resources", and "balancing expected benefits against foreseeable detriments":
The large number of omissions and misinformation demonstrate the DEIS should be recalled and revised.
There is enough information in this document to show how the negative impacts to the Public greatly outweigh the positive impacts of LNG ...since the LNG isn't needed here, that LNG positive appears to just be a low number of jobs which can be had by other less destructive means. It would seem concern for protection of the heart healthy food source of salmon and the fishing industry including sport fishing would be much higher than destroying it for unneeded LNG. It would also seem that delays making our grain exports less competitive would not be desirous either. It would be good to see this decision matrix in a revised DEIS.
Although it may take some creative thinking to straighten the bent Agency knees to corporate-political greed of those above you, I urge you to make this effort on behalf of the Public, multitudinous costs to the Public of this LNG Trojan Horse, and costs to our brave soldiers, who will benefit greatly from less foreign energy, when we truly have all the energy we need for 500

Individuals

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IND106-92 The FERC's regulatory responsibilities have been established in legislation passed by Congress and signed into law by the President. With regard to Senator Wyden's letter, see our response to comment PM2-32.

IND106-93 WSAs for all LNG projects are filed as SSI. See also our response to comment PM6-23.

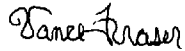
IND106-94 The analyses in the EIS indicate that the project would not destroy salmon or fishing in the lower Columbia River, project-related impacts on salmon can be mitigated, and it may cause only inconsequential delays for grain cargo ships using the river. The EIS does not contain misinformation or omissions and is adequate to comply with the NEPA. The Commission will ultimately decide if the project is in the public interest and is necessary.

years to come. And with 4 existing and 3 already authorized LNG facilities in the USA along with those in Canada and Mexico, there is more than enough LNG coming to the USA (Note previous FERC Chairman comments).

One can never forget who owns the large media, Wallstreet corporations do, and energy company profits are riding high the more they claim energy is in short supply. And it is very difficult to justify high prices without a plausible method why energy could be cut off at any time.

Thank you for all the efforts, to the Patriots of the USA!

Sincerely,



Vance Fraser

cc: EPA
Senator Ron Wyden (see next to last page)
Senate Energy Committee members
House Energy Committee members

Individuals

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K-1077

Frans G. Eykel

199 Ostervold Road
Cathlamet, WA. 98612
360 849-4254
frainseykel@yahoo.com

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC. 20426

December 17,
2007

Re: Docket No. CP06-365-000 et. Al

Dear Ms. Bose,

Thank you for the opportunity to comment on the FERC DEIS for the Bradwood Landing Project.

IND107-1 | A major concern to me seems the amount of river water intakes at up to 35,000gpm¹ and the secrecy of the applicants intake strainer design. The applicant should be able to show a percentage of fish kill due to impingement or other causes just as our hydro projects on the river.

IND107-2 | Footnote d, page 4-53 States the applicant to offer incentives to retrofit LNG carriers with a water intake system. **Should not the FERC in good judgement DEMAND that all LNG carriers on the Columbia River be equipped with such a system.**

2.8.1.3. Hazard Control System.

IND107-3 | The applicant seems to omit a High Expansion Foam system (HEFS) as this would be one of the only systems to extinguish a fire of this source.

3.1.6.3 Alternative Vaporization Technologies.

IND107-4 | Page 3-42, 3-43 The applicant should be limited to the highest environmental standards in regards to air and water quality, therefore only the STV system should be allowed in this environmental sensitive area. This system will not discharge water into the river and the exhaust can be treated by means of a Selective Catalytic Reduction (SCR) and Oxidation Catalysts system.

Page 2.

¹ Page 4-53, table4.3.1-1

Individuals

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IND107-1 | Potential impacts on aquatic resources due to water intake are discussed in section 4.5.2.1. See also our response to comment PM1-131.

Engineering views of the pump station have been submitted to the FERC for review; however, these design drawings are considered proprietary information and are not available to the public.

IND107-2 | See our response to comment PM1-31.

IND107-3 | High expansion foam is discussed under Safety and Security Systems at the LNG terminal in section 2.1.3.6.

IND107-4 | SCV systems are commonly considered in the design of LNG import terminals throughout the world. Their proven operational history, low capital cost, simplicity in design and operational flexibility combine to make this an attractive option to LNG terminal developers. While it may be technically feasible to use a vaporization system with reduced emissions and/or water discharges, the use of the SCV system would be required to operate within acceptable air and water quality standards.

K-1078

4.1.3.3 Geologic Hazards.

Shoreline Erosion, page 4-15, 4-16

IND107-5 | This subject is totally to the advantage of the applicant with statements such as “The results indicate that the potential for bank erosion due to the high velocity created by a tugboat would be low for the shoreline along Puget and Tenasillahe Islands”. Regardless what the circumstances of high or low velocity fields, the applicant needs to assume responsibility of additional erosion due to their operation, and I request this to added to the FEIS.

Site Suitability

IND107-6 | The applicant controls 411 acres, with a facility footprint of 40 acres and a permit application for 13.71 acres of tidal and non-tidal wetland fill, wouldn't the FERC ask the question “Is this a suitable site”.

1.1 Purpose and Need.

IND107-7 | Page 1-3, This whole chapter is a case of salesmanship as the need is not realistic nor the ability to subscribe to some of the pipelines. The FERC should DEMAND from the applicant to be truefull.

2.1.5 Wetland and Habitat Mitigation.

IND107-8 | The FERC and other agencies should not allow or accept Svendsen Island's² mitigation to offset the lost of habitat, due to this was in process of being returned to its natural state. Hunt Creek³ is currently a beautiful fish rearing creek in a natural setting, why mitigate this site, unless the applicant destroys it during construction. FERC and other agencies should DEMAND robust and significant mitigation sites.

4.8.1.3 Property Values.

IND107-9 | The applicant is unaware of any studies that have been done relative to the effects on property values, etc.⁴. I disagree with the applicant and will be able to proof the opposite⁵, the applicant should accept responsibility for their effects on the disruption of life on the river and the residents. Page 3.

4.12.7 Air quality and Noise.

² Page 2-29, fig. 2.1.5-1.

³ Page 2-29, fig. 2.1.5-1

⁴ Page 4-323

⁵ Preliminary Assessments of Economic Impacts from the proposed Bradwood LNG Terminal, Julie Ann Gustanski, Phd.

Individuals

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IND107-5 | See our response to comment PM3-18.

IND107-6 | The site was formerly occupied by lumber mills and has been used for disposal of almost 1 million cubic yards of dredge spoils. It is zoned for industrial use. The purpose of the EIS is to look at a myriad of factors to determine whether the site would be suitable for the proposed use.

IND107-7 | See our response to comment PM1-8.

IND107-8 | See our response to comment FA3-3.

IND107-9 | The referenced study has not been filed with the FERC as part of this proceeding, so we are unable to address this comment. We do not believe that the proposed project would cause major disruptions to regional residents and river users. There are already existing industrial facilities operating along the lower Columbia River.

I totally disagree with the statement made in this paragraph⁶, such as “These effects could add to the ongoing air and noise impacts in the project area”.

At this time there are no other effects on the local area, unless the applicant is granted a permit. If granted a permit, this will indeed add a significant air quality problem to the upriver areas of Longview/Vancouver and Portland with a known airshed problem during the summer.

Conclusion.

The applicant and the FERC DEIS have been less than truefull about their representation of the facts and/or minimized the negative impacts to the river, estuary, cumulative impacts of water and air quality, socioeconomic impacts on the river communities.

Very truly yours,

Frans Eykel

Cc: Maria Cantwell, US Senator, WA.
Gordon Smith, US Senator, OR.
Ron Wyden, US Senator, OR.
Chris Gregoire, Governor, WA.
Theodore Kulongoski, Governor, OR.
Brian Baird, US Representative, WA.

⁶ Page 4-457

Individuals

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ORIGINAL

Steven Miller and Erika L. Miller
7915 NW Skyline Blvd
Portland, Oregon 97229

Docket CP06-365-000
OFFICE OF THE SECRETARY

December 20, 2007

2007 DEC 27 P 3:37

Federal Energy Regulatory Commission
Comment on the draft EIS for the proposed Bradwood Landing LNG Project

We urge you to stop the Bradwood Landing LNG project.

IND108-1 | Objection #1: There is an unacceptable level of risk to the community. There is not a sufficient guarantee of public safety. From the information buried in the Oregon Department of Energy's Appendix K, the Safety Advisory Report, there is an assumption that local jurisdictions will be able to upgrade their capability to handle a LNG emergency situation. Where is an assessment of their current capability? Who will pay for upgrades if they are found lacking? Should the cost of the upgrades, no doubt in the millions, be born by the community for the benefit of a private corporation? Is this the best use of limited public funds?

IND108-2 | Objection #2: There was very brief mention in 5-8 of the "impact of marine release of LNG with ignition." This needs to be explored further and analyzed. How will Columbia County be able to respond? How can the firm assure us that there will not be such a "significant event?" As we know from Three Mile Island and the Valdez spill, just because the odds are "remote" does not mean they do not happen. I do not believe that the very limited benefits to our community outweigh these huge risks.

And, if an incident occurs, who cleans it up? The state? The county? The firm? Would a several billion dollar bond be appropriate?

IND108-3 | Objection #3: The report in section 5.1.7 refers to the population of our area as less than 500 people, as though damage to our family and property counts less because we're fewer in number. Our area seems to be especially vulnerable to economic justice issues because it's difficult for a county of our size to respond to the complexities of such a project.

IND108-4 | Objection #4: I was surprised at the public meeting in Longview to see no educational material available for the dozens of people who cared to show up, not even a map. The draft EIS was written in such a way that makes it difficult for a non-professional to understand it. There are no maps, it's full of acronyms, and important information to the community is buried in its depths. Something as basic as having the address and/or email printed on a meeting notice so that people can send in their comments is missing. This strikes me as an economic justice issue when notices are poorly written, inadequately distributed, and little true information is made available.

Individuals

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IND108-1 | See our response to comments PM1-1, PM6-24, and LA3-55.

IND108-2 | See our response to comment FA2-35.

IND108-3 | The EIS states that other communities along the waterway, outside of Warrenton, Astoria, Cathlamet, and Puget Island, each individually have populations of less than 500 people. It is an established fact that the project area is mainly rural, and the proposed LNG terminal would not be located in a densely populated urban center. The reference to population is not meant to imply a lesser importance regarding risk. Economic justice issues are addressed in sections 4.8.1.9, 4.8.2.9, and 4.8.3.9.

IND108-4 | The Notice of Availability for the draft EIS, which requested public comments on the document, contained the name (Secretary of the Commission) and the address of the FERC to which comments could be sent. It also indicated how comments could be filed electronically by computer via the internet. These instructions for submitting comments were reiterated at the public meetings, the transcripts of which have been placed into the record of this proceeding. Copies of the draft EIS were available at the public meetings, such as the two held in Longview, Washington on November 7, 2007. The EIS contains many maps and drawings.

K-1081

IND108-5 | Objection #5: How is the public compensated for this significant benefit to a private company? What should the cost of such a permit be? According to 4.8 there is very limited benefit to the residents of Oregon

IND108-6 | Objection #6: Why does a private company get to have pre-emptive use, a 500-yard zone, of the river? Why should all other traffic defer to them? The Columbia River is a major source of food, transportation, and recreation for the Pacific Northwest and why should any of those interests take a back seat or be damaged in any way? We will need more food and more transportation in the future, not less.

IND108-7 | Let us invest our community's resources into developing renewable sources of energy instead of damaging our ecosystem to perpetuate a system of imported energy.

Thank you for your attention to these issues. I urge you to stop the LNG project.

Sincerely,

Steven Miller and Erika L. Miller
7915 NW Skyline Blvd
Portland, Oregon 97229
503 283 8626

Individuals

108

IND108-5 | We disagree. We think section 4.8 demonstrates that the project may have a strong economic benefit for the region. The general question of public need and benefit from this project would be addressed in the Commission's Order.

IND108-6 | The LNG carriers would not pre-empt other river users. NorthernStar and the Coast Guard, together with the river pilots and other commercial ships, will coordinate safe passage for LNG carriers with other river traffic. The project would not result in significant negative impacts on river transportation, recreational use of the river, or food production. See our responses to comments IND33-59 and IND33-71.

IND108-7 | The EIS discusses renewable energy resources in section 3.1.1.3.

K-1082

Docket No. CP06-365-000 et al.

ORIGINAL

To: Federal Energy Regulatory Commission

Delivered at Tues, Sept 18 meeting, Warrenton High School

From: Lee & Judy Talbot - PO Box 925, Astoria, Or
Property owners/ Residents in Clatsop County

FILED
OFFICE OF THE
SECRETARY

2007 DEC 27 P 3:34

IND109-1

Based on facts and setting aside unknowns and unenforceable promises and sales pitches, my wife and I see LNG as a source of irreversible damage to our beautiful area, as well as raising a safety issue. We spent a day listening to LNG promoters dodging pointed questions and making vague promises. Clatsop Co. Commissioners have approved some things that should have involved other responsible agencies such as Coast Guard, law enforcement, Emergency response, Fire depts, ect. Who, what agency is going to make the LNG people accountable?

Our concern and reason for involvement is the safety issue. I retired from Lawrence Livermore National Lab. after 36 years in Nuclear Test Eng. I'm no stranger to sources of destruction. When I was a youngster I was active in a water ski club in the Calif. Delta. The club had an island that was 1/2 mile long and 1/4 mile wide. One evening we were called to the island by the local fire dept. Apparently the 500 gal. propane tank which had just been filled, leaked its contents. The low lying gas cloud was concentrated on the island because of the heavy growth of tules surrounding it. Gas must have permeated some of the structures before it reached an ignition source. What wasn't blown up was burn to a crisp. The volunteer firemen's comment was "This was no regular fire like we're used to." This episode is still clear in my mind. Relating the destructive potential of that 500 gals to what the volume of gas in an LNG tanker would be capable of, is beyond comprehension.

IND109-2

To get the perspective of a qualified authority, I contacted Dr. Ron Koopman who is a Hazard Analysis Consultant involved in California's proposed off shore LNG terminal. I interacted with Dr. Koopman while at LLNL when he was directing a series of Liquefied Gaseous fuel test at the lab's Nevada test site. Since our proposed LNG sites are located on a geographical fault, I asked Dr. Koopman what he could visualize, if during the transfer of LNG, we experienced an earthquake which broke the transfer line, creating an uncontrolled flow of LNG into the river and surrounding area. The following is a quote from Dr. Koopman's response. "The biggest and unique hazard associated with an LNG ship (should there be an uncontrolled release of LNG) would be spilling LNG on the water, but not igniting it. Since LNG is so cold, it vaporizes very rapidly when spilled on water, forming a dense low lying vapor cloud that can travel long distances down wind. It will travel down wind (indefinitely as long as there is a source) until it disperses to concentrations below the lower flammability limit (5%), or runs into an ignition source and ignites. It will not explode unless it infiltrates a confined space and is then ignited. But it (the gas cloud) will burn back to its source. If the spill rate is large, the flammable cloud could travel several miles down wind."

In summary, I understand FERC has the final responsibility for the LNG terminal approval. I would hope that FERC's #1 priority would be the safety of our citizens, the emergency response, fire fighters, and law enforcement. Films of field test conducted by LLNL and Sandia Labs are available. I believe FERC has responsibility to show these films to the public and afford 1 on 1 awareness sessions for our emergency response people.

Respectfully

Lee Talbot

Individuals

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IND109-1

The various agencies (FERC, COE, Coast Guard, and DOT, along with state and local authorities) with regulatory jurisdiction over the project oversee the operation of permitted facilities through regular reporting, inspections and maintaining communications with the operators of those facilities. Safety is addressed in section 4.11.

IND109-2

Section 4.11.5.3 discusses the hazards associated with a spill from an LNG carrier and includes both thermal radiation and vapor dispersion modeling.

K-1083

ORIGINAL

December 17 2007

Federal Energy Regulatory Commission
Office of the Secretary, Washington DC 20426

Re: Docket Numbers CP06-365-000 and PF07-10-000

I have been extremely disappointed in the Federal Energy Regulatory Commission (FERC) process in permitting Liquefied Natural Gas (LNG) terminals and pipeline proposals for the state of Oregon.

The federal Energy Act of 2005 needs to be revised if a federal regulatory agency continues to "promote private speculation in their quest for profit. Very little information about the Oregon LNG proposal was provided to the property owners affected by the pipeline. As recently as last week the pipeline route has been revised. FERC's website is cumbersome and has had numerous technical problems. Why are there three separate competing proposals being considered at the same time in one state? How many similar overlapping proposals are being considered in other states? Should there not be an overall national plan for natural gas terminals and pipelines instead of tagging along behind each individual proposal to license and permit? I question if this is good use of taxpayer dollars. Northern Star, Palomar and Oregon LNG have little regard for the health, safety, environment or even the long-term economic conditions in Oregon. They are here for the short-term, will sell their interests in the docking facilities and pipelines as soon as they are built and leave state and local agencies with any problems that arise once the projects are built.

State agencies have voiced serious reservations about the draft of the LNG environmental impact statement. FERC has not provided an independent assessment to justify the need for terminals or pipelines. The Oregon Department of Geology and Mineral Industries found the Bradwood Landing site to have "severe natural hazard potential". Even the US Coast Guard said the Bradwood site is "unsuitable without extensive measures to improve safety and security". Representative David Wu has asked Admiral Thad Allen to make public the Waterways Suitability Assessment report for the proposed Bradwood Landing site. The Columbia Bar is one of the most dangerous areas on the Pacific coast. Do we really want ships loaded with LNG navigating this area? Do we really need a LNG pipeline under the Columbia River? Does this not conflict with state and federal efforts to restore and promote fish habitat on the Columbia River? How will dredging for terminal and pipeline affect water quality?

The proposed terminals and pipelines are a move toward continued dependence on foreign energy sources. Sources, I might add, that are potentially unstable and unreliable. It does not make sense to spend billions on creating these facilities. Oregon's own energy policy encourages renewable and conservation measures. Transporting LNG from long distances offsets any benefit there is to "clean" natural gas. The liquefaction process requires massive amounts of energy. We need to support sustainable energy policies for the state and on a national level. Invest in tidal energy research, initiate strong campaigns to conserve energy, promote solar, biomass, geothermal and wind projects.

I own a 14-acre parcel in the foothills of the Coast Range. I have 12 acres in timber that I have managed and cut in a sustainable manner for over thirty years. I have witnessed numerous landslides when timber is removed from steep slopes. What happens to a pipeline that is buried in unstable soils? Fire and emergency services are stretched very thin in our rural areas. Who will respond to an emergency in the forest? Is it right to use eminent domain to support these speculative for-profit short-sighted LNG proposals? Most of these questions have not been answered. These LNG proposals for Oregon are seriously flawed. I hope you will consider rejecting the LNG docking terminals and pipelines proposed for the state.

Sincerely,
Chris Michel and Linda Kaiser

56970 NW Strassel Road, Forest Grove Oregon 97116
503 324 8635 michel@integroonline.com



Individuals

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IND110-1

Only Congress can revise the EPAct 2005. See our response to comment FA4-1.

IND110-2

Any operator of a FERC-authorized facility would have to adhere to the conditions of the project Order.

IND110-3

The purpose and need for the project is described in section 1.1.

IND110-4

The Coast Guard has identified the measures necessary to make the waterway suitable for LNG marine traffic (see WSR in Appendix H). The WSA is SSI and can not be made public.

IND110-5

The pipeline would transport re-gasified natural gas, as opposed to LNG. The pipeline would be installed beneath the Columbia River using the HDD method. The HDD method avoids disturbance of waterbody bed and banks and therefore is the most effective means of avoiding impacts on fish habitat. The effects of dredging on water quality are discussed in sections 4.2.2.2 and 4.3.2.3.

IND110-6

The EIS discusses conservation under section 3.1.1.2 and renewable energy resources in section 3.1.1.3.

IND110-7

Areas of unstable soils would either be avoided or mitigated as described in section 4.1.4.3.

IND110-8

Emergencies would be responded to by the emergency response unit(s) having local jurisdiction.

IND110-9

A discussion of landowner rights, the easement negotiation process, and eminent domain is included in section 4.7.3.1. See our response to comment PM1-15.

K-1084

Attn: Kimberly D. Bose, Secretary
FERC

Docket No. CP06-365-000 et al.

ORIGINAL

Comment in Opposition to Proposed Bradwood Landing LNG Project

2007 DEC 27 12:52

- IND111-1 | Whereas, all industrial development in Clatsop County is subject to State of Oregon, Planning Goals and Guidelines, the Clatsop County Comprehensive Plan, and local land use laws;
- IND111-2 | Whereas, LNG tankers traversing the narrow Columbia River channel will adversely affect commercial shipping, commercial fishing, treaty rights, and the tourism industry of the entire Columbia River basin;
- IND111-3 | Whereas, LNG tankers, three proposed Bradwood Landing storage tanks 17 stories high, off-loading facilities, and all pipeline segments will constitute prime terrorist targets that endanger the people, property, ecology and beauty of the Columbia River Estuary;
- IND111-4 | Whereas, LNG tanker security escort requires the same designation as Search and Rescue, the United States Coast Guard will be constrained in its emergency response to other vessels and other duty assignments on the sea and in the Columbia River ;
- IND111-5 | Whereas, the Bradwood Landing Project's reliance on foreign fossil fuels will not contribute to Oregon's goal of 25% renewable energy by 2012;
- IND111-6 | Whereas, the Bradwood Landing Project terminal, storage tanks, and pipelines are proposed in areas subject to earthquakes, slides, and tsunamis;
- IND111-7 | Whereas, a spill at any location involved in this project (tankers, terminal site, storage tanks, and/or pipelines) could result in a vapor cloud fire endangering the lives of people for over one mile;
- IND111-8 | Whereas, the Bradwood Landing Project, as a result of its effect on federally protected salmon and countless other endangered species in the Columbia River Estuary , will be in direct violation of Oregon Planning Goal 16, Estuarine Resources;
- Whereas, Northern Star Natural Gas, Inc is demanding twenty-seven changes to Clatsop County's Comprehensive Plan in order to fit a large terminal/storage landing and pipeline project into a site that does not allow large development;
- Therefore, We call upon Governor Ted Kulongoski, U.S. Senators Ron Wyden and Gordon Smith, U.S. Representative David Wu, State Senator Betty Johnson, and State Representative Debbie Boone, and the Clatsop County Commissioners to take any and all means necessary , to stop this inappropriate and dangerous Bradwood Landing project.

Carl Dominey

Jean Dominey

November 26, 2007

Carl Dominey *Jean Dominey*

3647 Duane

Astoria, OR 97103

12/21/07

Individuals

111

- IND111-1 | Clatsop County approved NorthernStar's requested land use zoning changes in a final decision of the Board of Supervisors on March 20, 2008.
- IND111-2 | The EIS indicates that LNG carriers in the waterway transiting to the proposed Bradwood Landing LNG terminal would probably not have significant adverse impacts on commercial ship, fishing, treaty rights, and tourism on the lower Columbia River. See sections 4.7.1.4 and 4.8.1.7
- IND111-3 | See our response to comment IND60-17. Pipeline safety is addressed in section 4.11.9.
- IND111-4 | Most Coast Guard units are multi-mission assets, capable of performing Search and Rescue or Ports, Waterways, and Coastal Security, as well as Law Enforcement (e.g. drug or migrant interdiction, fisheries enforcement).

The Coast Guard balances and prioritizes various mission requirements to best allocate resources to meet public needs.

The Coast Guard is fully aware of the potential LNG escort requirements and would balance mission needs and resources accordingly to mitigate risks throughout the port.
- IND111-5 | The EIS discusses renewable energy resources in section 3.1.1.3.
- IND111-6 | Geologic hazards and mitigation measures are discussed in sections 4.1.3.3 and 4.1.4.3.
- IND111-7 | LNG spill hazards are described in section 4.11.
- IND111-8 | The project would not be in violation of Oregon Planning Goal 16. Clatsop County made land use zoning changes so that the project is now compatible with Oregon Planning Goals. See section 4.7.

K-1085

*Please enter in
Dockets CP06-365-000
and CP06-366-000*

Sarah McKinley

From: The Kiser's [kiser@cni.net]
Sent: Wednesday, January 02, 2008 11:59 AM
To: OEA Customer
Subject: Re: Bradwood Landing, LLC Doc. CP-06-365 (DEIS comments)

Sarah,

Enclosed are requested comments.

Bob

December 1, 2007

Kimberly D. Bose

Federal Energy Regulatory Commission

888 First Street, N.E., Room 1A

Washington, DC 20426

Reference:

OEP/DG2E/Gas 3

Bradwood Landing, LLC

NorthernStar Energy, LLC

Docket Nos. CP06-365-000,

CP06-366-00, et al.

Dear Ms. Bose:

IND112-1 The Draft Environmental Impact Statement for the Bradwood Landing, LLC does not meet National Environmental Protection Act criteria. It is woefully deficient in process and procedure. I see no other alternative but for you to issue a new DEIS in order for the public to comment on the total impact of the project once all the information has been gathered and evaluated in a like manner. The DEIS needs to be analytical. It can't be without all the

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IND112-1 See our response to comment PM4-20.

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- IND112-1 cont'd pertinent resource information. For example, as of October 23, 2007 NMFS, National Marine Fisheries Service, still had 25 unresolved major adverse impact questions that Northern Star had not answered to their satisfaction. To issue a FEIS without it will result in a "homerun" for an appellant. This is obviously a "rush to press" document. Section 1502.2 (Implementation) of NEPA states agencies shall not commit resources prejudicing selection of alternatives before making a final decision and should not justify decisions already made. The DEIS reads like a justification statement.
- In reviewing NEPA and instructions for preparing an environmental impact statement, I found the DEIS deficient in the following areas.
- IND112-2 1.. The impact statement is supposed to be driven by the process of scoping. The scoping process, in part, includes public comments, as well as agency, to determine issues, concerns, and opportunities. Although you mention (1-24, 1-25) pre-filing public scoping process and meetings, you have excluded, in part, comments from the public meetings that dealt with unsuitable soils and socioeconomic effects of landowners. All issues, concerns, or opportunities identified by the public need to be addressed in the DEIS.
- IND112-3 2.. Criteria to evaluate alternatives are not adequately addressed. There is no systematic way for the reader to evaluate alternatives against each other. This applies to all alternatives for various planned project activities and is especially important for terminal site and pipeline location. The criteria again should reflect data developed from the scoping process. How can you select an alternative if you haven't evaluated alternatives in a systematic manner against issues, concerns and opportunities; identified a preferred, and documented such? The DEIS only tells you the agency looked at other alternatives and discarded them! You can't even tell if you considered a "broad range of alternatives" as required by NEPA. The document does not follow NEPA 1502.14 that states in part that alternative development and evaluation is the "heart" of the EIS and that "(a) Rigorously explore and objectively evaluate all reasonable alternatives.". The evaluation of the alternatives was subjective rather than objective.
- IND112-4 3.. The cover letter indicates that: "The draft DEIS addresses the potential environmental effects associated with the construction and operation of the following facilities located at the proposed Bradwood Landing LNG terminal..". The letter states that the DEIS also "evaluates alternatives to the proposal". If the alternatives were equally evaluated, including the "No Action", against each other, why weren't other alternatives addressed with equal weight as the preferred Bradwood Landing and the pipeline alternative?
- IND112-5 4.. The definition section of the document does not include the definition of "Pacific Northwest". It is imperative to know if other states besides Oregon and Washington are included in the purpose or objective of the project. This is especially true when considering demand for natural gas. For example, California's demand is much more than Oregon or Washington. Should this facility and pipeline be built to serve California? The evaluation of alternatives against economics might suggest the demand, now or in the future, isn't here in Oregon or Washington for a LNG facility.
- IND112-6 5.. The DEIS is a draft decision document. There should not be any

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- IND112-2 The FERC considers issues raised during public scoping that are relevant to the project.
- IND112-3 The criteria we used to evaluate alternatives are explained at the beginning of section 3.1 and in section 3.1.5.3. Our alternatives analysis meets the standards outlined by the CEQ at 40 CFR 152.14. We evaluated a broad range of alternatives including no action or postponed action, LNG terminal system alternatives, site alternatives, LNG terminal design alternatives, vaporization technology and tank design alternatives, power line and pipeline route alternatives, and dredged material placement alternatives. See also our responses to comments FA3-14, SA1-78, SA1-180, and IND86-8.
- IND112-4 The no action alternative is discussed in section 3.1.1. The information on different alternatives differs because the availability of data on certain alternatives was limited. See also our response to comment IND112-3.
- IND112-5 California is not included as a target market of the project. See our response to comment PM1-58.
- IND112-6 See our response to comment PM6-94.

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IND112-6

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questions left unanswered, especially ones involving environmental consequences. Several places it leaves it up to Northern Star to do what they want rather than telling them what they must do. I realize the Commission makes the decision on the FEIS but the statement that you recommend to them for consideration should contain the words necessary to meet NEPA. This document should not leave any subjectivity to NS, FERC, COE, USCG, DOT, or the commission, especially to the discretion of Northern Star. The public must have a chance to evaluate all project activities that effect environment, property, economics, and health and safety. This document does not do that. Some examples are:

1. Section 106 of the National Historic Preservation Act has not been met. A completed survey of proposed pipeline location hasn't been done. (ES-5)

2. FERC identified safety concerns with both the proposed facilities and the related LNG vessel transit through the Columbia River yet NorthernStar doesn't have to address these concerns prior to this DEIS or final EIS. (ES-8)

3. FERC recommends that NorthernStar develop The Emergency Response Plan with local emergency agencies which includes cost sharing. How do we, the public, know what economic effect or human impact this has on us? This should be part of the DEIS decision

4. The discharge temperature does not meet 303(d) requirement of the Clean Water Act. What are the effects?

There are many more.

IND112-7

6.. The mitigation Plan for T&E species does not adequately compensate for loss of habitat and taking of species. No reference has been found to requiring a "Taking Permit". There is no question that the dredging, terminal construction and subsequent ballast water intake will "take" T&E fish species. A recovery Plan for T&E species addresses the enhancement needs...not mitigation. An enhancement plan satisfying NMFS is needed prior to approval of EIS. There is no mention of an approved Enhancement Plan.

IND112-8

7.. Trenching across many of the streams reviewed on the maps provided is not compatible with requirements of Washington Department of Natural resources Forest Practices permitting process concerning stream crossings and vegetation removal. Also nothing is mentioned about requirements of wildland fire season. WDNR requirements must be met.

IND112-9

IND112-10

8.. I can't believe that the proposed pipeline couldn't have an effect on BPA transmission facilities in areas of unstable soils. Especially when BPA has had to work on a tower in the past because of unstable soil. There is no reference to proximity to BPA lines and the potential hazards. Have you requested pertinent information from them? In addition, the K-B natural gas pipeline (now owned by Northwest Natural Gas) has several hundred feet of natural gas line above ground because of mass movement. The last noted movement was in April/May 2007. This line is approximately ¼ to ½ mile from proposed location of the proposed Bradwood pipeline. Cowlitz County mapping, Critical Areas Ordinance, identifies the entire area as unstable soils. I found nothing in the DEIS so noting.

IND112-11

9.. NEPA states that a "systematic interdisciplinary approach" needs to be

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IND112-7 See our response to comment PM4-18.

IND112-8 See our response to comment PM4-11.

IND112-9 Meeting the applicable WDNR requirements related to forest fires would be an obligation of NorthernStar. Also, see our response to comment IND22-10.

IND112-10 The pipeline would not affect the stability of the BPA transmission line towers. The pipeline would be collocated with the KB pipeline as much as possible along the route through Cowlitz County but not in areas of landslide potential.

IND112-11 As the lead federal agency responsible for compliance with NEPA, the FERC coordinates input, analysis, and review from professionals in industry, regulatory agencies, and the public with a broad range and depth of expertise relevant to the environmental impact analysis embodied in the EIS. Comment periods and other aspects of the FERC's Pre-filing NEPA Process are essential to gathering that input.

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- IND112-11 cont'd utilized to insure integrated use of the natural sciences and the environmental design arts in planning and in making decisions. Although the document references several participants of various arts and sciences, no mention of an interdisciplinary approach to decision making is mentioned. How can a graduate wildlife biologist expertly evaluate impacts to T&E fish?
- IND112-12 10. This document states on page ES6 that to make the Columbia River suitable for LNG marine traffic, specific risk mitigation measures would be necessary. The measures would include a 500 yard moving safety zone around LNG ships in transit and a 200 yard fixed security zone around LNG ships moored at Bradwood terminal. Even though the Captain of the Port may make an exception to this, he still can enforce the above restrictions. There are no guarantees. This will drastically effect other commerce on the river and recreational boating including fishing. Very little data is available in this document concerning recreational fishing. On page 4-328 it states that there were 1500 recreation fishing boats using the effected portion of the river between February and October 2004. This number has to be in error. I would estimate there are at least that many in August alone. The disruption in and around buoy ten, if the above restrictions are enforced, would be tremendous. let alone in the river proper. The impacts to fishing and other marine traffic are not adequately evaluated.
- IND112-13 11. On page 4-330 is the following statement: "In fact, implementation of NorthernStar's SEI is expected to result in a net benefit to fishery resources on the lower Columbia." This is based on NorthernStar avoiding, minimizing, reducing, rectifying and compensating for impacts during construction and operation of project. I strongly disagree. The mitigation plan doesn't compensate for the lost and there is no enhancement plan in place. The final location of the pipeline has not been determined so how can you adequately evaluate environmental impacts? Also, if the oversight is anything like what was provided during the K-B pipeline construction, there will be a considerable net loss. The document does state (page 2) that federal DOT is responsible for "ensuring the safe, reliable and environmentally sound operation of the nation's transportation system.". No reference is made to pipeline installation. NorthernStar is required to hire an independent contractor to monitor construction but this is like letting the fox, coyote in our case, guard the chicken house. Who from FERC or state agencies will be monitoring the daily on the ground construction activities so the EIS isn't a moot point? The landowners need to know in advance what federal or State public official to contact with the authority to immediately stop work when environmental problems arise. This needs to be in writing. NorthernStar's environmental inspector responsibilities (page 2-56,57,58) means nothing to the landowner. Again, how can you possibly allow NorthernStar to develop a third-party environmental plan. That's your job. Are you going to let them select the contractor also?
- IND112-15 12. The landowners in the path of the pipeline route are left hanging. They are on their own to protect their interests, resources, and any improvements. Enforcement of the right-of-way agreement with NorthernStar can only be accomplished through the court unless you can get contractors to stop work until resolved, which is highly unlikely. This includes such things as topsoil segregation, property monument protection, drilling mud disposal, and road and culvert protection to mention a few. This should be addressed as part of the social-economic write-up of the DEIS.
- IND112-16 13. Page ES-4 First paragraph. You state NMFS and FWS has requested

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- IND112-12 We do not believe that the safety and security zones around LNG carriers would have significant adverse impacts on other commercial river uses, including recreational boating and fishing; see sections 4.7.1.4 and 4.8.1.7. Section 4.8.1.7 has been revised to correct the number of recreational fishing boats.
- IND112-13 See our response to comment FA4-12.
- IND112-14 The project will be monitored by a variety of independent agencies. The EPAct 2005 provided a role for the states to monitor construction and operation for safety concerns. DOT would conduct inspections to make certain the facilities meet their standards and regulations; typically delegated to the states through the OPUC and WUTC. In addition, FERC staff and our third-party contractors would conduct inspections. Our environmental compliance inspection and mitigation monitoring program is explained in section 2.6.
- IND112-15 As discussed in section 4.8.3.3, NorthernStar would compensate the landowner for use of the land through the easement negotiation process. The easement agreement between NorthernStar and the landowner would specify compensation for damage to property during construction, loss of use during construction, and loss of renewable and nonrenewable or other resources. See our responses to comments PM4-4 and IND48-3.
- IND112-16 See our response to comment PM5-27.

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IND112-16
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additional information and that you will be revising your EHA Assessment and BA. Your revision again needs to be part of the DEIS so that the public can respond intelligently to the impacts to T&E species.

14.. Page ES-5. You state that the technical review identified: "Several areas of concerns with respect to the proposed facility, and we identified specific recommendations to be addressed by NorthernStar prior to site preparation.". Again these concerns should be part of the DEIS and EIS, not left up to the discretion of NorthernStar. They shouldn't be recommendations, but mandatory. A portion of the terminal site, including mill pond, is below MHWL. Oregon State lands, Marine Board, etc need to be involved in permit issuing.

15.. Page ES-7. You stated that US Coast Guard will issue an LOR finding including recommendations that "may" include (6) conditions. Here again it leaves it up to NorthernStar discretion to implement all of the USCG identified safety conditions. It should be a requirement of the DEIS. Otherwise, how can you adequately evaluate navigational and community safety?

16.. Page ES-8. How can you conclude that construction and operation of the Bradwood Landing Project has the potential for limited significant environmental impacts when NMFS and FWS are still requesting additional information and haven't identified the impact on federally listed species? They need the answers before they can issue a BA and give you the BO. How can you possibly even issue a DEIS without this pertinent information?

IND112-17

17.. Page 1-25. I specifically mentioned at a scoping meeting, along with others, the unstable soils along the proposed pipeline route. Nothing mentioned.

IND112-18

18.. Page 1-3 Purpose and Need. How can NS deliver natural gas to the Williams Northwest interstate pipeline system when it is fully subscribed?

IND112-19

19.. Page 1-6 Permits, Approvals, and Regulatory Requirements. FERC is also required to follow the NEPA process. NEPA is excluded from statement regarding regulatory requirements of FERC.

IND112-20

20.. Page 2-12 2.1.2.5 The discussion concerning 1500 recreational fishing boats using the Lower Columbia River in a year is a very poor way of determining use. Besides the number being very low, the use needs to be expressed in user days to determine and accurate description of total use. Charter boats, for example, can be on the Columbia for 8 hours a day. It is not uncommon for a recreational fishing boat to spend 5 hours a day on the river. In addition, a person who fishes the Columbia usually takes more than one trip per year. For example, I took seventeen. On November 9, 2007 I went crabbing out of Warrenton, OR. There were 18 other boats doing likewise within 500 yards of a incoming cargo and oil tanker vessels. This was over a two hour period of time at or near high tide. Your description and evaluation of potential effects of LNG tankers on recreation boating on the Columbia is very poor and needs to be re-evaluated. One paragraph and five lines are insufficient to describe the current situation. The impact is much greater than described.

IND112-21

21.. Page 2-46 Survey and staking. It is unclear if survey and staking occurs before felling and clearing operation begins or before "construction" of trench. Property survey and witness monuments need to be marked and protected throughout all phases of construction. All phases of construction must operate within the ROW or with approval of landowner. This should include all equipment including egress and ingress over approved access

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- IND112-17 Soils prone to liquefaction and landslide areas along the pipeline route are discussed in section 4.1.4.3.
- IND112-18 See our response to comment PM6-94.
- IND112-19 The EIS text states explicitly on page 1-1 that the document was produced to comply with the NEPA. Also, see table 1.3-1.
- IND112-20 Section 4.8.1.7 has been revised to correct the number of recreational fishing boats.
- IND112-21 Figure 2.4.2.1 outlines the sequence of construction activities. Survey and staking requirements are discussed in section 2.4.2.1. Access roads that would be used are described in table 4.7.3-3.

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IND112-21 cont'd	roads. All access roads must be indicated in DEIS otherwise how can impacts of use be evaluated.
IND112-22	22.. Page 2-46 Clearing and Grubbing. This paragraph is entirely inadequate. There is nothing stating that the felling, bucking and yarding of merchantable timber should maximize utilization. The trees still belong to the landowner and should be handled accordingly. The appropriate way to determine value of commercial trees is to cruise, appraise, and pay for standing trees prior to harvest. Nothing is mentioned about felling trees within the right-of-way to avoid damage to other trees or property improvements. Nothing is mentioned about Washington State DNR fire protection needs during fire season. Construction equipment needs to be washed periodically to avoid distributing noxious plant distribution.
IND112-23	23.. Page 2-48 Trenching. In many instances, drainage structures, water pipelines, and other underground improvements could, and probably would be, severed by trenching. These structures need to be repaired or replaced. Statement regarding "Foreign Pipelines and Utilities" page 2-53 is insufficient.
IND112-24	24.. Page 2-48 Cleanup/ Revegetation. Access roads need to be restored to original condition. When will temporary erosion control fencing be removed? Access roads needed for rehabilitation work needs to be identified in advance of start of work, not after the pipe is laid.
IND112-25	25.. Page 4-24 Subsidence. The statement "there are no significant aquifers beneath the proposed pipeline". What is "significant"? There are several wells drawing from aquifers that landowners are concerned about. What are the potential economic and environmental impacts?
IND112-26	26.. Page 4-24,25 Cowlitz County CAO Considerations. Between milepost 32.5 and 34 is considered a potential landslide area. This area is designated by NorthernStar to trench across streams. Paragraph 4 page4-25 states that HDD installations can serve to avoid or minimize impacts to landslide areas. The HDD method needs to be implemented.
IND112-27	27.. The acronym ESC is used throughout DEIS. It is not listed on page xvi.
IND112-28	28.. Page 4-59,60 Groundwater Uses/ Impacts Mitigation. There is no reference to potential impact of identified wells within 200 ft. of drill sites under Cowlitz or Columbia Rivers. Deeper drilling has more potential of damaging domestic or public wells. References should be made.
IND112-29	29.. Page 4-64,65 Critical Areas Ordinance/ The work area and the Cowlitz River drill site is within the 100 year flood plain. A flood plain permit will be required.
IND112-30	30.. Page 4-81 Table 4.3.2-3 Waterbodies crossed by Bradwood Landing Project. All six Leckler Creek tributary crossings are stream class Np or Ms. Leckler Creek is a salmon/steelhead bearing stream. Open trenching should not be allowed. Ditch and trenching would not be permitted under WNDNR Forest Practices Rules.
IND112-31	31.. Page 4-96 Mitigation. NorthernStar's final Mitigation Plan, as well as the Enhancement Plan should have been part of this DEIS to properly evaluate compensation for project impacts, not prior to construction.
IND112-32	32.. Page 4-115 Paragraph 4. If the ownership of commercial timber remains with the landowner until sold at the mill, How can NorthernStar make an agreement with WDFW for large logs to be used for woody debris habitat improvement bank? Unmerchantable trees and debris needs to be hauled off site to reduce fire hazard not chipped on site. This would not meet WDNR

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IND112-22	Details regarding handling of merchantable timber would be negotiated between NorthernStar and individual property owners. See also our response to PM4-6. Topics included in section 2.4.2.1 are limited to general construction techniques. A detailed discussion of measures proposed to prevent the spread of noxious weeds is provided in section 4.4.2.3 and in the response to comment FA3-10.
IND112-23	The FERC staff's Plan discusses restoration of drain tiles. NorthernStar has indicated that it would ensure the existing pipelines and utilities are not damaged during construction of its pipeline. Locations of these other utility lines would be identified during preconstruction shallow hazards surveys.
IND112-24	Section 4.3.8.7 addresses restoration of access roads once construction is completed. Temporary erosion control measures would be removed when permanent erosion control measures have been put in place.
IND112-25	The statement refers to the fact that there are no major water supply aquifers beneath the pipeline route which are being extensively pumped to the degree that land surface subsidence could result.
IND112-26	HDD or other mitigation measures would be used in potential landslide areas. See also our response to PM3-60.
IND112-27	ESC is an acronym for Erosion and Sediment Control.
IND112-28	See our response to comment PM1-40.
IND112-29	We discuss the Cowlitz County Critical Area Ordinance in sections 1.3.11 and section 4.7.3.2, together with the Cowlitz County Floodplain Management Ordinance. See our response to comment PM4-12.
IND112-30	As described in NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan, Tributaries 2-7 to Leckler Creek would be crossed using the dam and pump method. Table 4.3.2-3 has been updated to reflect these changes. The Lower Columbia River Chinook, Lower Columbia River coho, and Columbia River chum ESUs have been documented within these tributaries. However, these waterbodies are all intermittent headwater streams that would be crossed during the in-water work window (July 15 – September 15), thus it is likely that the streams would be dry at the time of crossing. Therefore, direct impacts on federally listed salmonids would not be anticipated. It is important to note that potential impacts on federally listed species due to waterbodies crossings (including Tributaries 2-7 to Leckler Creek) will be analyzed in further detail in the revised BA and EFH Assessment. Waterbody crossings using open-cut methods as they relate to the WDNR's Forest Practice Rules are discussed in the response to comment PM4-11.

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- IND112-31 NorthernStar's compensatory mitigation is discussed in the response to comment FA2-16.
- NorthernStar's SEI is not a part of the compensatory mitigation for unavoidable impacts associated with the project. The SEI is described in section 4.6.2.2 of the EIS. In addition, NorthernStar filed detailed information on the SEI in a supplement to the draft applicant-prepared BA on November 22, 2006 and is available for viewing by the public on the FERC's internet web page at www.ferc.gov, through the eLibrary link, selecting "General Search," entering the docket number minus the last three digits (i.e. CP06-365), and putting in the proper date range.
- IND112-32 The option of using certain trees cut down during pipeline construction in Washington for the establishment of a LWD bank was suggested by the former WDFW Area Habitat Biologist for Cowlitz County. Because portions of the pipeline cross land owned by the State of Washington, we believe that this agreement is reasonable. The option for use of wood off of any given landowners property would be part of the negotiations for the pipeline easement across that property and would be compliant with both WDNR and WDFW rules and regulations and individual landowner needs.
- Table 1.3-1 lists the major federal, state, and local codes, ordinances, statutes, rules, regulations, and permits that would apply to the project. NorthernStar would adhere to conditions of these permits. Each agency designs the permitting process to ensure that projects comply with the regulations set by each agency for the area of concern.

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IND112-32

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IND112-33

hazard reduction requirements with some vegetation classes.

33.. Page 4-115 Paragraph 5. Any grass seed used for revegetation needs to be certified seed to verify viability and noxious weed free. Page 4-117 Paragraph 6. "When available" should be stricken from sentence. The treatment of noxious weeds needs to be more specific as to application of chemicals, including kind and strength of each, time of year, or mechanical control.

IND112-34

34.. Page 4-116 First paragraph. The riparian strip (25 ft) should be planted with indigenous trees when trenching across stream courses. "In kind" replanting of trees need to be defined.

IND112-35

35.. Page 4-121 Paragraph 6. The discussion of present situation for recreation fishing is terrible. NorthernStar's description of use and impact on recreation fishing is embarrassing. The potential economic impact on recreational fishing on the Columbia is tremendous.

IND112-36

36.. Page 4-165 Paragraph 3 In-stream construction would also raise stream temperature.

IND112-37

37.. Page 4-180 No information on Western Snowy Plover.

IND112-38

38.. Page 4-260 Lower Columbia River Coho are also found in Leckler Creek.

IND112-39

39.. Page 4-261 Lower Columbia River Steelhead also found in Leckler Creek

IND112-40

40.. Page 4-265 The Northern Spotted Owl needs to be surveyed along the pipeline where habitat exists.

IND112-41

41.. Page 4-280 Willow Grove boat launch omitted table 4.7.1-1.

IND112-42

42.. Page 4-321 Socioeconomics. This section does not speak to the project impact costs. Dollar values need to be identified when both temporary and permanent loss of resources occur. Such items as loss of timber production, loss of building sites, transfer of livestock while under construction, loss of crops, plus many others. If you are going to identify the amenities by dollars its only right to do the same with impacts. For example, I will permanently lose 3 ½ acres of forest land, a building site, and 20 years of Douglas-fir tree growth. Economic impacts as well as environmental need to be given equal treatment in this DEIS. Property taxes will still have to be paid on land that is not available for use of the landowner. This should be included in the impact cost.

IND112-43

43.. Page 4-453 Paragraph 3. The recreation fishing boat information is inconsistent with other sections in this document. (1,500 boats) Need to use "user days" to evaluate impacts. ODFW and WDFW would have best information. When there is a 500 yard moving exclusion zone around the tankers this is a great impact.

IND112-44

44.. Page 4-454 Paragraph 4. "750 workers" is inconsistent with other tables.

IND112-45

45.. Page 5-19 5.2 FERC STAFF RECOMMENDED MITIGATION.

IND112-46

1.. FERC should require, prior to start of construction, a substantial performance bond to cover all aspects of construction.
2.. Page 5-23 (19) Both the mitigation plan and enhancement plan should be filed with FERC before the end of DEIS comment period, not prior to construction. Otherwise how would you know if mitigation and enhancement satisfies project resource impacts.

IND112-47

3.. Page 5-29 (62) The final ERP should be agreed to by appropriate agencies, including shared cost, prior to DEIS comment period to determine socioeconomic effects.
In summary, there is a lot of information provided by Northern Star that supports the project; little to nothing that can be evaluated to determine

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IND112-33 See our response to comment FA3-10.

IND112-34 Our Procedures require that a riparian strip at least 25 feet wide be allowed to permanently revegetate with native woody plant species. The term "in-kind" as it relates to revegetation along the right-of-way has been defined in section 4.4.1.3.

IND112-35 We do not believe that the proposed project would have significant adverse impacts on recreational fishing; see section 4.7.1.4.

IND112-36 Section 4.5.3.1 addresses in-water impacts on aquatic resources. Specifically, potential impacts on water temperature due to in-stream construction are discussed in section 4.5.3.1, *In-water Construction Activities, Vegetation and Habitat Removal*.

IND112-37 The federal and state status as well as occurrence within the project area for the Pacific Coast DPS of the western snowy plover is included in table 4.6.1-1.

IND112-38 Waterbodies not crossed by the proposed route are not included in section 4.6.2.3, *Occurrence Along the Pipeline Route*. Although the Lower Columbia River coho ESU has been documented within Leckler Creek, the creek is not crossed by the proposed pipeline route. Potential impacts on aquatic resources, including downstream impacts, due to waterbody crossings are described in section 4.5.3.1 and will be described in detail in the revised BA and EFH Assessment.

IND112-39 Waterbodies not crossed by the proposed route are not included in section 4.6.2.3, *Occurrence Along the Pipeline Route*. Although the Lower Columbia River steelhead DPS has been documented within Leckler Creek, the creek is not crossed by the proposed pipeline route. Potential impacts on aquatic resources, including downstream impacts, due to waterbody crossings are described in section 4.5.3.1 and will be described in detail in the revised BA and EFH Assessment.

IND112-40 As described in section 4.6.2.3, forests in the vicinity of the proposed pipeline route are relatively young and generally lack characteristics that contribute to nesting habitats, foraging, and roosting areas for spotted owls. Therefore, we do not believe that requiring surveys for northern spotted owls is warranted.

IND112-41 Table 4.7.1-1 has been revised to include the Willow Grove boat launch.

IND112-42 Landowners would be compensated by NorthernStar for loss of use of the easement, timber, crops, and other negotiated items. See our response to comment PM2-4.

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- IND112-43 Section 4.8.1.7 has been revised to correct the number of recreational fishing boats.
- IND112-44 The number of 750 workers referenced in section 4.12.5 refers to the peak number of construction workers that would occur at any one time.
- IND112-45 See our response to comment IND3-22.
- IND112-46 See our response to comment IND112-31.
- IND112-47 See our response to comments PM1-1 PM6-24, and LA3-55.

adverse consequences. Thus, it doesn't meet NEPA policies and goals. The DEIS is purely a justification of the project.

Sincerely,

Robert L. Kiser
2112 West Side Hwy
Kelso, WA
98626

----- Original Message -----

From: "OEA Customer" <Customer@ferc.gov>
To: "The Kiser's" <kiser@cni.net>
Sent: Wednesday, January 02, 2008 5:39 AM
Subject: RE: Bradwood Landing, LLC Doc. CP-06-365 (DEIS comments)

Mr. Kiser:

Mark Hershfield is on leave. Could you e-mail me the document and I'll follow up on this?

Thanks.

Sarah McKinley
202-502-8368

----- Original Message -----

From: The Kiser's [mailto:kiser@cni.net]
Sent: Monday, December 31, 2007 2:52 PM
To: OEA Customer
Subject: Re: Bradwood Landing, LLC Doc. CP-06-365 (DEIS comments)

It is now December 31, 2007 and my letter with comments dated December 1, 2007 have yet to be filed in E-library contrary to your efforts. How am I assured that my comments will be entered into the public record as part of DEIS/EIS process? If I do not get a satisfactory answer I will be contacting commissioner Phil Moeller.

Robert Kiser

----- Original Message -----

From: OEA Customer
To: The Kiser's
Sent: Thursday, December 20, 2007 3:42 PM
Subject: RE: Bradwood Landing, LLC Doc. CP-06-365 (DEIS comments)

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ORIGINAL

Steve Miller
7915 NW Skyline Blvd
Portland, OR 97229

December 19, 2007

2007 DEC 27 P 12:53
Federal Energy Regulatory Commission
Comment on the draft EIS for the proposed Bradwood Landing LNG Project

- IND113-1 Objection #1: There is an unacceptable level of risk to the community. There is not a sufficient guarantee of public safety. From the information buried in the Oregon Department of Energy's Appendix K, the Safety Advisory Report, there is an assumption that local jurisdictions will be able to upgrade their capability to handle a LNG emergency situation. Where is an assessment of their current capability? Who will pay for upgrades if they are found lacking? Should the cost of the upgrades, no doubt in the millions, be born by the community for the benefit of a private corporation? Is this the best use of limited public funds?
- IND113-2 Objection #2: There was very brief mention in 5-8 of the "impact of marine release of LNG with ignition." This needs to be explored further and analyzed. How will Columbia County be able to respond? How can the firm assure us that there will not be such a "significant event?" As we know from Three Mile Island and the Valdez spill, just because the odds are "remote" does not mean they do not happen. I do not believe that the very limited benefits to our community outweigh these huge risks.
- And, if an incident occurs, who cleans it up? The state? The county? The firm? Would a several billion dollar bond be appropriate?
- IND113-3 Objection #3: The report in section 5.1.7 refers to the population of our area as less than 500 people, as though damage to our family and property counts less because we're fewer in number. Our area seems to be especially vulnerable to economic justice issues because it's difficult for a county of our size to respond to the complexities of such a project.
- IND113-4 Objection #4: This strikes me as an economic justice issue when notices are poorly written, inadequately distributed, and little true information is made available. I was surprised at the public meeting in Longview to see no educational material available for the dozens of people who cared to show up, not even a map. I was hoping to discover just what the impact would be to farmland if a pipeline went through it. After reading the draft EIS I'm still wondering what the answer is to this very basic question. The draft EIS was written in such a way that makes it difficult for a non-professional to understand it. There are no maps, it's full of acronyms, and important information to the community is buried in its depths. Something as basic as having the address and/or email printed on a meeting notice so that people can send in their comments is missing.

Individuals

113

IND113-1 See our response to comments PM1-1 PM6-24, and LA3-55.

IND113-2 See our response to comment FA2-35.

IND113-3 See our response to comment IND108-3.

IND113-4 See our response to comment IND108-4.

K-1096

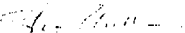
IND113-5 | Objection #5: Do property owners have to sell or lease their land for the pipeline? Who has the right of eminent domain in this case? Should a private corporation have the right of eminent domain? I don't think so.

IND113-6 | Objection #6: How is the public compensated for this significant benefit to a private company? What should the cost of such a permit be? According to 4.8 there is very limited benefit to the residents of Columbia County

IND113-7 | Objection #7: Why does a private company get to have pre-emptive use, a 500-yard zone, of the river? Why should all other traffic defer to them? The Columbia River is a major source of food, transportation, and recreation for the Pacific Northwest and why should any of those interests take a back seat or be damaged in any way? We will need more food and more transportation in the future, not less. Let us invest our community's resources into developing renewable sources of energy instead of damaging our ecosystem to perpetuate a system of imported energy.

Thank you for your attention to these issues. I urge you to stop the LNG project.

Sincerely,



Steven R. Miller
7915 NW Skyline Blvd
Portland, OR 97229

Individuals

113

IND113-5 NorthernStar would negotiate an easement agreement with landowners. In an agreement cannot be reached, and the company has a Certificate issued by the FERC, it may use eminent domain under section 7h of the NGA. See our response to comment IND108-9.

IND113-6 See our response to comment IND108-5.

IND113-7 The 500-yard security zone is an area that would be under control of the Coast Guard. It is not an exclusion zone. Recreation, transportation, and shipping would not be damaged by the project. See also our response to comment IND33-16.

K-1097

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ORIGINAL

#CP06-365-000

Leslie Hildula
79056 Erickson Dike Road
Clatskanie, Oregon 97016

OFFICE OF THE
SECRETARY

December 19, 2007

2007 DEC 27 P 12:53

Federal Energy Regulatory Commission

Comment on the draft EIS for the proposed Badwood Landing LNG Project

IND114-1

Objection #1: There is an unacceptable level of risk to the community. There is not a sufficient guarantee of public safety. From the information buried in the Oregon Department of Energy's Appendix K, the Safety Advisory Report, there is an assumption that local jurisdictions will be able to upgrade their capability to handle a LNG emergency situation. Where is an assessment of their current capability? Who will pay for upgrades if they are found lacking? Should the cost of the upgrades, no doubt in the millions, be born by the community for the benefit of a private corporation? Is this the best use of limited public funds?

Objection #2: There was very brief mention in 5-8 of the "impact of marine release of LNG with ignition." This needs to be explored further and analyzed. How will Columbia County be able to respond? How can the firm assure us that there will not be such a "significant event?" As we know from Three Mile Island and the Valdez spill, just because the odds are "remote" does not mean they do not happen. I do not believe that the very limited benefits to our community outweigh these huge risks.

And, if an incident occurs, who cleans it up? The state? The county? The firm? Would a several billion dollar bond be appropriate?

Objection #3: The report in section 5.1.7 refers to the population of our area as less than 500 people, as though damage to our family and property counts less because we're fewer in number. Our area seems to be especially vulnerable to economic justice issues because it's difficult for a county of our size to respond to the complexities of such a project.

Objection #4: This strikes me as an economic justice issue when notices are poorly written, inadequately distributed, and little true information is made available. I was surprised at the public meeting in Longview to see no educational material available for the dozens of people who cared to show up, not even a map. I was hoping to discover just what the impact would be to my farm if a pipeline went through it. After reading the draft EIS I'm still wondering what the answer is to this very basic question. The draft EIS was written in such a way that makes it difficult for a non-professional to understand it. There are no maps, it's full of acronyms, and important information to the community is buried in its depths. Something as basic as having the address and/or email printed on a meeting notice so that people can send in their comments is missing.

Individuals

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IND114-1

Safety issues are addressed in section 4.11. NorthernStar is responsible for paying for additional resources needed by local first-responders to protect communities in the unlikely event of a project-related incident, according to the cost-sharing plan outlined in its ERP. Environmental justice is addressed in section 4.8. See our response to comment IND108-4. Congress conveyed the power of eminent domain to jurisdictional pipelines under section 7h of the NGA. Section 4.8 discusses potential economic benefits from the project. The project would not have pre-emptive use of the Columbia River, and would result in less than significant impacts on other river users as discussed in sections 4.7 and 4.8. The project would not impact the production of food. See our response to comment IND106-31.

K-1098

~~SECRET~~

IND114-1
cont'd


Objection #5: Do I have to sell or lease my land for the pipeline? Who has the right of eminent domain in this case? Should a private corporation have the right of eminent domain? I don't think so.

Objection #6: How is the public compensated for this significant benefit to a private company? What should the cost of such a permit be? According to 4.8 there is very limited benefit to the residents of Columbia County

Objection #7: Why does a private company get to have pre-emptive use, a 500-yard zone, of the river? Why should all other traffic defer to them? The Columbia River is a major source of food, transportation, and recreation for the Pacific Northwest and why should any of those interests take a back seat or be damaged in any way? We will need more food and more transportation in the future, not less. Let us invest our community's resources into developing renewable sources of energy instead of damaging our ecosystem to perpetuate a system of imported energy.

Thank you for your attention to these issues. I urge you to stop the LNG project.

Sincerely,



Leslie Hildula
79056 Erickson Dike Road
Clatskanie, OR 97016
503 939 8648

Individuals

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K-1099

 ORIGINAL

BENNETT AND PATRICIA GARNER
10 Pier One, Suite 306
Astoria, OR 97103
E-mail: bgtickets@mac.com

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2008 JAN -2 P 2:45

FEDERAL ENERGY
REGULATORY COMMISSION

December 23, 2007

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

RE: Bradwood Landing Draft Environment Impact Statement Review, Docket
No. CP06-365-000; CP06-366-000

Dear Secretary Rose,

We are Astoria home owners and work immediately adjacent to the West mooring basin and the Columbia River channel. While we appreciate the need for natural gas and we are not so naive to think that change in and of itself cannot represent a positive force for community growth and development, we have grave concerns about the Bradwood Landing LNG project. The Columbia River waterway represents the very lifeblood of our community, providing commercial and sports fishing, tourism, hunting, recreational activities and, plain and simple, what it is to live here. Astoria is unique and has a long and proud history. Every effort must therefore be expended to protect it.

IND115-1

We understand that a serious accident, whether intentional or accidental, or as a result of post 9-11 terrorism, carries with it the danger of an LNG vapor cloud, which would at the very least entirely wipe out the commercial district of Astoria. If we were at work, that would mean we would be vaporized. Although on some level reference to this danger may sound somewhat melodramatic to those who don't face it, it is certainly on the minds of people who actually live and work in Clatsop County. These incineration zone dangers are described, somewhat chillingly, in the Sandia Report, "Guidance on Risk Analysis and Safety Implications of a Large Liquefied Natural Gas (LNG) Spill Over Water," authored by Mike Hightower, et al. It is for these and other reasons that the community has expressed again and again that it does not support the project. At the very least each and every consideration raised by community members, as for example are summarized in the Columbia River Estuary Study Taskforce's 12-21-07 report, which was prepared at the request of the Clatsop Board of Commissioners, should be carefully examined.

IND115-2

While one of our primary concerns about this project is safety, we are also mystified as to why an off-loading facility has to be placed inland, such as at Bradwood Landing, and not be placed 20 miles or so off shore. We understand that the proponents of the project contend that rough sea and weather conditions prevented any consideration

Individuals

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IND115-1 Comment noted.

IND115-2 The placement of offshore facilities off the Oregon coast was considered and was eliminated because it did not meet the project objectives (see section 1.1), was not technically and economically feasible, and presented additional potential environmental impacts (see section 3.1). In terms of a comparison with conditions in other locations, weather conditions in Oregon were compared with conditions for an existing location that has developed LNG infrastructure offshore (in the Gulf of Mexico) and one proposed location (offshore Massachusetts) (see section 3.1.4.1). Based on this analysis, the FERC does not believe that an offshore alternative is a reasonable alternative to the proposed project.

K-1100

Individuals

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IND115-2
cont'd of an LNG terminal off the coast of Oregon. It is salient that this was not even considered, much less looked into or examined. This should not be countenanced. It also strains credulity that concerns about storms would prevent such an off shore project. This has not prevented natural gas pipeline terminals from being constructed off shore of Mexico, which certainly experiences strong storms and hurricane winds (i.e. www.cprod.com/bs_op_ongp.html). California has determined that it will not even allow such systems off its shores. Are we then being asked to withstand the inherent dangers of such a project more than residents of Mexico?

IND115-3 Given the opportunity for alternative natural gas supply systems and seemingly casual, or at least short sighted, refusal to even consider it as a viable option, we are concerned about the nature of motivation behind the Bradwood Landing LNG project and its potential to abuse Astoria and the Columbia River estuary. It appears that most of the newer natural gas ships are much larger. These ships could easily navigate to and from off shore systems, but the Columbia River channel is not sufficiently large to accommodate them. The ships which would therefore be used within the Columbia River waterway are older ships, which have a tendency to be owned and operated by companies which own a very few ships, possibly only one ship. The incentives to keep these smaller, less profitable, ships as safe as the larger ships are considerably less. Should an accident or spill occur, the ship owner's assets would most probably not be anywhere sufficient to ameliorate, much less deal with, such a disaster, and we would be left with the bulk of the financial sequelae. At the very least, then, Bradwood Landing - NorthernStar Gas LNG should be absolutely required to have ample insurance or bond assurances to cover all expenses, direct and indirect, of an accident, which is likely to be disastrous if it occurs.

We are very apprehensive that issues relating to the safety of the Bradwood Landing LNG project have not been adequately addressed. In this regard the uniqueness of Astoria, and surrounding areas, cannot be underestimated. We will discuss some specific areas of concern below, but our recent (December 3 and 4, 2007) experience with a storm carrying 50+ mile per hour sustained and 120+ mile per hour wind gusts is telling. The problem we refer to is not the damage to trees and homes, difficult though that was, nor even the lack of electricity for the entire city for a week, but for at least 2 or 3 days, depending upon where one was, Astorians were completely and utterly isolated from the outside world. We know that it is difficult to imagine that such a circumstance could happen in this day and age, but it did. Transportation via Highway 30, 101 and 26 was totally blocked by numerous fallen trees and electrical lines, landslides and sink holes, and these routes were closed to all transportation. This meant that all avenues of road transportation in and out of Astoria were completely unavailable for use. Adding significantly to the reality of our isolation, we could not communicate by phone at all, not at all. Cell phones did not work, nor of course, cordless phones which rely upon electricity, but even the land lines did not work. We were not only unable to place a telephone call to Portland or any nearby Oregon towns or beyond, but we could not even call from one end of Astoria to the other. Critically, emergency 911 service failed. We understand that our telephone service initiates here but goes all the way to Portland and then back in order for even a local call to be completed. For only the second time in its

IND115-3 See our response to comment FA2-35.

K-1101

K-1102

history our local newspaper, The Daily Astorian, did not publish a daily edition. People as near as Portland had absolutely no idea what was happening here. Only days later when communication was possible did the news of what had happened in Astoria appear in the Daily Oregonian, the Portland newspaper. It was quite an unnerving experience.

IND115-4 The point of raising this experience with our winter storm in this letter is that, hopefully, it highlights significant issues of safety and the capability of this region to effectively respond to large scale emergencies. The Bradwood Landing site is even more remote than the town of Astoria. When other alternatives, such as off shores platforms are available, it seems injudicious not to at least seriously consider this option and/or conclude that the risks to the project outweigh any benefits. As can be seen, these issues take on particular and unique importance given the nature of Clatsop County and Astoria.

IND115-5 We are also worried about the potential for damage to our area from earthquakes or tsunamis. We are told by experts that the potential for such disasters is not "if" but "when." If that is so, then the highest level of scrutiny must be given to such projects as Bradwood Landing.

IND115-6 The potential for natural and man-made disasters raises the potential for severe, indeed devastating, long term consequences of not only a liquefied natural gas explosion, but natural gas and ship fuel oil spills. We have but to look to the recent heavy-duty bunker fuel oil spill which took place when a ship hit the San Francisco Bay Bridge. Not only did this spill cause immediate problems by fouling water and beaches and the death of seabirds and other wildlife, but the long term consequences are grave. We read in the San Francisco Chronicle that this oil is "nasty," toxic, breaks down slowly and can persist in sediment for decades, if not more. No one can apparently predict how long the deleterious effects that this damaging pollution will continue.

IND115-7 It is, of course, impossible to predict accident or disasters, but it is not impossible to be aware of and protect ourselves against them. The likelihood of a fuel oil spill such as occurred in California is much higher here as not only the channel but the waterway itself is quite narrow and there are frequent limitations of visibility due to fog and rain. The topography is complicated (see, for example, Dept of Commerce, NOAA, CHART #18253). These aspects of the Columbia River waterway would mean that should an accident such as occurred at the Bay Bridge occur here, the damage here would, if such can be imagined, be much worse. Resting aside the narrow Columbia River waterway are homes, neighborhoods and businesses, even the popular tourist destination, the Columbia River Maritime Museum, which border the waterfront. These are not "merely" uninhabited shorelines.

IND115-8 We can also hardly emphasize enough that the Columbia River estuary is an environmentally complex and sensitive area. One has but to look at the time, money and resources which have been expended in our multi-layered, citizen-local-county-state-federal struggles, spanning decades, to protect salmon habitat. To put this at risk seems to require the highest level of scrutiny. We understand Northern Star has indicated it

Individuals

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IND115-4 See our response to comment IND22-20.

IND115-5 As discussed in section 4.1.3.3, the LNG terminal location would not be affected by a tsunami and the terminal facilities would be designed to safely withstand the design earthquakes.

IND115-6 See our response to comment PM1-22.

IND115-7 See our response to comment PM1-22.

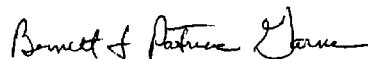
IND115-8 See our response to comment FA4-12.

IND115-8 | will spend millions in salmon enhancement, but this does not represent a commitment but
cont'd | only a voluntary assertion.

IND115-9 | Commercial shipping and fishing are important sources of revenue for Clatsop
County. While we are not experts on this point, it is our understanding that there will
have to be a 500 foot exclusion zone for 15 minutes or more as the natural gas ships head
to and from Bradwood Landing. Frankly, just mentioning such a thing as an "exclusion
zone" raises concerns about the danger of the project which Bradwood Landing
represents. In any event, we are very aware of the difficulties of crossing the Columbia
River bar and the necessity of timing such crossings with an exceeding degree of care.
Limiting access would narrow, if not totally eliminate, the opportunities for safe
crossings. This is particularly true at peak fishing seasons. Being able to cross the bar at
a particular time is not merely a matter of inconvenience but a life-or-death matter,
particularly for commercial fishermen who face time constraints as to when they can fish
or not. We also understand that the wake which the liquefied natural gas vessels will pull
has the potential to erode our shorelines and related diking systems.

The Bradwood Landing LNG plant raises serious and substantial questions which
must be scrutinized with the highest degree of thoroughness and care. We urge you to
not only look to the considerations we have identified, but those of other groups seeking
to question the viability of this project.

Sincerely,



Bennett and Patricia

Individuals

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IND115-9 We do not believe that the safety and security zones around LNG carriers
in transit in the waterway to the proposed Bradwood Landing terminal
would have significant impacts on commercial shipping and fishing on the
lower Columbia River. Section 4.8.1.7 has been revised to include
additional discussion regarding potential for navigational conflicts LNG
carrier traffic may have with other commercial ships traversing the
Columbia River bar. The potential for shoreline erosion resulting from
LNG marine traffic in the waterway is addressed in section 4.1.2.3 of the
EIS.

ORIGINAL

CP06-365-000

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2008 JAN -2 P 2:48

FEDERAL ENERGY
REGULATORY COMMISSION

December 24, 2007

Dear Ms. Bose,

Yes, here it is Christmas eve, and I am having trouble sending via e-mail my comments on the Bradwood DEIS. I went through the registration process and am waiting for my e-mail confirmation from FERC, but it looks like Santa's elf forgot me, or hasn't gotten around to it, so I am sending it via the old fashioned way, the Post Office. It will be postmarked on the 26th, so I am hoping that it will be considered timely. Thanks for your help, and believe me if I didn't think this was so important (it's the biggest cause of concern in our lives) I wouldn't be doing this on this wonderful night. I thank you.

Kristin Lee



Individuals

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K-1104

December 21, 2007

Ms. Kimberly D. Bose, Secretary
FERC
888 First Street NE Room 1A
Washington, DC 20426

FILED
OFFICE OF THE
SECRETARY

2008 JAN -2 P 2:48

FEDERAL ENERGY
REGULATORY COMMISSION

Re: DEIS Bradwood Landing LNG Project (Docket#CP06-365-000, etal.)

I would like to submit the following comments on the DEIS:

- IND116-1 The current information on the geological hazards and seismic and landslide hazards has not been addressed adequately. This area is subject to slides and earth movements. Recently there was a major landslide that blocked the main highway, demolished homes, and destroyed thousands of trees in its wake. This occurred just a few miles from the Bradwood site. It and the major storms that recently hit the north coast of Oregon shut down this major portion of the state. It was so bad that a bar pilot (these are the people who will be piloting the LNG ships) was the only one that had a working cell phone which he had to keep recharging in his car. The events that unfolded from these recent storms and slides alone also tell one that emergency services are lacking as well in the DEIS. The human and safety issues have not been addressed adequately to the extent that there are not enough personnel to respond to an accident or an act of nature of what was witnessed recently. The size of an emergency of an LNG accident with current staff at Knappa, Astoria, and Cathlamet would be tragic. Based on models of impact of an accident within a 2 mile radius it would destroy Puget Island and all of its population. This is not acceptable. Puget Island which has a population of over 1000 people has only one way out, and that is the bridge to Cathlamet. There is only a volunteer fire station on the island. Even if there were adequate personnel if an accident occurred, it would forever destroy this entire area of its livability. Human health, and safety impacts as well as emergency response need to be in the final EIS. The vapor cloud exclusion zone is incorrect and needs to be reexamined and recalculated.
- IND116-2
- IND116-3 I have a huge concern that FERC is not assessing the need for LNG and Natural Gas (and I know they have continually said that need is not there concern as market will determine it), but they need to review this project and it's pipeline as well as other LNG projects in the works in Oregon. FERC should look at these projects comprehensively and review all proposals that are related and interdependent on each other, particularly the Palomar pipeline. It is clear that the footprint for a 3rd storage tank signifies the future need for the Palomar. Therefore, the Palomar project needs to be analyzed in conjunction with the Bradwood site. With regards to the pipeline included in this permit, a Williams NW Pipeline company spokesman said they don't have room for all the gas that Bradwood is proposing and that there also is not enough demand for it. All information points to the fact that the Palomar is crucial to this project and a Supplemental DEIS should be issued incorporating Palomar. FERC needs to solicit comments from all entities prior to the final EIS in this regard.

Individuals

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IND116-1 See our responses to comments PM1-1, LA3-55, and IND22-20.

IND116-2 See our responses to comments PM1-1, LA3-55, and IND22-20.

IND116-3 This EIS is based on the proposed action, which includes two LNG storage tanks. If expansion of the LNG terminal is proposed in the future, FERC authorization, with the associated environmental review process, would be required. The Palomar pipeline is a separate project and its environmental impacts are being evaluated under a separate EIS. As discussed in section 1.0, the Williams Northwest pipeline would have capacity for the natural gas from the Bradwood landing pipeline project.

K-1105

Individuals

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IND116-4

Potential conflicts need to be addressed between LNG tankers and the normal activity that occurs on the Columbia. With the current 125 ships per year at the least, with an approximate 36 hour turnaround time (given nothing goes wrong in delays, tanker problems, the Coast Guard, etc.) you are looking at 4500 hours that the river will be at the mercy of LNG and it's militarized maneuvers. And that is at a minimum. When the Palomar is in operation, there will not be a time when there is not activity regarding LNG tankers. This is not acceptable. This will be a huge threat to our fishing, tourism, and general livability and any potential growth in this direction. This is a significant commercial and recreational fishing region and provides millions of dollars in revenue for this area. The impacts on fish habitat are numerous. All phases of the project would greatly impact the salmonids in this area. You can never recover from this destruction no matter the mitigation or stabilization practices. Long term multi-billion dollar efforts over the past 30 years in restoring critical habitat for all salmon species in the Columbia River should not be risked for an LNG facility. Northern Star's mitigation is lame at best. The plan in place could never replace the loss and continued loss of this incredible estuary.

IND116-5

"Contract incentives" to LNG carriers for appropriate screening of fish and other aquatic organisms when taking on ballast water is not an option. Every carrier should have the proper screens as well as the facility. It appears there is no requirement of these ships to do so. This should be mandatory, as well as the system on site. The aesthetic, visual, noise, and light pollution needs to be addressed, particularly to the surrounding communities that will be negatively impacted on a daily basis from this project. The pollution and noise from the LNG tanker and its accompanying tugs keeping it in place at the plant will be continuous. With the prevailing winds from the west this will pollute this whole area particularly Puget Island, Cathlamet, and everyone in that general area. This will be a major health hazard. The general lack of consideration of the welfare of residents all along the Lower Columbia is criminal. This project is flawed in so many ways and should be denied in its entirety

IND116-6

Kristin Lee
5803 SW Garden Home Road
Portland, OR 97219 503-293-5997



IND116-4 As described in sections 4.7.1.4 and 4.8.1.7, the LNG marine traffic would not have a significant impact on commercial and recreational fishing and boating. Potential impacts to salmonids are discussed in 4.5.2.1. See also our responses to comments FA2-10 and PM3-68.

IND116-5 See our response to comment PM1-31.

IND116-6 We have revised section 4.5 with regard to our analysis of impacts on aquatic resources due to the proposed water intake requirements of LNG carriers at berth at the terminal, and have changed condition 24 accordingly.

K-1106

ORIGINAL

OFFICE OF THE SECRETARY

2007 DEC 28 P 3:39

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 2A
Washington, DC 20426

Reference: Bradwood Landing, LLC Docket No. CP06-365-000

Dear Ms Bose:

The follow comments are submitted in regards to the Draft Environmental Impact Statement for the Bradwood Landing LNG and associated pipeline.

Chapter 3 Alternatives:

- IND117-1 General comment regarding geology and geotechnical issues: This chapter provides a discussion of alternative sites and in summary rules out most of the sites on various grounds and leaves others as open possibilities. The proposed Bradwood Landing LNG site DEIS discussion of alternative sites does not provide a comparison of geologic issues at these other sites. There are very significant geotechnical and geology issues at the Bradwood site that may make this site much less attractive relative to other northwest sites. Some discussion and comment should be made in regards to these concerns, particularly for those sites not ruled out.
- Chapter 3 Alternatives, 3.1.8 Pipeline Route Alternatives
- IND117-2 3.1.8.1 Major Pipeline Route Alternatives: In the first paragraph the DEIS states three of the project objectives. The first objective is to supply gas to PGE power plant and the GP mill. Is not gas already readily available to these sites via the existing Kelso-Beaver pipeline? Hence is this really a critical objective warranting FERC oversight or should this be a state issue under Oregon EFSEC?
- IND117-3 3.1.8.1 Major Pipeline Route Alternatives: Second paragraph dismisses the possibility of a direct crossing of the Columbia at Bradwood with a simple declaration that the crossing would not be possible. No analyses or discussion is provided backing up this statement.
- IND117-4 3.1.8.1 Railroad Route Alternative: NorthStar notes that this route to interstate markets would be shorter and hence potentially much less impact. The route is not considered as an alternative because it fails to meet the objective of providing gas to PGE and GP because of the need for a lateral line. A lateral line could readily be constructed under Oregon EFSEC and as noted above gas is readily available to these sites via FERC approved Kelso-Beaver pipeline. This criteria should not dominate the pipeline route decision.
- IND117-5 3.1.8.1 Railroad Route Alternative: NorthStar notes that this route would require potential blasting along the section between Bradwood to Wauna GP. This same issue is readily addressed with the preferred alternative route going west of this section. Hence the Railroad Alternative is viable with this slight variation on the route.

Individuals

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- IND117-1 The alternatives analysis was conducted based on information that could be readily obtained from published sources. Although site-specific geologic and geotechnical data are available for the proposed LNG terminal site and the pipeline route (i.e., from project-specific geotechnical and seismic reports), the same level of detail is not readily available for all the alternatives.
- IND117-2 The Bradwood Landing pipeline would provide an alternative source of natural gas to the Beaver Power Plant and Wauna Mill. All interstate pipelines require certification by the FERC under section 7c of the NGA.
- IND117-3 NorthernStar indicated that it could not use HDD methods to cross the Columbia River directly north of its proposed Bradwood Landing LNG terminal because of the width of the river at that location. A crossing north from Bradwood Landing would place the pipeline at the town of Cathlamet, and a pipeline route east from there to an interconnection with the existing Williams Northwest system near Kelso, Washington would have to traverse over rough topography.
- IND117-4 As described in section 3.1.8.1, the lateral to serve the Beaver Power Plant would significantly increase the overall length of the pipeline system and subsequently increase the number of landowners and environmental resources impacted by the project. In addition, blasting would be required for pipeline installation which could result in instability issues for the railroad bed.
- IND117-5 Blasting would not be required adjacent to the railroad bed along the proposed pipeline route.

K-1107

K-1108

- IND117-6** Table 3.1.8-1: The table provides a comparison of impacts to various environmental factors between the alternative routes. Three environmental factors are not on the table: landslides, steep slopes that potentially could erode and soils subject or be degraded by pipeline excavation/installation. The proposed route crosses a significant number of landslides and steep slopes and encounters areas of very deeply weathered and in some areas highly leached soils. The landslides on the proposed route are well documented in the URS geology report. Based on the route descriptions, it would appear that there will be many more acres of steep slopes on the proposed route relative to the Railroad route. In regards to deeply weathered soils with areas of leached soils the proposed route encounters soils that have been deeply weathered and are much older than most of the soils that will be encountered on the Railroad route (the Railroad route follows areas underlain by recently alluvium and areas impacted by the Bretz floods). These deeply weathered soils caused revegetation problems on The Kelso-Beaver pipeline route.
- IND117-7** Table 3.1.8-1: The table indicates that 228.9 acres of forest would be cleared on the proposed route. This is significantly more than the Railroad route. In addition the table does not take into account potential blowdown of trees along the proposed route and I was unable to find any reference to this very real issue. Significant stretches of blowdown impacted the Kelso-Beaver pipeline route shortly after construction due to the predominant slope aspects of the southwest and south facing slopes of the proposed route. Hence the loss of forest may be somewhat larger than projected in the table.
- Chapter 4
- IND117-8** Page 4-12 and 4-13 Recommendations: A list of recommendations for work to be completed at the early stages of project design is provided. This list is in response to significant challenges posed by development at the site by settlement sensitive soils, seismically induced soil liquefaction and seismically induced lateral spreading. The URS geotechnical report recommends very significant soil augmentation and deep pile foundations. Of particular concern will be the need to support the LNG tanks on piles and at the same time augment soil conditions beneath the site in a manner that will prevent lateral spreading from impacting the pile supports. I concur with the detailed analyses recommended and suggest that this analysis be verified by an independent qualified geotechnical engineering firm.
- IND117-9** Section 4.1.3.2 and 4.1.4.2 Mineral Resources: The proposed pipeline route and development of the site will impact the potential future use of the quarry at Bradwood. It is my understanding that the quarry is located in a designated mineral resource area of Clatsop County. The pipeline should be routed and the site should be developed in a manner that will not preclude mining of this resource. Pipeline setbacks preclude mining of significant mineral resources. Given the proximity of this deposit to water access, this resource should be adequately protected as a high value source of aggregate crushed rock.
- IND117-10** Page 4-20 Recommendations: The DEIS recommends further site specific analyses of the pipeline route. This is consistent with the URS pipeline geology report. That said, a more robust analyses of the Railroad route should be provided in order to adequately compare the two alternatives. I would strongly encourage the second review to lean towards rerouting the pipeline away from steep hazardous slopes unless completely infeasible. Generally the areas crossed by the proposed pipeline consist of a mix of deeply weathered soils and basalt and unstable slopes are common. Preference should be given to rerouting or boring under landslides over wiring and monitoring for strain on the pipeline.

Individuals

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- IND117-6** See our response to comment IND117-1.
- IND117-7** Although the term "blowdown" is not used in the EIS, section 4.4.2.3 states that edge trees that were located within a dense stand of trees before construction may lack stability following removal of adjacent supporting trees, which may result in increased tree failures.
- IND117-8** The detailed analysis would be reviewed by qualified FERC engineers and its consultants. Also see our response to comment SA1-4.
- IND117-9** Basalt is very common in the region of the project and the on-site quarry is not a unique mineral deposit that warrants special provisions to allow use during the lifetime of the project.
- IND117-10** The additional facilities and greater number of affected landowners does not support a conclusion that the Railroad Alternative would be significantly superior to the proposed route.

Table 4.1.4-3

IND117-11 Strong justification criteria should be applied to not rerouting the pipeline around confirmed landslides. Otherwise the proposed mitigations with options left open are impossible to fully evaluate. It may be appropriate to defer this more in depth analyses to a more detailed geology and geotechnical analyses, but the criteria for making a choice between mitigation alternatives should be established.

Page 4-42


IND117-12 Soil: Most of the erosion concerns use fairly standard language referring to typical best practices. Some of the soils encountered on the pipe line route are very deeply weathered. Lands in the area were purchased years ago by Reynolds Aluminum as potential bauxite sources. These soils proved to be very difficult to get vegetation established after disturbance at the Kelso Beaver pipeline. Extreme care will need to be applied to save top soil from these areas.

IND117-13 Elk are present in this area and used the pipeline route as a trail as well as resting area. This activity prevented timely establishment of vegetation along portions of the pipeline route and may require temporary fencing.

IND117-14 Noxious weeds: FERC staff should require that NorthStar develop locally specific Noxious Weed Control Plans. FERC should assist the local Noxious Weed Control boards to enforce the plans. The native local ecology of the area is predominantly forest. Areas where the forest canopy is opened and left open will become incubator areas for invasive noxious weed infestations unless ongoing aggressive maintenance is applied. This will be particularly true in areas where NorthStar is asking for wider corridors. Pipeline and electric transmission corridors in western Washington and Oregon are often areas of significant noxious weed infestations.

Thank you for consideration of these comments and I hope they provide some small assistance in your evaluation of this project.

Best regards


Dan McShane, L.E.G., M.Sc.
Licensed Engineering Geologist



K-1109

Individuals

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IND117-11 The appropriateness of the mitigation measures would be assessed when the final pipeline design geotechnical report has been completed.

IND117-12 Comment noted.

IND117-13 Comment noted. It is anticipated NorthernStar would consider temporary fencing or other measures necessary to re-establish stable vegetation along the pipeline corridor. Follow-up inspections of all disturbed areas would occur after the first and second growing seasons to determine the success of revegetation. If revegetation has not been successful after 2 years, revegetation efforts would continue until it is successful.

IND117-14 Noxious weed control is discussed in the response to comment FA3-10. Directions for accessing NorthernStar's Noxious Weeds and Soil-borne Plant Disease Control Plan via the eLibrary can be found in the response to comment PM6-60. The FERC's role in enforcement of the Commission's environmental conditions is discussed in the response to comment IND60-54.

K-1110

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OFFICE OF THE
SECRETARY
2007 DEC 26 P 3:16
WASHINGTON

IND118-1

Hello,
I respectfully register my VEHEMENT op-
position to any LNG terminals on or near the
vulnerable Columbia River in Oregon.
Please do the right thing and do NOT allow
these projects to go forward.
Happy Holidays—
Harriet Cavalli

Harriet Cavalli
Box 288004-Seattle-Wash 98145
Owen Park WA 99040 USA
206 926-3649
harrietcavalli@yahoo.com
www.harrietcavalli.net

Individuals

118

IND118-1 Comment noted.

Jeff Blackwood
47073 Kirkpatrick Rd. Pendleton, OR 97801

Tel: 541 276-4240 Fax: Home Fax Phone Home Email

 ORIGINAL

Federal Energy Regulatory Commission
Office of the Secretary
888 First Street NE
Washington, DC 20426

Sunday, February 17, 2008

Dear Commissioners,

FILED
OFFICE OF THE
SECRETARY

2008 FEB 26 P 2:38

FEDERAL ENERGY
REGULATORY COMMISSION

CP66-366-0000 ET AL

IND119-1

I am writing to you to express my opposition to the development of the Bradwood Landing Liquefied Natural (LNG) Gas Terminal near Astoria, Oregon. My belief is even stronger after reviewing the Draft Environmental Impact Statement (DEIS) on the proposal. Changing words, and even presenting further clarity will not suffice in making this a viable and sustainable proposal.

Many individuals and interests have conversed with your office about concerns such as safety, disruption of other river commerce, long term ability and guarantees of mitigation, impacts on private landowners, and the pressing question of where the LNG will actually end up. I will not repeat these concerns. My primary concern continues to be the health and sustainability of the Columbia River and its many resources, coupled with the never ending stresses we consciously add to the River.

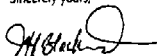
The Bradwood landing LNG terminal proposal suggests that adverse impacts from the development can be easily mitigated by design and off-site habitat improvements over time. I disagree.

I am a long term upstream resident from Northeast Oregon. I have spent a career in natural resource management and have seen the continued pressures on our systems. I am not affiliated with any group or interest; my interest is in the health and sustainability of the River and its resources. Currently, significant work is going on to develop steelhead and salmon recovery plans with the ultimate goal being to recover and de-list these species under the Endangered Species Act. These species are more than just political or biological anomalies. They are part of our culture, communities, and economies. We identify with them as who we are in the Northwest. Currently, Native American Tribes, private landowners, and public agencies have made significant sacrifices and adjustments in their activities and economies to mitigate adverse impacts to aquatic resources. Literally, billions of dollars have been spent for habitat improvement, yet populations still remain tenuous. We continue to pressure aquatic resources, and as in the LNG proposal, propose mitigating these stresses through habitat improvement. This can only go so far. The recovery planning process for the Columbia River Basin has demonstrated one clear message: Habitat improvements alone are not enough for recovery and de-listing of these species. Non-tributary influences, such as main stem hydro power operations, hatcheries, harvest schedules, predation, and estuarine management will all have to play a significant role.

All this being said, the listed fish are but a symptom of the stresses we are now seeing on Columbia River resources. It just does not make sense to continue to stress and adversely impact the Columbia River through shakey proposals such as the Bradwood Landing LNG terminal when so much is at risk in the river system and we have not yet resolved long standing issues such as salmon and steelhead recovery.

The Bradwood Landing LNG Terminal proposal should not move forward to development.

Sincerely yours,


Jeff Blackwood

cc's: Senators Ron Wyden, Gordon Smith

Individuals

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IND119-1 See our responses to comments PM3-68 and FA2-10.

K-1111

Comment of Houman Sabahi M.D. in Docket(s)/Project(s) PF05-10-000
Submission Date: 3/16/2008

IND120-1 Re: LNG proposals in the state of Oregon, (as well as the Pacific Northwest), I just wanted you to know my position on this matter. I am vehemently opposed to companies such as Northstar waltzing into our region with your approval, placing our citizens at risk with minimal short term gain to our communities with great profits for themselves and to benefit remote end-users. In fact, research shows that given the high risk and security necessary for such an operation, this will have a negative impact on other developments and businesses and even tourism in our area, which will ultimately hurt the community. This will not only increase our dependence on fossil fuels, but also, as we have learned from history, these companies exploit the local people and their communities as well as the local environment which do not receive adequate protections. Potential for a fire or toxic gas cloud or explosion is low but these things happen. Given the fact that each LNG tanker carries the energy equivalent of 50 Hiroshima nuclear bombs, the so called exclusion zones are clearly inadequate. People want security in their lives and do not appreciate living under the daily specter of the possibility a truly catastrophic event in their community. Everyone I have talked to shares these views once they are aware of the facts. You have too easily granted Northstar's requests without regard to our communities oppositions, who are directly affected by these proposals.

Houman Sabahi M.D.
92160 Whiskey Ln
Warrenton, OR 97146

Individuals

120

IND120-1 Comment noted.

ORIGINAL

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SECRETARY

7008 MAR 11 A 11:37

FEDERAL ENERGY
REGULATORY COMMISSION

Ms. Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE
Washington D. C. 20426

Dear Ms. Bose,

CP06-365-000 ET AL

IND121-1 | Enclosed please find the latest local information about the Bradwood Landing/LNG proposal in Oregon. My fervent wish is that everyone involved in the siting process of this debacle receives a copy of this information.

It would be an irreversible tragedy to approve a project whose supporters have shown such a blatant disregard for the truth.

Most respectfully,

Harriet Cavalli

Harriet Cavalli
P.O. Box 945
Ocean Park WA 98640
360.665.3446

Individuals

121

IND121-1 Comment noted.

K-1113

LARGE-FORMAT IMAGES

One or more large-format images (over 8½" X 11") go here. These images are available in E-Library at:

For Large-Format(s):

Accession No.: 20080331-0009

Security/Availability:

- ☒ PUBLIC
☐ NIP
☐ CEII
☐ NON-PUBLIC/PRIVILEGED

File Date: 3/11/08 Docket No.: CP06-365

Parent Accession No.: 20080331-0008

Set No.: 1 of 1

Number of page(s) in set: 2

Individuals

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K-1114

Comment of Marian Sawtell in Docket(s)/Project(s) PF05-10-000, PF06-25-000, PF06-26-000, PF07-10-000, PF07-13-000, CP07-444-000, CP07-441-000, CP07-442-000, CP07-443-000, CP06-365-000, CP06-365-001
Submission Date: 4/22/2008

Why should we support LNG and the Bradwood Landing?

IND122-1 Why do we need to ship natural gas into the USA from foreign countries, bring in huge ships full of natural gas up the Columbia River to Bradwood just as a so called bridge to carry us over to the future with renewable energy? Solar, wind and thermal energies are all here just waiting to be developed. We donâ€™t need this bridge just so large companies can make more money.

IND122-2 Yes, for three years several union workers will be employed putting the landing and pipeline in, but what of the landowners who will be asked to sacrifice their property and property values? That wonâ€™t be for just three years. Then there are all of the public lands that will be used for the pipeline and the rivers and streams that will need to be crossed. They say it can be done safely, but from our experiences with pipelines in the ground we doubt it. There are many fault lines that will be crossed, land slides that occur. Even the earth beneath our feet moves ever so slightly over time. Weâ€™ve had rocks that werenâ€™t there when the pipe was placed in the ground make their way up and eventually put a hole in the pipe.

IND122-4 Do you think they will decommission the pipeline once the renewable energy is in place? Not likely when there is so much money to be made. Making us dependent on another energy source from other countries around the world doesnâ€™t seem like a very good idea.

Will this ensure that we move on more quickly to renewable energy and conservation measures? More likely the progress will slow down as these companies have lots of natural gas to sell and with a patch in place whatâ€™s the hurry?

IND122-5 So Clatsop County will receive approximately \$7.8 million per year. What about the property owners with the easements crossing their properties? They keep paying taxes on these easements and are restricted to the uses of their properties.

IND122-6 The Columbia River which moves the largest amount of fresh water in the USA will be put at risk when the huge ships move all of that natural gas up the river to Bradwood. Even human errors occur in the shipping industry. All of the money being spent to preserve the Columbiaâ€™s natural beauty and fishing industry could be for naught.

Now ask yourself this, do we want a better future now or will we accept the patch-bridge and wait longer?

Looking for a brighter
future,
Tom & Marian Sawtell

Individuals

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- IND122-1 As explained in section 1.1, bringing in new sources of natural gas by importing LNG would diversity the energy portfolio of the Pacific Northwest, meet future demands, and may work to stabilize natural gas and electric prices. It would not necessarily reduce the incentive to conserve or develop additional renewable resources. Increased efficiency and conservation is discussed in section 3.1.1.2. Renewable energy resources are discussed in section 3.1.1.3.
- IND122-2 NorthernStar would compensate the landowner for use of the land needed for the pipeline right-of-way, including damage to property during construction, loss of use during construction, and loss of renewable and nonrenewable or other resources (see section 4.8.3.3).
- IND122-3 Geologic hazards and associated mitigation for the pipeline are discussed in section 4.1.4.3. Proper pipeline construction techniques would prevent damage to the pipe from rocks, as described in section 2.4.2.1.
- IND122-4 See our response to comment IND122-1.
- IND122-5 See our response to IND122-2.
- IND122-6 The Coast Guard has determined in its WSR that the Columbia River navigation channel would be suitable for LNG marine traffic if measures were implemented to responsibly manage navigation, safety, and security risks. These measures are discussed in detail in section 4.11.5.4.

ORIGINAL

**VanNess
Feldman**

ATTORNEYS AT LAW

September 4, 2007

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Room 1A
Washington, D.C. 20426

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John J. Buchovecky
(202) 298-1887
jb@vnf.com

Re: NorthernStar Energy LLC Docket Nos. CP06-366-000
CP06-376-000
CP06-377-000

Bradwood Landing LLC Docket No. CP06-365-000

**Response of Bradwood Landing LLC and NorthernStar Energy LLC to the
Information Requests in the Draft Environmental Impact Statement of the
Federal Energy Regulatory Commission**

Dear Ms. Bose:

Bradwood Landing LLC and NorthernStar Energy LLC, Applicants in the above-captioned proceedings, hereby submit for filing with the Federal Energy Regulatory Commission ("Commission") an original and 7 copies of the Applicants' response to questions 40, 94, and 95 of the Commission's Information Requests in the Draft Environmental Impact Statement.

Please contact me at the above address if you have any questions about these materials.

Sincerely,



John J. Buchovecky
Counsel for NorthernStar Energy LLC and
Bradwood Landing LLC

cc: P. Friedman (FERC)
Service List

Applicant

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K-1116

*Bradwood Landing LLC and NorthernStar Energy LLC
FERC Docket Nos. CP06-365-000, et al.*

**Response of Bradwood Landing LLC and NorthernStar Energy LLC
to the Information Request in the DEIS of the
Federal Energy Regulatory Commission**

A1-1

40, 94 and 95. NorthernStar shall provide, in its comments on the draft EIS or in a separate report, calculations showing how the troughs feeding the impoundment sumps would adequately handle the unloading line spill of 529,091 gallons. [Note: Same condition in 40, 94 and 95]

RESPONSE: The question contains the value of 529,091 gallons. If the duration over which this volume drains is one hour, then the 2037 m³/hour is equivalent to 538,000 gallons per hour and satisfies the question. However, we presume the question refers to a spill that would result from a 10 minute spill at 12,000 m³/hour- we disagree that this is the proper design basis for sizing the trough. The attached letters provided by FERC to Bradwood Landing in June 2005 formed the basis for the sizing of the troughs serving the LNG unloading line. See Attachment A hereto: Letters from Richard R. Hoffmann (FERC) and Stacey L. Gerard (USDOT). The Applicants discussed the appropriate line size break with FERC staff for a 10-minute design spill and were told to use a 6" line break as the sizing criterion. The Applicants used the 6" line break as instructed by FERC staff. For the sizing calculation for the 6" line break ten minute spill, and the calculation for the other spill flowrates and preliminary trough sizing, see Attachment B hereto: Spill Rate Calculation and Trough Sizing Calculation.

Applicant

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A1-1

See updated condition and text in section 4.11.4.

*Bradwood Landing LLC and NorthernStar Energy LLC
FERC Docket Nos. CP06-365-000, et al.*

Attachment A

Letters from Richard R. Hoffmann (FERC) and Stacey L. Gerard (USDOT)

Applicant

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K-1118

Applicant

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FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426

ORIGINAL

OFFICE OF ENERGY PROJECTS

April 19, 2005

Theodore L. Wilke
Deputy Associate Administrator for Pipeline Safety
U.S. Department of Transportation
400 Seventh Street, SW
Washington, DC 20590

Dear Mr. Wilke:

In accordance with the February 2004 Interagency Agreement for the review of LNG import/export facilities, we are requesting your concurrence that we are following appropriate procedures on a technical issue related to evaluating exclusion zones around LNG import terminals. The technical issue is about our selection of the single accidental leakage source used to calculate spills from piping at a terminal.

The incorporation of NFPA 59A into 49 CFR Part 193 in March 2000, has resulted in some discussion within the regulatory community on how design spills should be determined for marine transfer lines. Under NFPA Section 2.2.3.5, the design spill used in thermal and flammable vapor exclusion zone calculations for vaporization, process, or LNG transfer areas must equal the greatest volume from any "single accidental leakage source." Prior to March 2000, the design spill required the rupture of a single transfer pipe with the greatest overall flow capacity, for not less than 10 minutes (old Part 193.2059(d)).

The FERC staff presently uses the greatest overall flow volume for sizing impoundments at vaporization, process and transfer areas. This approach ensures that impoundments are sized for a catastrophic failure that could result from an external event or intentional act, while recognizing that a more likely rupture of a connection to the transfer line is more appropriate as the design spill used to calculate flammable vapor exclusion zones.

Our review of marine transfer systems finds that the design construction, operation and historical integrity of all-welded large diameter marine transfer piping does not support a full pipe rupture without ignition as a credible accident scenario. Marine transfer systems are constructed of relatively thick-walled seamless pipe, fully x-ray inspected during construction, and operated at moderate pressures (50 to 80 psi). Maximum flow rates are limited to the 10- to 12-hour cargo unloading period, a time when extra staff is on hand to monitor operations and detect abnormal events and quickly

K-1119

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- 2 -

activate emergency shutdown systems. As a result, our determination of a single accidental leakage source for a marine transfer system is based on a facility-specific review of piping and instrumentation diagrams to identify all small diameter attachments to the transfer piping for instrumentation, pressure relief, recirculation, etc, and any flanges that may be used at valves or other equipment, in order to determine the largest spill rate.

As an additional measure of conservatism in evaluating hazards from a terminal's operations, we have also decided to evaluate the marine unloading arms connected to the dock-side end of marine transfer system since the typical 16-inch diameter arms have the potential for a larger spill volume. However, we find that a shorter spill duration is appropriate since the powered emergency release coupling (PERC) valves equipped on all modern arms and the integrated ship to shore emergency shutdown systems should limit spills to less than 30 seconds.

We solicit your concurrence on this approach in determining the accidental leakage source for marine transfer systems. If you have any questions about this request, please call Chris Zerby at 202-502-6111. Thank you for your continued cooperation.

Sincerely,

Richard R. Hoffmann, Director
Division of Gas - Environment
and Engineering

Applicant

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K-1120

Applicant

1

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U.S. Department
of Transportation
Pipeline and
Hazardous Materials Safety
Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

MAY 8 2005

FILED
05 JUN 15 PM 12:10
FEDERAL ENERGY REGULATORY COMMISSION

Richard R. Hoffmann
Director
Division of Gas - Environment and Engineering
Federal Energy Regulatory Commission
838 First Street, N.E.
Washington, DC 20426

Dear Mr. Hoffmann:

This is in response to your letter of April 19, requesting the Office of Pipeline Safety's (OPS) advice on the procedures you are following in evaluating exclusion zones for marine cargo transfer lines in LNG import terminals. We are pleased to respond in the spirit of the February 2004 Interagency Agreement on coordination of Federal safety efforts and because our regulations, 49 CFR Part 193, are used to assess the safety and hazard impacts from proposed siting of LNG facilities, including marine transfer lines.

Our regulations provide that impounding areas for marine cargo transfer systems be based on a design spill defined as flow from any single accidental leakage source for 10 minutes or for a shorter time. The shorter time is based upon demonstrable surveillance and shutdown provisions acceptable to the authority having jurisdiction. Therefore, these spills are the basis upon which hazard exclusion modeling could be performed.

The OPS agrees that the design and construction of marine cargo transfer systems is very robust and that failure is unlikely under operational constraints. Moreover, the extensive security and safety oversight provided by the USCG before, during, and after transfer operations further reduces the risk that a spill could threaten life and property. There is no documented evidence of a catastrophic failure ever having occurred in either LNG operational experience or research. The OPS intends to explore a more comprehensive approach that accounts for risk and probability instead of a spill based only on a worst case scenario. This may include incentives that encourage operators to utilize more mitigating measures in controlling potential spills to reduce the impact on people and property close to LNG facilities.

The OPS concurs with the two credible scenarios you propose for potential single accidental leakage sources, including your justification for smaller spill durations. The first scenario focuses on facility-specific small diameter attachments to the transfer piping to determine the largest spill rate. The OPS agrees with using this scenario for the design spill.

K-1121

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2

The second and more conservative scenario requires the review of the marine unloading arms based on the fact that these components are reconnected to the ship each time a ship docks. We agree that the integrated ship to shore shutdown systems make large spills here very unlikely. Therefore, spill duration of 30 seconds or less from leaking flanges instead of guillotine breaks may be used for the spill rate criteria.

We appreciate the opportunity to provide the above input on your approach in determining the accidental leakage source for marine transfer systems. If you have any questions or require any additional information on our position, please feel free to contact me or Theodore Wilkie, Deputy Associate Administrator for Pipeline Safety, at (202)366-4595.

Sincerely yours,



Stacey E. Gerard
Associate Administrator for Pipeline Safety

Applicant

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K-1122

*Brathwood Landing LLC and NorthernSiar Energy LLC
FERC Docket Nos. CP06-365-000, et al.*

Attachment B

**Spill Rate Calculation
Trough Sizing Calculation**

Applicant



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K-1123

Applicant

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K-1124

			
Document No.	Revision	Date	Sheet
W00031-000-PR-CA-037	P1	2/10/2006	1 of 2

Client: Northern Star Natural Gas

Project No. 31

Northern Star Natural Gas Project

**SPILL RATE
CALCULATION**

Document No:

W00031-000-PR-CA-037

P1	Issue for JDC	LH	10/2/06	GD	15/2/06	JCF	15/2/06
Rev	Details	Made by	Date	Check by	Date	App'd by	Date
Created	Northern Star Natural Gas	Enquiry/Project No.	31				

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Applicant

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K-1125

Calculation Continuation Sheet		WHESSOE	
1.1 Purpose The purpose of this calculation is to determine the spill rates to be used in vapour dispersion analysis. The spill is assumed to be from a line rupture. Rupture of the 32" unloading lines is not considered. Flow due to a rupture of the 6" recirculation line is calculated assuming flow through an orifice.			
1.2 Calculation method From Coulson & Richardson, Chemical Engineering, Vol 1 (Fluid Flow, Mass Transfer and Heat Transfer) $G = C_D A_o \sqrt{2 \times \rho \times (\Delta P)}$ where G = mass flow rate (kg/s) C _D = coefficient of discharge = 0.61 where Re > 10000 A _o = area of orifice (m ²) A = area of upstream pipe (m ²) ρ = density (kg/m ³) ΔP = Upstream pressure - downstream pressure (Pa)			
1.3 Spill rate - Berth			
1.3.1 Flow through 2" orifice in 32" line			
Density	ρ =	421 kg/m ³	HYSYS
Upstream line size		32 in	
Orifice size		2 in	
			0.8128 m
			0.0525 m
Upstream pipe area	A =	0.519 m ²	
Orifice area	A _o =	0.002 m ²	
	$[1 - (A_o / A)^2]^{0.5} =$	1.000	
Upstream pressure	P =	520.575 Pa (g)	HYSYS
Downstream pressure	P _j =	0 Pa (g)	Atmospheric
Mass flow	G =	27.65 kg/s	
			99,526 kg/h
Volumetric flow	Q =	238 m ³ /h	
1.3.2 Flow through 6" orifice in 32" line			
Density	ρ =	421 kg/m ³	HYSYS
Upstream line size		32 in	
Orifice size		6 in	
			0.8128 m
			0.1541 m
Upstream pipe area	A =	0.519 m ²	
Orifice area	A _o =	0.019 m ²	
Title		Spill Rates	
Calculation No.		W00031-000-PR-CA-037	
		Rev	
		P1	1 of 2

Calculation Continuation Sheet		WHESSOE	
$[1 - (A_2/A_1)^5]^{1/5} = 0.999 \rightarrow 1$			
Upstream pressure	$P_1 = 520.575$ Pa (g)	HYSYS	
Downstream pressure	$P_2 = 0$ Pa (g)	Atmospheric	
Mass flow	$G = 238.19$ kg/s	=	857.482 kg/h
Volumetric flow	$Q = 2.037$ m ³ /h		
1.4 Spill rate - Tank			
1.4.1 Flow from rupture of in-tank pump common discharge line			
Three in-tank pumps provided per tank. For worst case, assume all pumps running i.e. 9 pumps running.			
Pump max capacity	2,353	Usgal/min	= 534 m ³ /h W00031-161-PR-DS-002
Number of pumps running	9		
Max flow in line	21,177	Usgal/min	= 4810 m ³ /h
1.5 Spill rate - Sendout			
1.5.1 Flow from rupture of sendout pump common discharge line			
Seven sendout pumps provided (incl future). For worst case, assume all pumps running i.e. 7 pumps running.			
Pump max capacity	2,398	Usgal/min	= 545 m ³ /h W00031-561-PR-DS-004
Number of pumps running	7		
Max flow in line	18,786	Usgal/min	= 3813 m ³ /h
Title		Spill Rates	
Calculation No.		W00031-000-PR-CA-037	
		Rev P1	2 of 2

Applicant



1

K-1126

Applicant

1

K-1127

 			
Document No.	Revision	Date	Sheet
W00031-000-PR-CA-038	P1	2/10/2006	1 of 2

Client: Northern Star Natural Gas

Project No. 31

Northern Star Natural Gas Project

**TROUGH SIZING
CALCULATION**

Document No:

W00031-000-PR-CA-038



P1	Issue for IDC	LH	17/02/06	JM	17/02/06	JCF
Rev	Details	Made by	Date	Chk'd by	Date	App'd by
Client	Northern Star Natural Gas		Enquiry/Project No.	31		

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Applicant

1

K-1128

Calculation Continuation Sheet		WHESSOE	
1.1 Purpose The purpose of this calculation is to determine the flowrate along a trough of assumed dimensions. This calculation is iterative, requiring variation of trough dimensions until required flowrate is achieved. Based on flow of water.			
1.2 Trough Size - Berth			
Required flowrate	Q _r =	2.037	m ³ /h
$v = (r^{2/3} \times S^{1/2}) / n$			
where v = velocity (m/s) r = hydraulic radius S = slope = 1 / 400 = 0.0025 n = coefficient (concrete) = 0.019			
$\Rightarrow v = 2.631 r^{2/3}$			
Width	W =	1.2	m
Depth	H =	0.5	m
Area	A =	0.6	m ²
Wetted perimeter	P =	2.2	m
Hydraulic radius	r =	0.273	
Velocity	v =	1.106	m/s
Flowrate	Q =	2.390	m ³ /h
Q = v x A (x 3600)			
OK			
			
1.3 Trough Size - Sandbar			
Required flowrate	Q _r =	3.815	m ³ /h
$v = (r^{2/3} \times S^{1/2}) / n$			
where v = velocity (m/s) r = hydraulic radius S = slope = 1 / 400 = 0.0025 n = coefficient (concrete) = 0.019			
$\Rightarrow v = 2.631 r^{2/3}$			
Width	W =	1.8	m
Depth	H =	0.5	m
Area	A =	0.9	m ²
Wetted perimeter	P =	2.8	m
Hydraulic radius	r =	0.321	
Velocity	v =	1.235	m/s
Flowrate	Q =	4.000	m ³ /h
Q = v x A (x 3600)			
OK			
			
Title		Trough Sizing	
Calculation No.		W00031-000-PR-CA-038	
Rev		P1	
		1 of 2	

Applicant

1

K-1129

Calculation Continuation Sheet		WHESSOE	
1.4 Trough size - In-tank pumps (one tank)			
Required flowrate	Q =	1,600	m ³ /h
$v = (r^{2.48} \times S^{0.54}) / n$			
where			
v = velocity	(m/s)		
r = hydraulic radius			
S = slope	= 1 / 400 =	0.0025	
n = coefficient (concrete)	=	0.019	
$\Rightarrow v = 2.6 / (1/r)^{2.48}$			
Width	W =	1.2	m
Depth	H =	0.5	m
Area	A =	0.6	m ²
Wetted perimeter	P =	2.2	m
Hydraulic radius	r =	0.273	
Velocity	v =	1.106	m/s
Flowrate	Q =	2,392	m ³ /h
OK			
Q = v x A x 3600			
1.5 Trough size - In-tank pumps (common sendout i.e. 9 pumps)			
Required flowrate	Q =	4,810	m ³ /h
$v = (r^{2.48} \times S^{0.54}) / n$			
where			
v = velocity	(m/s)		
r = hydraulic radius			
S = slope	= 1 / 400 =	0.0025	
n = coefficient (concrete)	=	0.019	
$\Rightarrow v = 2.6 / (1/r)^{2.48}$			
Width	W =	2.1	m
Depth	H =	0.5	m
Area	A =	1.1	m ²
Wetted perimeter	P =	3.1	m
Hydraulic radius	r =	0.339	
Velocity	v =	1.278	m/s
Flowrate	Q =	4,832	m ³ /h
OK			
Q = v x A x 3600			
Title		Trough Sizing	
Calculation No.		W00031-000-PR-CA-038	
Rev		P1	
		2 of 2	

ORIGINAL

**VanNess
Feldman**
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Washington, D.C. 20007-3871
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Seattle, Washington
(206) 823-8372

John J. Buchovecky
(202) 296-1887
jjb@vnf.com

September 4, 2007

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Room 1A
Washington, D.C. 20426

**Re: NorthernStar Energy LLC Docket Nos. CP06-366-000
CP06-376-000
CP06-377-000**

Bradwood Landing LLC Docket No. CP06-365-000

Dear Ms. Bose:

Enclosed for filing with the Federal Energy Regulatory Commission in the above referenced proceedings please find an original and 7 copies of letters in support of the Bradwood Landing liquefied natural gas terminal and pipeline.

Please contact me at the above address if you have any questions about these materials.

Sincerely,



John J. Buchovecky
Counsel for NorthernStar Energy LLC
and Bradwood Landing LLC

cc: P. Friedman (FERC)
Service List

Applicant

2

K-1130

Applicant

2

2/13/07
copy

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426
Reference No. CP06-365, CP06-366

Dear Madam Secretary,

A2-1

I am writing in support of the NorthernStar Natural Gas LNG receiving terminal and associated pipeline at Bradwood Landing in Clatsop County, Oregon. Demand for clean burning natural gas is increasing, while North American supplies are stable to decreasing. This is a significant problem in the Pacific Northwest as more and more of the natural gas supply is moving to the Eastern United States. Exploration and drilling in the U.S. and Canada has only managed to maintain current production. Bradwood Landing will assure natural gas supplies needed to maintain a strong economy here in the Northwest. There is no question that the U.S. needs to import liquefied natural gas for the Northwest's energy needs.

The United States continues to lose jobs to overseas manufacturing and I believe we will lose more jobs offshore if we do not compete in the world energy market by importing natural gas. The United States and Pacific Northwest need to import natural gas to maintain "Family Wage" jobs.

I am a Union Carpenter, a member of the Pacific Northwest Regional Council of Carpenters. The PNWRCC represents over 18,000 Union Carpenters in Washington, Oregon, Idaho, Montana and Wyoming. I believe that Northern Star's commitment to a Project Labor Agreement will be a key component to the success of Bradwood Landing. Highly skilled and professional workers will ensure a safe and high quality construction project.

NorthernStar has done an outstanding job of communicating with the Lower Columbia community. They have been open and transparent, hosting open houses at Bradwood Landing, information meetings on both sides of the Columbia River, and public presentations showing a strong commitment to the community. This effort proves that NorthernStar is an exceptional developer and should get your YES vote for issuing the permit to construct Bradwood Landing.

Bradwood Landing was an industrial site for decades, where citizens of the Lower Columbia lived and worked. I believe it is beneficial to use existing industrial land for development, rather than "Greenfield" locations. This also shows NorthernStar's commitment to the environment. In addition, Bradwood Landing is an excellent location for the importation of LNG and the necessary pipeline to Kelso. Bradwood Landing is over two miles north of Highway 30 at mile marker 38 on the Columbia River. It is close to both the Pacific Ocean and the interstate pipeline.

Bradwood Landing should get your approval, a "Yes" vote from the Federal Energy Regulatory Commission. Please approve Bradwood Landing.

Sincerely, *W. H. Ewing Jr.* Local 2154

27470 SW Lenske Ln
Wilsonville OR 97070

A2-1

Comment noted.

K-1131

Applicant

2

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington DC, 20426
Reference Docket No. CP06-365

June 28, 2007

Dear Magalie Salas:

I am writing to voice my support for NorthernStar Natural Gas's proposed LNG terminal at Bradwood Landing in Clatsop County, Oregon.

A2-1
cont'd

I am a resident of the Northwest and believe that this new facility is great for our community by providing much-needed family wage jobs and clean energy for the Pacific Northwest.

The proposed Bradwood Landing terminal site is located on the Columbia River, between Washington and Oregon, which has a long history as a working river. The Columbia is essential to the region's logging and fishing industries, and Bradwood Landing would be a welcome addition to the area's economy. NorthernStar is a responsible company who has pledged to mitigate any environmental effects and even leave the ecosystem in better shape than they found it.

I urge you and the commissioners to support this project.

Sincerely,



Terry Klemetsrud
10121 Evergreen Hwy #25-141
Everett, WA 98204

K-1132

Applicant

2

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington DC, 20426
Reference Docket No. CP06-365

June 28, 2007

Dear Magalie Salas:

I am writing to voice my support for NorthernStar Natural Gas's proposed LNG terminal at Bradwood Landing in Clatsop County, Oregon.

A2-1
cont'd

I am a resident of the Northwest and believe that this new facility is great for our community by providing much-needed family wage jobs and clean energy for the Pacific Northwest.

The proposed Bradwood Landing terminal site is located on the Columbia River, between Washington and Oregon, which has a long history as a working river. The Columbia is essential to the region's logging and fishing industries, and Bradwood Landing would be a welcome addition to the area's economy. NorthernStar is a responsible company who has pledged to mitigate any environmental effects and even leave the ecosystem in better shape than they found it.

I urge you and the commissioners to support this project.

Sincerely,



Todd Holt
108 East Bay Drive
Newport, OR 97365

K-1133

Applicant

2

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington DC, 20426
Reference Docket No. CP06-365

June 28, 2007

Dear Magalie Salas:

I am writing to voice my support for NorthernStar Natural Gas's proposed LNG terminal at Bradwood Landing in Clatsop County, Oregon.

A2-1
cont'd

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The proposed Bradwood Landing terminal site is located on the Columbia River, between Washington and Oregon, which has a long history as a working river. The Columbia is essential to the region's logging and fishing industries, and Bradwood Landing would be a welcome addition to the area's economy. NorthernStar is a responsible company who has pledged to mitigate any environmental effects and even leave the ecosystem in better shape than they found it.

I urge you and the commissioners to support this project.

Sincerely, 

Edward J Mitchell Jr
3728 SW Firdrona Lane S.
Port Orchard, WA 98367

K-1134

**VanNess
Feldman**
ATTORNEYS AT LAW

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SECRETARY
2001 SEP 19 P 1:19
NUCLEAR ENERGY
REGULATORY COMMISSION

Seattle, Washington
(206) 623-9372

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
Room 1A
888 First Street, N.E.
Washington, D.C. 20426

Dear Ms. Bose:

Enclosed for filing with the Federal Energy Regulatory Commission in the above referenced proceedings please find an original and 7 copies of letters in support of the Bradwood Landing liquefied natural gas terminal and pipeline.

Please contact me at the above address if you have any questions about these materials.

Sincerely,

John J. Buchovecky
Counsel for Bradwood Landing LLC and
NorthernStar Energy LLC

cc: Paul Friedman (FERC)
Service List

Applicant

Applicant

3

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington DC, 20426
Reference Docket No. CP06-365

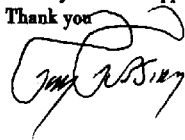
Dear Magalie Salas:

I support Bradwood Landing, the proposed LNG terminal on the Columbia River. I support Bradwood for Environmental reasons and I have listed them below:

- Methane, otherwise known as Natural Gas produces a much lower amount of CO2 than coal or coal gasification. We are going to need reliable energy supplies and Natural Gas produces less CO2.
- Many of the world's gas reserves are historic "stranded" reserves. These reserves were discovered during oil explorations and capped. So much of the drilling and discovery has been completed. That alone lessens the environmental impact
- Until recently oil wells burned their excess Natural Gas, flared it off. They looked at methane as a useless byproduct in the exploration and development of oil wells. Now, that methane is being captured and sent to market. This again is a very positive environmental gain. The conservation of energy!
- Bradwood will have minimal impact along its pipeline route with directional drilling of the pipeline under rivers and sensitive wetlands. Only 36 miles of pipeline to get Bradwood Landings Natural Gas to the Northwest energy markets.
- Northern Star, Bradwood Landings developer has committed to restoring the Hunt Creek Estuary and Hunt Creek. A small project but we all know how positive Salmon enhancement on multiple projects adds up to Salmon restoration.

Northern Star is a responsible company developing a responsible project. Please join me in supporting Bradwood Landing.

Thank you



Jim Tussing
480 W Main St
Astoria, OR

A3-1

Comment noted.

A3-1

K-1136

Applicant

3

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington DC, 20426
Reference Docket No. CP06-365

Dear Magalie Salas:

I support Bradwood Landing, the proposed LNG terminal on the Columbia River. I support Bradwood for Environmental reasons and I have listed them below:

A3-1
cont'd

- Methane, otherwise known as Natural Gas produces a much lower amount of CO2 than coal or coal gasification. We are going to need reliable energy supplies and Natural Gas produces less CO2.
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Northern Star is a responsible company developing a responsible project. Please join me in supporting Bradwood Landing.

Thank you

Lea Rae Michelle Bucy
LEA-RAE Michelle Bucy
193 Bond St #3
Astoria, Oregon 97103

K-1137

Applicant

3

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington DC, 20426
Reference Docket No. CP06-365

Dear Magalie Salas:

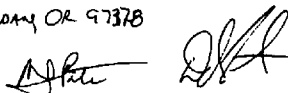
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A3-1
cont'd

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Northern Star is a responsible company developing a responsible project. Please join me in supporting Bradwood Landing.
Thank you

DON & JENN POTE
503 SE STEEDMAN RD #3
SEASIDE OR 97138



K-1138

Applicant

3


Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington DC, 20426
Reference Docket No. CP06-365

Dear Magalie Salas:

I support Bradwood Landing, the proposed LNG terminal on the Columbia River. I support Bradwood for Environmental reasons and I have listed them below:

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- Northern Star, Bradwood Landings developer has committed to restoring the Hunt Creek Estuary and Hunt Creek. A small project but we all know how positive Salmon enhancement on multiple projects adds up to Salmon restoration.

Northern Star is a responsible company developing a responsible project. Please join me in supporting Bradwood Landing.
Thank you



Thomas E. Kamen

3222 Hwy 101 N #2
Eugene, Oregon 97125

A3-1
cont'd

K-1139

Applicant

3

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington DC, 20426
Reference Docket No. CP06-365

Dear Magalie Salas:

I support Bradwood Landing, the proposed LNG terminal on the Columbia River. I support Bradwood for Environmental reasons and I have listed them below:

A3-1
cont'd

- Methane, otherwise known as Natural Gas produces a much lower amount of CO2 than coal or coal gasification. We are going to need reliable energy supplies and Natural Gas produces less CO2.
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Northern Star is a responsible company developing a responsible project.
Please join me in supporting Bradwood Landing.
Thank you

Virginia Dieter
Virginia Dieter
90952 Hungry Hollow Ln #3
Westport, OR 97016

K-1140

Applicant

3

Magalie R. Salas, Secretary
Federal Energy Regulatory Commission
888 First St. N.E., Room 1A
Washington DC, 20426
Reference Docket No. CP06-365

Dear Magalie Salas:

I support Bradwood Landing, the proposed LNG terminal on the Columbia River. I support Bradwood for Environmental reasons and I have listed them below:

A3-1
cont'd

- Methane, otherwise known as Natural Gas produces a much lower amount of CO2 than coal or coal gasification. We are going to need reliable energy supplies and Natural Gas produces less CO2.
- Many of the world's gas reserves are historic "stranded" reserves. These reserves were discovered during oil explorations and capped. So much of the drilling and discovery has been completed. That alone lessens the environmental impact
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Northern Star is a responsible company developing a responsible project. Please join me in supporting Bradwood Landing.

Thank you

Morgan Palmer

12505 42ND. AVE NW
PLYMOUTH MN. 55441
Phone 763 559 7488

K-1141

**VanNess
Feldman**

ATTORNEYS AT LAW

October 15, 2007

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Room 1A
Washington, D.C. 20426

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2007 OCT 15 P 4:39

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(202) 338-2416 Facsimile

Seattle, Washington
(206) 629-8372

John J. Buchovecky
(202) 298-1887
jjb@vnf.com

 ORIGINAL

Re: NorthernStar Energy LLC Docket Nos. CP06-366-000
CP06-376-000
CP06-377-000

Bradwood Landing LLC Docket No. CP06-365-000

Response of Bradwood Landing LLC and NorthernStar Energy LLC to the
Information Request in the Draft Environmental Impact Statement of the
Federal Energy Regulatory Commission

Dear Ms. Bose:

A4-1 | Bradwood Landing LLC and NorthernStar Energy LLC, Applicants in the above captioned proceedings, hereby submit for filing with the Federal Energy Regulatory Commission ("Commission") an original and 7 copies of the Applicants' response to question 18 (Thermal Mixing Zone Modeling) of the Commission's Information Requests in the Draft Environmental Impact Statement.

Please contact me at the above address if you have any questions about these materials.

Sincerely,



John J. Buchovecky
Counsel for NorthernStar Energy LLC and
Bradwood Landing LLC

cc: P. Friedman (FERC)
Service List

Applicant

4

A4-1

Information from the technical memorandum, *Mixing Zone Analysis for Bradwood Landing Point Source Discharges – NorthernStar Natural Gas*, (submitted by NorthernStar in response to a recommendation in the draft EIS) has been incorporated into section 4.3.2.3. Directions for accessing NorthernStar's Mixing Zone Analysis for Bradwood Landing Point Source Discharges – NorthernStar Natural Gas via the eLibrary can be found in the response to comment FA1-14.

K-1142

**VanNess
Feldman**

ATTORNEYS AT LAW

October 15, 2007

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Room 1A
Washington, D.C. 20426

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2007 OCT 15 P 4: 38

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Seattle, Washington
(206) 623-9372

John J. Buchovecky
(202) 298-1887
jb@vnf.com

 ORIGINAL

Re: NorthernStar Energy LLC Docket Nos. CP06-366-000
CP06-376-000
CP06-377-000

Bradwood Landing LLC Docket No. CP06-365-000

Response of Bradwood Landing LLC and NorthernStar Energy LLC to the
Information Requests in the Draft Environmental Impact Statement of the
Federal Energy Regulatory Commission

Dear Ms. Bose:

A5-1 | Bradwood Landing LLC and NorthernStar Energy LLC, Applicants in the above captioned proceedings, hereby submit for filing with the Federal Energy Regulatory Commission ("Commission") an original and 7 copies of the Applicants' response to questions 41 and 96 (Rail Traffic Description) of the Commission's Information Requests in the Draft Environmental Impact Statement.

Please contact me at the above address if you have any questions about these materials.

Sincerely,



John J. Buchovecky
Counsel for NorthernStar Energy LLC and
Bradwood Landing LLC

cc: P. Friedman (FERC)
Service List

Applicant

5

A5-1 Information in this comment regarding rail traffic and associated Safety/ Security procedures, which was submitted by NorthernStar in response to a recommendation in the draft EIS, has been incorporated into section 4.8.2.7.

K-1143

*Bradwood Landing LLC and NorthernStar Energy LLC
FERC Docket Nos. CP06-365-000, et al*

**Response of Bradwood Landing LLC and NorthernStar Energy LLC
to the Information Request in the DEIS of the
Federal Energy Regulatory Commission**

41(a) and 96(a). NorthernStar shall provide in its comments on the draft EIS a description of historical, current, and anticipated rail traffic which includes the type of rail traffic (cargo, passenger, etc.), type of cargo, and frequency of all rail traffic which may utilize the railroad tracks adjacent to the facility. [Note: Same condition in 41 and 96]

RESPONSE: There is one set of railroad rails that runs through the Bradwood Landing terminal site. The tracks end approximately 25 miles west of the site.

Passenger train service through the Bradwood Landing terminal site, running between Portland and Astoria, was abandoned in 1952 due to low ridership.¹ Anecdotal information collected by Bradwood Landing indicates that, with the exception of the brief period described below, a train has not run through the terminal site since at least 1987. In fact, soil covered the railroad tracks for at least 12 years prior to the clearing of the tracks to allow the Lewis & Clark Explorer Train (LCE) to temporarily operate from 2003 to 2005. From 2003 to 2005, during the bicentennial celebration of Lewis and Clark's exploration, the LCE provided summer-only passenger train service between Portland and Astoria. The LCE was heavily subsidized, and the service was terminated in 2005 when the subsidy ended.

Since the termination of the LCE service, a train has not run through the Bradwood Landing terminal site. There is currently no traffic on the tracks and the P&W railroad has no plans to run trains west of Wauna (Wauna is east of Bradwood). The tracks were washed out west of the Bradwood Landing terminal site two years ago, approximately half-way to Astoria, and are currently impassable. The tracks have not been repaired, and there is no justification for trains to run between Bradwood and the washed out tracks, although the P&W railroad is in discussions with the local diking districts to repair the dikes and restore the tracks.

During the construction of Bradwood Landing, materials that can be cost effectively delivered by rail will be.

¹ <http://www.nationalcorridors.org/df/d06022003.shtml>

Applicant

5

K-1144

*Bradwood Landing LLC and NorthernStar Energy LLC
FERC Docket Nos. CP06-365-000, et al*

41(b) and 96(b). NorthernStar shall also provide detailed procedures for coordinating with the railroad company to ensure safe rail transit through the Bradwood Landing LNG facility property.

RESPONSE: If there is an upset event at the Bradwood Landing Terminal (the "Terminal"). Terminal security will call the railroad dispatch operator who will call the train engineer and tell him to stop short of the Bradwood Landing facility property until the all clear is given. Such procedures are not foreign to the railroad and are in place for other locations, conditions, and circumstances. The following is the detailed procedure for coordinating with the railroad company to ensure safe rail transit through the Bradwood Landing LNG facility property.

General Operations of the LNG Terminal

Routine Terminal operations are broadly comprised of three separate categories:

1. LNG Carrier Offloading
2. LNG Vaporization
3. General Support Operations

LNG Carrier Offloading operations involve the arrival of a LNG Carrier, the transfer of LNG from the Carrier to the terminal storage tanks, and the departure of the Carrier.

LNG Vaporization activities are carried out based on market demand and are unrelated to LNG Carrier activities. The Terminal is expected to carry out this activity as an around-the-clock routine and under normal operations, no phase of this activity presents any risk to the safety of railroad operations, nor do vaporization operations influence railroad operations.

General Support Operations include routine and nonscheduled maintenance and repairs, administrative support, and all other miscellaneous activities required at the Terminal. Under normal operations, no phase of this activity presents any risk to the safety of railroad operations, nor do LNG Carrier operations influence railroad operations. Under operational upset or emergency response conditions, railroad operations may potentially be affected depending on the nature and severity of the event.

General Operations of the Railroad

There is only one set of railroad rails that runs through the Bradwood Landing Terminal. The railroad may schedule future trains so that there is either an east bound train or a west bound train running at any one time. The logistical possibilities for rail traffic are very limited, thus if service ever did commence, keeping track of train traffic would be simple.

Railroads run trains on a routine schedule where service is provided. If trains begin running through the Terminal, Bradwood Landing management/security would coordinate with the railroad to obtain the schedule for the trains passing through the Terminal.

Applicant

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*Bradwood Landing LLC and NorthernStar Energy LLC
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Upset Conditions

An upset condition could be an act of nature, such as an earthquake or severe storm; a fire at the terminal or surrounding site; or a hydrocarbon leak. Events that require an Emergency Response are very rare (with the exception of severe storms, which are still infrequent, but less so than the other upset conditions). It is more likely than not that no Emergency Response event will occur during the life of the Terminal. Regardless of the unlikelihood of an upset condition at the facility, it is still necessary for Bradwood Landing to have current and executable procedures in place for the notification of the railroad in the event of an upset condition at the Terminal. In the event that the railroad commences service, the notification procedures would be used to tell the train to stop short of Terminal. Such procedures are not foreign to the railroad and are in place for other locations, conditions, and circumstances.

Notification Procedures

The railroad has a dispatch operator that is reachable by direct phone line 24 hours a day, 7 days a week. If there is an upset event at the Terminal, plant security will call the railroad dispatch operator, who will call the train engineer, and tell him or her to stop short of the Terminal until the all clear is given.

Non-Emergency Operational Upsets

In the event of non-emergency operational upsets, a notification shall be made to the railroad providing the following information:

1. Description of upset/activity: *Scheduled or unscheduled maintenance, equipment failure, etc.*
2. Location on facility of upset: *Jetty, Control Room Building, etc.*
3. Anticipated duration: *When will upset condition be remedied; When will routine operations commence?*
4. Any safety issues: *Description of any issues that may result in an increase, or otherwise influence safety or railroad passage or track use.*
5. Change of status: *Any change to operational upset conditions or other information previously reported.*

An initial notification to the railroad shall be made as part of the initial action to any facility emergency response.

Emergency Response Conditions

There are a number of emergency response events which have specific response plans.

These include:

- Spill or Release
- Severe Weather
- Fire
- Bomb Threat
- Earthquake

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*Bradwood Landing LLC and NorthernStar Energy LLC
FERC Docket Nos. CP06-363-000, et al.*

- Terrorist Incident
- LNG Carrier Response

In the event of an emergency response, an initial notification shall be made to the railroad consisting of the following information:

1. Description of upset/activity: *LNG spill, fire, etc.*
2. Recommendation of immediate action by railroad: *Whether conditions and/or risks are such that a train should be stopped outside the Terminal until the situation improves.*

A follow-on notification shall be made providing the following clarifying information as it becomes available:

3. Location on facility of emergency: *Jetty, Control Room Building, etc.*
4. Anticipated duration of emergency: *When will the emergency be remedied; When will Terminal and/or Emergency Responders stand down from response operations?*
5. Any intermediate safety issues: *Description of any issues which may result in an increase, or otherwise influence safety, railroad passage, or track use; Safety related information in addition to that provided in the initial notification.*

Normalization of Conditions

For non-emergency operational upset situations, Bradwood Landing shall appraise the railroad dispatcher when conditions at the Terminal return to normal and shall include a final recommendation regarding the use of the railroad. The dispatcher will communicate the all clear to the train engineer.

Recovery actions from an Emergency Response condition depend on the nature, severity, and in some cases the duration of the event. Emergency responses may be handled completely by Bradwood Landing Terminal personnel or, for responses to events of significant magnitude, it may be appropriate to establish a Unified Command. In the case of a Unified Command structure for the response, the all clear communication to the railroad dispatcher shall be made jointly by the Unified Command and Bradwood Landing. The dispatcher will communicate the all clear to the train engineer.

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December 21, 2007

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Room 1A
Washington, D.C. 20426

Re: NorthernStar Energy LLC Docket Nos. CP06-366-000
CP06-376-000
CP06-377-000

Bradwood Landing LLC Docket No. CP06-365-000

**Applicants' Response to FERC Staff's Recommended Mitigation Measures
in the Draft Environmental Impact Statement; Request for Confidential
Treatment**

Dear Ms. Bose:

Pursuant to the Federal Energy Regulatory Commission's ("FERC" or "Commission") "Notice of Availability of the Draft Environmental Impact Statement for the Bradwood Landing Project" issued August 17, 2007, Bradwood Landing LLC and NorthernStar Energy LLC (the "Applicants") hereby submit the following materials in response to and as requested by FERC Staff's Recommended Mitigation Measures in the Draft Environmental Impact Statement ("DEIS") issued in the above-referenced dockets.

The following materials comprise this filing:

1. **Public Version:** Applicants are submitting for filing an original and 7 copies of a public version of the Applicants' Response to FERC Staff's Recommended Mitigation Measures in the Draft Environmental Impact Statement. The public version has certain privileged and confidential information redacted.

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2. **Confidential Version:** Applicants are also submitting for filing one copy of confidential version of the Applicants' Response to FERC Staff's Recommended Mitigation Measures in the Draft Environmental Impact Statement, and request that the Commission treat this material as privileged and confidential pursuant to Commission Rule 385.1112 (18 C.F.R. § 385.1112). Applicants hereby request confidential treatment of the enclosed information based on the concerns expressed by certain landowners over the personal nature of the information contained therein. This information is marked "Contains Privileged Information – Do Not Release."

The conditions and responses are summarized below. For certain responses, Applicants have enclosed additional responsive information, as noted below.

- A6-1 1. *DEIS Condition 16: Conduct a comparative analysis of the FERC's Plan and its pipeline ESC Plan and SWPPP to demonstrate that NorthernStar's plans provide equal or greater protections to the environment. If the analysis determines that specific aspects of NorthernStar's plans do not provide equal or greater protections, NorthernStar shall revise its plans to include the measures from the FERC's Plan or shall provide proposed alternative measures that would provide equal or greater protections*
Applicants' Response to Condition 16: Applicants' comparative analysis is included as "Applicants' Condition 16 Response" in the enclosed materials.
- A6-2 2. *DEIS Condition 20: NorthernStar shall revise the locations of the 10 unapproved additional temporary workspaces listed in table 4.4 1-7 of this EIS that are within 50 feet of wetlands per our Procedures (see section VI.B.1.a), or provide a better site-specific justification for situating those temporary workspaces within 50 feet of wetlands for the review and written approval of the Director of OEP.*
Applicants' Response to Condition 20: Applicants' revised locations for Additional Temporary Workspaces are included as "Applicants' Condition 20 Response" in the enclosed materials.
- A6-3 3. *DEIS Condition 21: NorthernStar shall consult with the appropriate federal and state agencies to develop a Bubble Curtain Contingency Plan that establishes a performance standard to assess whether or not bubble curtains are adequately working. The plan shall describe specific noise attenuation methods to be implemented if monitoring indicates poor noise attenuation performance*
Applicants' Response to Condition 21: Applicants' revised Bubble Curtain Contingency Plan is included as "Applicants' Condition 21 Response" in the enclosed materials.

Applicant

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- A6-1 NorthernStar's response did not provide adequate detail and, therefore, we have modified our recommendation in section 4.2.3.2 that NorthernStar should revise its pipeline ESC Plan and SWPPP to include the measures from the FERC's Plan that provide greater protections.
- A6-2 NorthernStar's response to our recommendation regarding unapproved temporary workspaces within 50 feet of wetlands has been incorporated into section 4.4.1.3.
- A6-3 Section 4.5.2.1 has been revised to include the information from NorthernStar's Bubble Curtain Contingency Plan. However, the Bubble Curtain Contingency Plan provided does not contain the information requested in the recommendation. Therefore, the recommendation has not been removed from section 4.5.2.1.

- A6-4 4. DEIS Condition 26: NorthernStar shall continue to consult with the appropriate federal and state agencies to **develop a Waterbody Mitigation Plan** that describes the specific methods of in-water habitat mitigation to be conducted
- Applicants' Response to Condition 26: The Applicants have continued to consult with federal and state agencies in the development of a Waterbody Mitigation Plan. The result of these continued consultations, Applicants' Waterbody and Wetland Construction and Mitigation Plan, is included as "Applicants' Condition 26 Response" in the enclosed materials.
- A6-5 5. DEIS Condition 30: NorthernStar shall expand the protective measures that would be used to **avoid or minimize impacts** on Steller sea lions during construction of the LNG terminal (e.g., safety, buffer, and noise impact zones) to include all pinnipeds
- Applicants' Response to Condition 30: Applicants' proposed protective measures to avoid or minimize impacts on Steller sea lions and other pinnipeds is included as "Applicants' Condition 30 Response" in the enclosed materials.
- A6-6 6. DEIS Condition 33: NorthernStar shall develop its **site-specific residential construction mitigation plans** in consultation with the affected landowners. These plans shall show the pipeline centerline; the limits of the construction work area, each residence and other structures; existing pipelines and power lines; water bodies, roads, driveways, fences, trees or other landscaping, and private wells; and the location of safety fencing that would be installed during construction
- Applicants' Response to Condition 33: Applicants' Residential Construction Conceptual Mitigation Plan is included as "Applicants' Condition 33 Response" in the enclosed materials.
- A6-7 7. DEIS Condition 38: Prior to the end of the draft EIS comment period, NorthernStar shall file with the Secretary a statement identifying the **noise mitigation measures to be implemented during HDD** activities to reduce noise levels at nearby NSAs. In addition, NorthernStar shall monitor noise during HDD activities and make all reasonable efforts to restrict noise increases from HDD operations to no more than 10 dBA above ambient noise levels if the resulting impact is above 55 dBA Ldn
- Applicants' Response to Condition 38: Applicants' HDD Noise Mitigation Measures are included as "Applicants' Condition 38 Response" in the enclosed materials.

Applicant

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- A6-4 NorthernStar has filed its Waterbody and Wetland Construction and Mitigation Procedures Plan with the FERC. Directions for accessing NorthernStar's Waterbody and Wetland Construction and Mitigation Procedures Plan via the eLibrary can be found in the response to comment FA2-17. However, agency comments on the plan have not yet been filed. Therefore, condition 26 has not been revised.
- A6-5 NorthernStar's response to our recommendation regarding protective measures to avoid or minimize impacts on pinnipeds was reviewed. However, the response does not provide the protections for pinnipeds requested in the recommendation. Therefore, the recommendation has not been removed from section 4.6.2.2.
- A6-6 Section 4.7.3.3 has been revised to include a discussion of NorthernStar's Residential Construction Conceptual Mitigation Plan.
- A6-7 Section 4.10.2.3 has been updated to include this information.

K-1151

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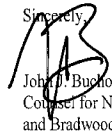
A6-8

8. DEIS Condition 39: Prior to the end of the draft EIS comment period, NorthernStar shall file with the Secretary, a statement identifying the **noise mitigation** that would be implemented for the Wauna Mill, Northwest Natural, and Williams Northwest pipeline valve sites to reduce noise at the NSAs to meet 55 dBA Ldn

Applicants' Response to Condition 39: Applicants' Valve Site Noise Mitigation Measures are included as "Applicants' Condition 39 Response" in the enclosed materials.

Please contact me at the above address if you have any questions about these materials.

Sincerely,



John P. Buchovecky
Counsel for NorthernStar Energy LLC
and Bradwood Landing LLC

cc: P. Friedman (FERC)
K. Kelley (USCG)
Karla Ellis (USACE)
Service List

Applicant

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A6-8

Section 4.10.2.3 has been updated to include this information.

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December 21, 2007

Ms. Kimberly D. Bose
Secretary
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888 First Street, N.E.
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Washington, D.C. 20426

Re: **NorthernStar Energy LLC** Docket Nos. CP06-366-000
CP06-376-000
CP06-377-000

Bradwood Landing LLC Docket No. CP06-365-000

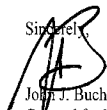
Applicants' Corrections to the Draft Environmental Impact Statement

Dear Ms. Bose:

Pursuant to the Federal Energy Regulatory Commission's ("FERC" or "Commission") "Notice of Availability of the Draft Environmental Impact Statement for the Bradwood Landing Project" issued August 17, 2007, Bradwood Landing LLC and NorthernStar Energy LLC (the "Applicants") hereby submit the original and 7 copies of the following matrix detailing a number of corrections to the FERC Draft Environmental Impact Statement issued in the above-referenced dockets.

Please contact me at the above address if you have any questions about these materials.

Sincerely,



John J. Buchovecky
Counsel for NorthernStar Energy LLC
and Bradwood Landing LLC

cc: P. Friedman (FERC)
K. Kelley (USCG)
Karla Ellis (USACE)
Service List

Applicant

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Applicants' Table of Corrections to
FERC Draft Environmental Impact Statement

Other Documentation Source	DEIS Language or Figure	DEIS Section and Page Number	Reason	Discrepancy to be corrected in FEIS
<p>A7-1 1. In Applicant-prepared BA filed in October 2006, dredging volume is stated at 700,000 cy for dredging on page 9. A cutter suction dredge would be used to remove approximately 700,000 cubic yards of material from about a 46-acre area of the 58-acre turning basin in the river (page 107)</p> <p>2. In March 2007 Conceptual Design Mitigation Plan, NSNG states "Dredging of 45.78 acres below the jurisdictional boundary of the Columbia River" is a permanent impact (page 4). On page 21 the Plan states "Turning basin dredging would affect about 58 acres of bottom habitat in 20 to 40 feet deep water."</p> <p>3. August 2007 Preliminary Design Mitigation Plan, Table 1-2, states "46 acres of bottom habitat ranges in depth from 21 to 42 feet." On page 15, we state: "Dredging of 45.78 acres for the 58-acre turning basin below the jurisdictional boundary of the Columbia River."</p> <p>4. Corps Public Notice October 2007 which is in part based on the April 2007 JPA says: "Dredging of approximately 46 acres"</p>	An additional 58 acres in the Columbia River would be dredged to create a ship maneuvering area	Executive Summary, Page ES-1	While dredging activities are typically quantified in terms of 3-dimensional units, by volume (calculated by estimating the length, width and depth of an area, and the proposed volume of 700,000 cubic yards has remained unchanged), an accompanying 2-dimensional description of the physical limits is typically provided in terms of length and width of the proposed area for dredging. Acres is an atypical way to describe dredging impacts because it's limited to 2 dimensions and doesn't account for surface variations that affect the actual estimated volume	Put construction dredging estimated footprint in the context of the larger "turning basin", "dredging of approximately 46 acres for the 58 acre turning basin is proposed associated with the terminal".

Applicant

A7-1

The text of the EIS has been modified to reflect the correct acreage to be dredged.

Bradwood Landing LLC and NorthernStar Energy LLC
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A7-2	In Oregon, temporary impacts to wetlands and waterways include up to 1.5 acres at the terminal and 75.64 acres along the pipeline	Construction of the LNG terminal facilities would result in temporary impacts on about 15 acres of wetland Construction of the pipeline facilities temporarily affect about 98 acres of wetlands	Executive Summary, ES-3	Decimal point dropped, overestimates impacts by factor of 10	August 07 Mitigation Plan, 3rd draft indicates in Oregon, temporary impacts to wetlands and waterways include up to 1.5 acres at the terminal and 75.64 acres along the pipeline.
A7-3	N/A	Bradwood Landing Project Dredge Area Figure 2.1.3-2	Description of the Proposed Action Page 2-15	Drawing shows old and outdated footprint of terminal footprint, turning basin and wharf configuration	Replace with updated terminal operational layout (correct layout is shown in Figure 2.1.3-1 of DEIS) and attached dredge layout

Applicant

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A7-2 As described in table 4.4.1-2, construction of the LNG terminal would have temporary impacts on about 14.8 acres of wetlands. Of these, 12.9 acres would be permanently impacted by operation of the LNG terminal. Therefore, we have not revised the wetland acreages impacted by the LNG terminal facilities in the Executive Summary.

A7-3 Figure 2.1.3-1 has been updated.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

NorthernStar Energy LLC	)	Docket Nos.	CP06-366-000
	)		CP06-376-000
	)		CP06-377-000
Bradwood Landing LLC	)	Docket No.	CP06-365-000

RESPONSE OF NORTHERNSTAR ENERGY LLC AND
BRADWOOD LANDING LLC TO THE FEDERAL ENERGY REGULATORY
COMMISSION STAFF'S RECOMMENDED MITIGATION MEASURE 24 IN
THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

NorthernStar Energy LLC and Bradwood Landing LLC, Applicants in the above captioned proceedings, hereby submit to the Federal Energy Regulatory Commission ("FERC" or "Commission") Applicants' supplemental comments on "Mitigation Measure 24" proposed by FERC Staff in the Draft Environmental Impact Statement ("DEIS"), issued on August 17, 2007.¹ In the DEIS, FERC Staff recommended certain mitigation measures to be included in the authorization if the Commission authorizes the proposed Bradwood Landing liquefied natural gas ("LNG") import terminal and associated sendout pipeline (the "Project"). Recommended Mitigation Measure 24 in the DEIS states:

Prior to beginning initial site preparation at the LNG terminal, NorthernStar² shall prepare a plan, for review and written approval of the Director of OEP, which outlines how NorthernStar would ensure that only LNG ships that are retrofitted to use the screened water supply system at the berth are allowed to unload cargo at the Bradwood Landing LNG terminal. The plan shall include a method for

¹ Draft Environmental Impact Statement regarding the Bradwood Landing Project under CP06-365 et al., Accession Number: 20070817-4000 (filed Aug. 17, 2007).

² The DEIS refers to Applicants collectively as "NorthernStar."

Applicant

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notifying FERC in advance of an LNG ship's initial call to the terminal and verify that it has been retrofitted to utilize NorthernStar's screened water intake system for taking on water from the Columbia River for ballast and engine cooling.³

Applicants respectfully request that FERC revise recommended Mitigation Measure 24 for the reasons set forth herein.

I. RECOMMENDED MITIGATION MEASURE 24 REFLECTS A MISUNDERSTANDING OF APPLICANTS' PROJECT AND PROPOSED MITIGATION MEASURES.

A8-1

Applicants propose to construct and operate an LNG import facility and sendout pipeline located at approximately river mile 38 on the Columbia River at Bradwood Landing in Clatsop County, Oregon. The Project will include a state of the art terminal design, including a screened intake shore-based ballast water system ("on-site water system") to avoid and minimize, to the maximum extent practical, any harm to species listed as threatened or endangered ("Listed Species"). Applicants cannot guarantee that the Project as proposed by Applicants, including the on-site water system, will be 100% effective at mitigating all impacts on Listed Species.

In contrast, FERC Staff's Recommended Mitigation Measure 24 would require Applicants to *only* accept LNG carriers that have been retrofitted to utilize the on-site water system. For the reasons discussed below, by requiring *all* LNG carriers to be able to accept the on-site water system, Mitigation Measure 24 establishes a standard that is impossible for Applicants to guarantee.

Applicants' proposal has been, and continues to be, to construct the on-site water system and to negotiate with LNG carriers to fit the LNG carriers with the equipment necessary to allow LNG carriers use of the on-site water system. The goal of Applicants'

³ Draft Environmental Impact Statement, *supra* note 1, at p. 4-145 and 5-24.

Applicant

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A8-1

Information in this comment regarding use of the on-site water system by LNG carriers, which was submitted by NorthernStar in response to a recommendation in the draft EIS, has been incorporated into sections 4.3.2.3 and 4.5.2.1. Additional analysis of the potential impacts on water quality and federally listed species associated with LNG carrier water intakes and discharges will be included in the revised BA and EFH Assessment.

A8-1
cont'd

on-site water system program is to ensure that as many LNG carriers as practicable have the ability to use the on-site water system. Over time, Applicants expect that the LNG carriers that regularly visit the Bradwood Landing terminal will routinely use the on-site water system. However, to date, there are no LNG carriers configured to accept filtered ballast and cooling water from the on-site water system. Equipping LNG carriers with this system is best done during construction. If equipping is undertaken after construction, *i.e.*, through retrofitting, such retrofitting can only be done during the dry-docking of the LNG carriers that happens only twice every five years. Applicants expect that the LNG carriers that routinely visit the Bradwood Landing terminal will be constructed or retrofitted to be compatible with the on-site water system, however, this process will take time.

Applicants have proposed, as part of the Project, to provide reasonable contract incentives to encourage equipping or retrofitting LNG carriers for compatibility, but it is not in Applicants' control to require *all* LNG carriers to retrofit. Despite these reasonable contract incentives proposed by Applicants, it is not likely that all LNG carriers making deliveries to the Bradwood Landing terminal under spot market contracts, short term contracts, or as replacement carriers to long term contracts will be equipped for the on-site water system. This is because it is likely that these spot cargoes will be diverted to the Bradwood Landing terminal from previously planned destinations at other terminals. It was never the Applicants' proposal to guarantee 100% use of the on-site water system as Mitigation Measure 24 appears to require, nor is such a guarantee possible.

Applicant

A8-1
cont'd

II. RECOMMENDED MITIGATION MEASURE 24 DOES NOT BEAR A RATIONAL RELATIONSHIP TO THE PROJECT

Mitigation Measure 24, as proposed in the DEIS, reflects a misunderstanding of Applicants' Project proposal, and establishes (or at a minimum implies) a requirement of usage of the on-site water system by 100% of the LNG carriers arriving at the Bradwood Landing terminal. For the reasons stated above, this mitigation condition would be impractical because it could never be satisfied, and as such it was not nor rationally could have been proposed by Applicants. Indeed, Applicants believe that the lack of a logical relationship between recommended Mitigation Measure 24 and the Applicants' Project proposal could place such a condition at risk of being deemed arbitrary and capricious under the Administrative Procedure Act.⁴ In addition, there is a question as to whether the Commission could ultimately require such modifications in light of international treaties.⁵ Recommended Mitigation Measure 24, therefore, is neither desirable from an agency perspective, nor is it necessary to ensure mitigation of Project impacts on Listed

⁴ See *Missouri Pub. Serv. Comm'n v. FERC*, 337 F.3d 1066 (D.C. Cir. 2003) (rejecting the Commission's approval of initial rates as both arbitrary and unsupported by substantial evidence); *Great Lakes Transmission Ltd. P'ship v. FERC*, 984 F.2d 426, 432–34 (D.C. Cir. 1993) (finding a condition included in a certificate authorizing expansion of a pipeline unreasonable because the Commission did not provide a full and rational explanation supporting the condition); *Ozark Gas Transmission Sys. v. FERC*, 897 F.2d 548, 551–53 (D.C. Cir. 1990) (rejecting a condition attached to a blanket certificate authorization because the condition was patently unreasonable). The Court found that the condition made it impossible for Ozark to compete in the market and that the Commission "had used a sledgehammer to accomplish [its objective], instead of an instrument suitable to the purpose." *Id.* at 552.

⁵ Federal agencies, in this instance FERC, do not have the authority to mandate that foreign-flagged vessels be retrofitted, and similarly, the agency's authority to condition Applicant's project on this basis may also be in question. International treaties governing the design, equipment, and construction of vessels specifically require the signatory state to honor certificates of compliance issued by foreign states. U.S. courts have recognized the need for consistency and reciprocity regarding international agreements, particularly in regard to foreign-flag vessels. See, e.g., *Ray v. Atlantic Richfield Co.*, 435 U.S. 151 (1978); *U.S. v. Locke*, 529 U.S. 89, 110–12 (2000).

Applicant

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A8-1
cont'd

Species. As discussed below, Applicants have proposed an innovative and sound approach to the protection of listed salmon.

III. APPLICANTS' PROPOSED ON-SITE WATER SYSTEM COUPLED WITH THE PERFORMANCE STANDARDS ARE PROTECTIVE OF LISTED SALMON.

In order to bolster the mitigation potential of Applicants' on-site water system and corresponding LNG carrier fit-out program, Applicants have proposed that two performance standards would be applicable to the Project. Applicants' performance standard proposals would be an innovation in LNG terminal operations and habitat protection, but they derive from the performance-based approach to salmon habitat protection followed by NOAA Fisheries in the Federal Columbia River Power System remand proceedings.⁶ The performance standards will specify: (i) that all cooling water discharges from LNG carriers at the wharf will meet the proposed temperature performance standard; and (ii) a performance standard for entrainment of Listed Species. Both performance standards will have a monitoring component. Applicants will include these performance standards in their Applicant-Prepared Biological Assessment to be submitted to the Commission at the end of May 2008.

As noted above, Applicants have designed this performance standard approach following the NOAA Fisheries' approach in the Federal Columbia River Power System remand process. Applicants agree with NOAA Fisheries that performance standards can provide the necessary certainty to ensure protection of the species and to address the

⁶ NOAA's National Marine Fisheries Service, Endangered Species Act - Section 7 Consultation Biological Opinion - Remand Draft, Consultation on Remand for Operation of the Federal Columbia River Power System, F/NWR/2005/05883 (Oct. 30, 2007) (revised and reissued pursuant to court order, *Nat'l Wildlife Fed'n v. NMFS*, Civ. No. CV 01-640-RE (D. Or. 2001)), <http://www.nwr.noaa.gov/Salmon-Hydropower/Columbia-Snake-Basin/Draft-BOs.cfm>.

A8-1
cont'd

recent holding by the U.S. Court of Appeals for the Ninth Circuit that an applicant's proposal must be reasonably certain to occur and must therefore be within the applicant's control.⁷ Applicants' on-site water system coupled with performance standards will provide protection for the listed salmon and satisfy the "reasonably certain to occur" standard as interpreted by the courts.

IV. RECOMMENDED MITIGATION MEASURE 24 IS PREMATURE

Applicants recognize that the Commission has a responsibility to fulfill under the National Environmental Policy Act ("NEPA") and are not suggesting that the Commission in any way abdicate this responsibility. However, the issue of listed salmon protection and the benefits of the on-site water system are being addressed as part of the consultation process with NOAA Fisheries pursuant to Section 7 of the Endangered Species Act.⁸ NOAA Fisheries consultation with FERC will conclude with the issuance of a Biological Opinion by NOAA Fisheries describing the effects of the proposed action on Listed Species or their critical habitat and determining whether the proposed action would cause jeopardy to the species or harm to their critical habitat.⁹ NOAA Fisheries may conclude no jeopardy and include reasonable and prudent measures. If the Biological Opinion finds that the proposed project may jeopardize the species or

⁷ *National Wildlife Federation v. NMFS*, 481 F.3d 1224 (9th Cir. 2007)(The Ninth Circuit upheld the invalidation of NMFS' 2004 Biological Opinion for the Federal Columbia River Power System, stating that NMFS' failure to ensure that certain proposed mitigation measures, including promises to implement removable spillway weirs, were conditioned on availability of Congressional appropriations).

⁸ 16 U.S.C. § 1536 (2007).

⁹ 16 U.S.C. § 1536(b)(3)(A).

Applicant

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A8-1
cont'd

adversely modify their habitat, NOAA Fisheries must work with the Applicant and FERC to develop a “reasonable and prudent alternative” to avoid jeopardy.¹⁰

NOAA Fisheries has not yet issued its Biological Opinion containing its analysis of the potential threat to Listed Species and any necessary “reasonable and prudent alternatives,” thus it is premature for FERC to establish a requirement that 100% of the LNG carriers servicing the Bradwood Landing terminal be equipped for use with the on-site water system. NOAA Fisheries’ Biological Opinion may recognize different risks to species resulting from the Project than those identified by FERC and/or may identify reasonable and prudent measures and/or reasonable and prudent alternatives necessary to avoid these risks entirely different than or incompatible with those identified by FERC.

While Applicants acknowledge that it is generally true that FERC is not bound to follow the recommendations of a Biological Opinion,¹¹ in the context of threatened or endangered species and an incidental take statement, both Commission and U.S. Supreme Court precedent recognize that it is prudent for FERC to defer to the conclusions of the agency principally charged with administering the ESA—NOAA Fisheries in the present case.¹²

For example, in *Pacific Gas and Electric Co.* (Potter Valley Project), the Commission in the Final Environmental Impact Statement (“FEIS”) disagreed with

¹⁰ *Id.*

¹¹ *Pacific Gas and Electric Co.*, 107 FERC ¶ 61,232, at P 16 (“PG&E is correct that the law does not require the Commission to adopt a reasonable and prudent alternative or the RPMs [reasonable and prudent measures] which implement the incidental take statement.”).

¹² See *Bennett v. Spear*, 520 U.S. 154, 169 (1997) (“[W]hile the Service’s Biological Opinion theoretically serves an ‘advisory function,’ in reality it has a powerful coercive effect on the action agency.”); *City of Tacoma, Wash.*, 110 FERC ¶ 61,239, P 7, n.4 (2005); *Pacific Gas and Electric Co.*, 106 FERC ¶ 61,065, order on reh’g, 107 FERC ¶ 61,232 (2004).

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NOAA Fisheries' Biological Opinion with respect to what operational and physical modifications to the project were required to benefit federally-threatened salmonids, "but concluded that in light of NOAA Fisheries' status as the agency principally charged with administering the ESA with respect to anadromous fishes, and the essentially mandatory nature of an incidental take statement, the Commission has no real choice but to amend the license consistent with the Biological Opinion."¹³ Similarly, because NOAA Fisheries is the agency principally charged with administering the ESA with respect to the Listed Species in the Columbia River, the Commission should not make any final decisions about appropriate mitigation requirements until NOAA Fisheries, the agency that has the relevant expertise, has the opportunity to fully evaluate the Project and advise what measures it feels are necessary to protect listed salmon. Mitigation Measure 24, as proposed in the DEIS, is premature because it proposes a standard that cannot be met, before any input from the resource agencies with relevant expertise is even presented.

In addition to being appropriate,¹⁴ reasoned deference to the Biological Opinion is prudent from an administrative perspective because an agency that deviates from a Biological Opinion bears a dual burden of "articulating in its administrative record its reasons for disagreeing with the conclusions of a biological opinion"¹⁵ and establishing that its actions will not result in jeopardy and will adequately protect Listed Species.¹⁶

The Commission and the U.S. Supreme Court both recognize that an action agency (FERC, in the instant case) that disregards an incidental take statement does so at

¹³ 107 FERC ¶ 61,223 at P 9.

¹⁴ *Id.* at P 21 ("It is appropriate for an agency to show reasoned deference to the ESA agencies with regard to the interpretation of their Joint Regulations and documents associated therewith.").

¹⁵ *Bennett*, 520 U.S. at 169 (citing 51 Fed. Reg. 19,956 (1986)).

¹⁶ 107 FERC ¶ 61,223 at P 16.

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its own peril because any person who knowingly takes an endangered or threatened species is subject to substantial civil and criminal penalties, including imprisonment.¹⁷ Therefore, rather than setting the stage for an inconsistent result with NOAA Fisheries, the prudent course of action is to defer establishment of any FERC mitigation condition until NOAA Fisheries proposes the measures it believes are required to ensure that sufficient protections for listed salmon are implemented by Applicants.

V. RECOMMENDED MITIGATION MEASURE 24 SHOULD BE MODIFIED BEFORE ISSUANCE OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT OR INCORPORATION INTO THE COMMISSION'S AUTHORIZATION

For the reasons stated above, Applicants respectfully request that FERC modify Mitigation Measure 24, as proposed in the DEIS, before issuance of the FEIS and incorporation thereof in any authorization by the Commission for the Project. Applicants propose the following substitute for recommended Mitigation Measure 24:

24. Prior to the issuance of a Biological Opinion by NOAA Fisheries, NorthernStar shall consult informally with NOAA Fisheries, as appropriate, in the development of proposed measures for mitigation of impacts on federally listed endangered species. After issuance of a Biological Opinion and prior to operation of the LNG terminal, NorthernStar shall prepare a plan, for review and written approval of the Director of OEP, setting forth the mitigation measures it intends to take with respect to the Biological Opinion. At the same time, copies of the plan shall be served upon the agencies consulted. NorthernStar shall allow a minimum of 30 days for the consulted agencies to comment on the plan.

After issuance of a Biological Opinion and prior to operation of the LNG terminal, NorthernStar shall file for the review and written approval of the Director of OEP a copy of a monitoring plan. At the same time, copies of the monitoring plan and schedule shall be served upon the agencies consulted. NorthernStar shall allow a minimum of 30 days for the consulted agencies to comment on the plan. Any written comments on the

¹⁷ 107 FERC ¶ 61,223 at P 16; *Bennett*, 520 U.S. 154, 170.

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monitoring plan received by NorthernStar from the consulted agencies shall be filed with the Commission.

If based on the results of the monitoring, NorthernStar determines that changes in project structures are necessary to protect the relevant federally listed endangered species covered by the consultation, then NorthernStar shall submit a schedule to the Commission for approval for implementing the specific changes in project structures. At the same time, copies of the schedule shall be served upon the agencies consulted.

The Commission reserves the right to require modification of any plans or schedules.

Applicants' proposed Mitigation Measure, above, allows for NOAA Fisheries substantive input on protective measures for listed salmon, reasonable evaluation of Applicants' proposed performance standard proposal, and full FERC oversight of all applicant-proposed mitigation measures. It also avoids the administrative and procedural deficiencies that may result from Mitigation Measure 24 as proposed in the DEIS.

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VI. CONCLUSION

Wherefore, the Applicants respectfully request that the Commission modify recommended Mitigation Measure 24 as requested herein, and takes such other actions as may be consistent with this submission.

Respectfully submitted,



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April 8, 2008

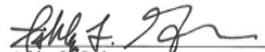
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CERTIFICATE OF SERVICE

I hereby certify that I have this day caused a copy of the foregoing document to be served upon each person designated on the official service list compiled by the Federal Energy Regulatory Commission in these proceedings.

Dated this 8th day of April 2008.


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The Northeastern Pacific Ocean has been further defined in section 4.6.1.3 as the area off the coasts of Oregon and Washington. The complete list of marine mammals with potential to be found off the coasts of Oregon and Washington has been added to section 4.6.1.3. The list was determined using the most recent versions of both the U.S. Pacific Marine Mammal Stock Report and the Alaska Marine Mammal Stock Report (NOAA Technical Memo.). State and federally listed species, and those which are most likely to be impacted by the proposed project, based on correspondence with the NMFS, have been further discussed in section 4.6.

Bradwood Landing LLC and NorthernStar Energy LLC
FERC Docket Nos. CP06-365-000, et al.

**NorthernStar Natural Gas
Bradwood Landing**

4/23/2008

This is the entire list of Species from the Table of Contents from Caretta et al. 2007.
This does not include Angliss and Outlaw's list of species except for the sea otter,
north pacific right whale, and gray whale.

PINNIPEDS	DEIS Discusses	Comments
1. California Sea Lion	Yes	
2. Harbor Seal	Yes	
3. Northern Elephant Seal	briefly	
4. Guadalupe Fur Seal	No	not likely off WA/OR based on distribution discussed in Caretta
5. Northern Fur Seal	briefly	
6. Hawaiian Monk Seal	No	not likely off WA/OR based on distribution discussed in Caretta
7. Steller Sea Lion	Yes	
1. Sea Otter (not in Caretta, but in Angliss and Outlaw)	briefly	brief sentences added, perhaps put in species considered but removed from further analysis?
CETACEANS		
Baleen:		
1. Humpback Whale	Yes	
2. Blue Whale	Yes	
3. Fin Whale	Yes	
4. Sei Whale	Yes	
5. North Pacific Right (not in Caretta, but in Angliss and Outlaw)	Yes	This whale is NOT common off WA. Last sighting was 13 years ago. This will appear in updated species presence text.
6. Gray Whale (Not in Caretta, but in Angliss and Outlaw)	Yes	
Toothed whales, dolphins, and porpoises:		
1. Harbor Porpoise	No	likely off WA and OR
2. Dall's Porpoise	No	likely off WA and OR
3. Pacific White Sided Dolphin	No	
4. Risso's Dolphin	No	
5. Bottlenose Dolphin	No	
6. Striped Dolphin	No	
7. Short-Beaked Common Dolphin	No	
8. Long-Beaked Common Dolphin	No	
9. Northern Right-Whale Dolphin	No	likely off WA and OR
10. Killer Whale (toothed whale)	Yes	discuss resident only, not transient which are frequently present off Columbia mouth
11. Short-Finned Pilot Whale	No	
12. Baird's Beaked Whale	No	
13. Mesoplodont Beaked Whales	No	
14. Cuvier's Beaked Whale	No	
15. Pygmy Sperm Whale	No	
16. Dwarf Sperm Whale	No	
17. Sperm Whale (toothed whale)	Yes	
18. Bryde's Whale	No	
19. Minke Whale	No	

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